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CHEMICAL ABSTRACTS

Vol. 9.

JUNE 10, 1915.

No. 11.

I. APPARATUS.

L. C. JONES.

Some notes on easy and accurate work with pipets. GEORG TH. PANOPULOS. Berlin. *Chem. Ztg.* 39, 248(1915).—Manipulation of graduated pipets is made easier by attaching a short piece of soft rubber tubing to the top, a short piece of glass tubing being in the other end of the rubber and a glass ball between. By squeezing the tubing at the ball air is admitted and the flow regulated.

J. H. MOORE.

Modified Jannasch bromine apparatus. V. ZARVNY. *Z. anal. Chem.* 54, 159-61 (1915); see fig.—All connections, except last, are of ground glass. Three Fresenius flasks are used for evolution of the Br₂ for the O-HCl gas. App. was devised for use in the analysis of tetrahedrite and arsenopyrite.



F. W. SMITHER.

A new aspirator. HENRI VIGREUX. *Bull. soc. chim.* 17, 41-3(1915).—The app. described is already in quite common use but has one modification. Air under moderate pressure for blast lamp work, etc., may be obtained by passing the discharge from a filter pump into a Wolff bottle from which the outflow may be regulated by a pinch cock. A screw set in the side of the pump may be advanced into the direct stream of water where it enters the air chamber inside the pump to spread the stream and cause it to carry more air. By regulating the screw the app. may be adjusted to various water pressures. It is claimed that the app. will give 600 liters of air per hr. at a pressure of 9 cm. Hg with water pressure of 28 m. The app. may be obtained from M. Leune, 28bis rue Cardinal-Lemoine, Paris. F. A. HARVEY.

The tapalog, a new multiple record pyrometer recorder. ANON. *Mel. Chem. Eng.* 13, 260-1(1915).—A multi-colored typewriter ribbon distinguishes between the different couples connected to the instrument. The record is 5 1/4 in. wide and advances 1 in. per hr. The paper used is suitable for blueprinting. Advantages claimed are ease of renewing paper and of changing the number of records taken at one time; rectilinear coördinates; points recorded every 12 sec.; slight mechanical work for the clock, dust-proof construction, and Pt-Rh elec. contacts throughout. Also in *Elec. World* 65, 871(1915).

W. L. BADGER.

Explanation of the calculation of the thickness of the walls of cylindrical copper steam and pressure vessels with internal over-pressure. ERNST GOLZ. *Chem. App.* 2, 73-5(1915).—A discussion of the formula, with quotations from official rulings.

J. H. MOORE.

Tests of vacuum pumps. P. Q. WILLIAMS. *Practical Eng.* 19, 390(1915).

C. G. F.

A brief history of the thermometer. W. S. ATCHISON. *Power* 41, 575(1915).

C. G. F.

A new hydrometer of total immersion with electromagnetic compensation. ANDERS ANGSTRÖM. Borno Station, Sweden. *Phys. Rev.* 5, 249-52(1915).—The app. consists of a glass tube, about 4 cm. in diam., with a coil of wire about 12 cm. long

wound around its lower half. The tube is constricted to a stopcock at the bottom. The float is drawn out into a narrow tube that contains a rod of soft iron 4 cm. long and 2 mm. in diam. The float is counterbalanced and held to the limiting point by means of Pt spirals of known wt. and then the current in the coil increased until the float is pulled down to a definite distance from the coil. This position is one of stable equil. provided the float is not brought too close to the coil. The most sensitive position occurs just before unstable equil. is reached. Marks etched on the tube and float show the proper position. Calibration is effected by filling the tube with liquids of known sp. gr., making a rough adjustment with the Pt spirals, and fine adjustment with current in the coil. The app. has been used to det. sp. gr. of sea water. With the aid of a current between 0 and 75 milliamperes the range of variation of the soln. which may be detd. by the current was about 2 per mil. The mean deviation of a set of observations was less than 0.01% of salinity.

F. A. HARVEY.

New crystal-grinding goniometer. F. E. WRIGHT. *J. Wash. Acad.* 5, 35-41 (1913).—Details are given of a new grinding goniometer with which crystal faces can be ground with a precision of 1' or greater, and flat within a wave length of light; plane-parallel crystal plates can also be ground normal to any given optical direction, as an ellipsoidal axis (α , β , or γ) or an optic axis. The instrument is based on the theodolite principle, but it is essentially different in design and construction from earlier types; certain features of the Goldschmidt design have, however, been incorporated in it.

F. W. SMITHER.

U. S., 1,135,002, Apr. 13. G. M. ELLIS. **Acetylene generator.**

U. S., 1,136,108, Apr. 20. R. W. CURTIS. **Buret with a glass stopcock and an adjustable stop for regulating the maximum opening of the stopcock.**

U. S., 1,136,227, Apr. 20. L. GOLDBERG. **Apparatus for generating ozone.**

Brit., 28,345, Dec. 9, 1913. I. HALL. **Construction of a device for agitating and mixing molten material in melting furnaces.** Cf. *C. A.* 9, 594.

Brit., 28,496, Dec. 10, 1913. L. V. MASONI. **A protective jacket and safety discharge fittings for storage receptacles for inflammable liquids.**

Brit., 28,609, Dec. 11, 1913. R. FRIGNOUX. **A phial for serum and like substances** comprizes a sealed tube *a* drawn out at the ends to form finely bored extensions *b*, and *c*, the end *c* being bent to lie along the side of the tube. In use, both ends are nipped off, and the needle of an hypodermic syringe inserted in the end *c*. The bore of the part *c* is so fine as to prevent air hubbles from passing in the reverse direction as the contents are drawn off.



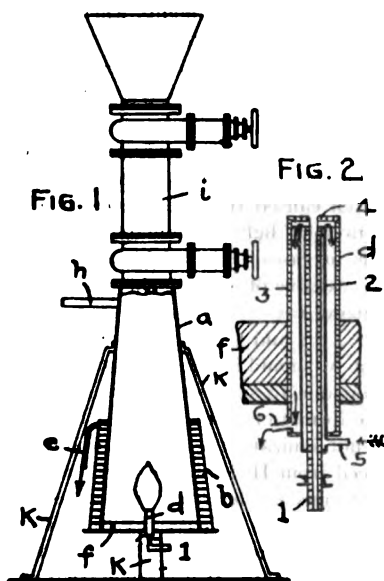
Brit., 28,988, Dec. 16, 1913. W. J. COOPER. **An oxy-acetylene, oxy-hydrogen, or like burner for welding, cutting, or for search-light purposes,** comprizes a rotatable plug valve, for simultaneously controlling both gas supplies, which is provided with a mixing passage, an axial exit passage and transverse inlet passages adapted to communicate with the transverse supply passages in the plug socket for O and C_2H_2 , etc.

Brit., 29,094, Dec. 17, 1913. H. R. WEBSTER. **In gas-testing apparatus** working on the diffusion principle, the indicating or recording parts are mounted in a frame or casing, which can be moved towards or away from the pressure-recording diaphragm of the diffusion chamber, so as to adjust the indicating or recording part to zero. Cf. *C. A.* 9, 1242.

Brit., 29,184, Dec. 18, 1913. W. REID. An arrangement for clarifying liquids containing suspended matter, such as H_2O containing coal dust, comprizes a series of open troughs of inverted triangular section, within each of which a vertical or substantially vertical partition extends from above the top of the trough downwards, a space being left between its lower edge and the bottom of the trough. The troughs are assembled side by side with their abutting edges making joints and with partitions closing their ends and extending above their level. A wide shallow stream of the liquid enters from a launder, and the deposit is fed by worm conveyors in the troughs to an endless band discharging over a lip on an inclined part. The worm shafts pass unpacked through an inner wall and carry sprocket-wheels for a driving-chain within a recess. Alternatively, worm conveyers in the troughs may push the material directly into the inclined exit with or without the addition of an inclined worm conveyer; or a series of parallel band conveyers may be used instead of the worms. A suction pipe or other means may also be used for removing the deposit.

Ger., 280,968, Sept. 25, 1913. SOC. ANON. POUR L'IND. CHIM. A BAIE. Furnace for producing pure carbon monoxide from O and C, comprizing a centrally placed, narrow

H_2O -cooled Fe nozzle *d* for introducing O into a H_2O -cooled furnace which is charged with coal. Fig. 1 shows the furnace in cross-section. Fig. 2 is an enlarged cross-section of *d*. In Fig. 1, *a* is the Fe casing of the generator, *b* the water-jacket around the lower portion, and *f* is the bottom plate, composed of an Fe plate covered with fire-brick. This bottom plate may be double-walled and H_2O -cooled, or *d* may be lengthened and the bottom plate single-walled. The gas generated escapes through the tube *h*. Through the double-valve charging device *i* the carbonaceous material may be charged during the operation. The base of the furnace is constructed to permit removal of *f*. The O is fed to the nozzle (Fig. 2) through the tube, and through the narrow opening of the removable cap 4 into the furnace. The cooling tube 2 terminates directly under 4. Cooling H_2O enters at 5 and passes, as indicated by arrows, through the nozzle and out at 6 from the tube 3.



2. GENERAL AND PHYSICAL CHEMISTRY.

WILLIAM D. HARKINS.

Assistants: E. B. MILLARD and A. B. CARTER.

Wilhelm Hittorf. ALFRED CORHN. *Naturwissenschaften* 3, 41-3(1915).—Bio-graphical. C. G. F.

W. Sackur. ANON. *Elektrotechn. Z.* 36, 11(1915).—Died Dec. 17, 1914.

C. G. F.

Theory of chemical reaction and reactivity. E. C. C. BALY. Univ. Liverpool. *J. Am. Chem. Soc.* 37, 979-93(1915).—When 2 atoms approach one another sufficiently closely, the force lines due to their respective fields will condense with loss of energy,

establishing a potential gradient. If this gradient be sufficiently steep, a transfer of one or more electrons will take place, and a true chem. compd. will be formed. The general stability of the compd. will depend upon the condensed force field between the atoms of which it is composed. If the fields of 2 mols. are of opposite types, the force lines of the two will condense, with the formation of an addition compd., perhaps followed by the formation of a true chem. compd. by the exchange of electrons if the gradient is sharp enough. Thus HX and YOH (un-ionized) may unite to form HX.-YOH, then rearrange to XY.H₂O, a system contg. less energy than the system HX.-YOH. If the force lines of 2 mols. form completely closed systems, no reaction will occur between them until the fields are opened up, as for example, by the mols. of a solvent. HCl and NH₃ form closed systems, and so do not react until the fields are opened by H₂O. H₂O possesses a "balance of uncompensated force lines," which accounts for its power of forming hydrates and addition compds. Aq. solns. of Hg(CN)₂ and KI are each diactinic to all rays of light above $1/\lambda = 5000$; therefore their absorption bands lie at shorter wave lengths. A moist mixt. of the 2 salts was exposed to light from a H vacuum tube through a fluorite window, and HgI₂ was formed in small amts. at the points where the light fell. This furnishes evidence that an equil. has been set up between the opened and unopened fields in the dissolved mols. The selective absorption increases the number of "opened" mols., and shifts the equil. to the reactive side. Allotropy, magnetic rotation, stereoisomerism, etc., are mentioned.

E. B. MILLARD.

Atoms and ions. J. J. THOMSON. *Engineering* 99, 251-2, 277-8, 303-4(1915).—The presence of ions in air was shown by means of a Zeleny electroscope. A lighted match caused the electroscope to discharge. Air blown over Po, Röntgen radiation, ultraviolet light, Schumann light, and the radiations from hot metals also produced ions in gases. Light which passed through a fluorite window into a discharge tube was capable of ionizing the gas within it, but a quartz plate stopped the passage of the ionizing rays. Hg vapor required an amt. of energy for ionization equiv. to 4.9 v., N 7.5 v., and O 9 v.; the inert gases were more difficult to ionize. A wave length of 2536 Å. should ionize Hg, but to ionize N the light must be shorter than 1600. Quartz is opaque to such short waves, but fluorite may be used for waves as short as 1200. The formation of ions by splashing was discussed. It was not possible to say whether or not ionization was ever produced by chem action. The electrification of H produced from HCl and Zn was possibly caused by the bubbling of the gas through the H₂O, since no electrified H was produced from Zn powder and gaseous HCl. The oxidation of NO by air gave rise to no ions, as shown by directing the stream of NO on the electroscope terminals. Tubes contg. Rb or Na-K alloy liberate electricity under the action of light. It was calcd. that at 2000° 1 particle in every 74000 of gas should be ionized, and at 0° only 1 in 10²⁸, i. e., a single ion per liter of gas. E. B. MILLARD.

Revision of the atomic weight of lead. Analysis of lead bromide. G. P. BAXTER AND T. THORVALDSON. *J. Am. Chem. Soc.* 37, 1020-7(1915); see C. A. 9, 984.

E. B. MILLARD.

Revision of the atomic weight of lead. Analysis of lead bromide and chloride. G. P. BAXTER AND F. L. GROVER. *J. Am. Chem. Soc.* 37, 1027-61(1915); see C. A. 9, 984.

E. B. MILLARD.

The atomic weight of copper by electrolysis. ALBERT G. SHRIMPTON. Paddington Tech. Inst. *Proc. Phys. Soc. London* 26, 292-312(1914).—Four Cu and 2 Ag voltameters were operated in series. The areas of the 4 Cu cathodes varied from 10 to 50 sq. cm. To eliminate the loss in wt. by soln., the wts. of the Cu deposits were plotted against corresponding cathode areas and the corrected wt. was obtained by extrapolating this curve to zero area. The at. wt. of Cu = (107.88' × 2 × corrected

wt. Cu)/(mean wt. Ag). Mean of 10 detns. = 63.563 ± 0.003 mean error. Several points are noted in regard to obtaining coherent deposits, and in regard to proper current densities.

PAUL D. FOOTE.

Theory and use of the molecular gage. SAUL DUSHMAN. *Phys. Rev.* [2] 5, 212-29(1915); cf. Langmuir, *Phys. Rev.* [2] 1, 337(1913).—A theoretical consideration of the behavior of gases at very low pressures shows that a rotating disc exerts a torque on a disc suspended above it that is proportional to the quantity $\Sigma p(M/RT)^{1/2}$, where p denotes the partial pressure and M the mol. wt. of each constituent of the gas present and R and T have the usual significance. To obtain the best results with a Gaede mol. pump it is necessary not only to heat the vessel to be exhausted and the connecting tubing to a temp. at which most of the moisture adsorbed in the walls is driven out, but also to insert a liquid air trap to prevent the back diffusion of condensable vapors. A vacuum gage is described, together with the results of some measurements carried out with it.

E. B. MILLARD.

Cyclic evolution of the chemical elements. F. H. LORING. *Chem. News* 111, 157-9(1915); cf. *C. A.* 8, 864, 1689, 1698, 1894, 1909.—Assuming Crookes' hypothesis of the evolution of the elements (*C. A.* 9, 752), L. presents an argument in favor of representing the evolution of the elements by means of a cyclic diagram similar to a hysteresis loop with internal complications, indicating changes in magnetism when the magnetizing force is periodically withdrawn and re-applied during its general progressive variation. Such a figure is essentially an energy cycle, thus keeping in the foreground the idea of work being performed in the process. It is assumed that elements can be formed when there are time breaks or "rests" in the continuity or activity of energy flow, in the sense that when the impelling or accelerating force is withdrawn or re-applied a new phenomenon asserts itself, as if the stored or impressed energy had creative power to form certain elements. This idea is expanded in the text.

E. B. MILLARD.

Determination of Avogadro's constant N from measurements of the Brownian movements of small oil drops suspended in air. HARVEY FLETCHER. *Phys. Rev.* [2] 4, 440-53(1914); cf. *C. A.* 6, 324.—Equations are derived from which N may be detd. from observable quantities. The expts. were made in a Millikan app. similar to that used in the previous expts. (*Phys. Rev.* [2] 1, 218(1913)), with some modification. The value found was $N = (60.3 \pm 1.2) \times 10^{23}$, which differs but 0.5% from the value found by Millikan, namely 60.62×10^{23} .

E. B. MILLARD.

Atomic numbers and atomic charges. FERNANDO SANFORD. *Phys. Rev.* [2] 5, 152-8(1915); cf. *C. A.* 8, 1700.—The at. charges increase as a straight line function of the at. number for the monovalent ions, but the curve for bivalent ions departs from a straight line on the low at. wt. end. Properties such as cohesion depend quant. upon the at. charges, but the magnitude of cohesion increases with increase of negative at. charge, and decreases with increase of at. charge. The m. ps. of the alkali metals may be calcd. from their at. no.; also from the relation $(N + 3)(T - 275) = 1.497$, where N is Rydberg's at. no., and T is the abs. m. p. A similar relation may be shown for many groups or closely related elements, but while within a given group the m. p. is higher the more electronegative the element, the m. p. may either increase or decrease with the at. no., as was shown in figures. Examples of increase of m. p. with increase in at. no., may be found in the groups Fe, Ru, Os; Ni, Pd, Pt; Co, Rh, Ir. With each set of triplets from which the above elements are taken, on the contrary, the m. p. decreases with increase in the at. no.

E. B. MILLARD.

Formula for calculating atomic weights. A. W. WARRINGTON. Chengtu, China. *Chem. News* 111, 110(1915).—Assuming only 85 elements between He and U, the

approx. at. wt. may be calcd. from the formula $x = -1 + 2Y + 0.008Y^2$, where x is the at. wt. and Y is the no. of the element. E. B. MILLARD.

Viscosity of iodine vapor. A. O. RANKINE. London. *Proc. Roy. Soc. London* (A) 91, 201-8(1915).—The method used for Br vapor (C. A. 7, 3876) was modified so that the I was weighed after transpiration through a capillary of known dimensions immersed in an oil bath of const. temp. The results were calcd. from the formula $\eta = (\pi R^4/16l) (p_1^2 - p_2^2)/p_0 m (d_0 T_0/T)$, where η is the coeff. of viscosity, R the radius and l the length of the capillary tube, p_1 and p_2 the pressures of entry and exit, m the mass transpired in the time t , d_0 the density of the gas at the pressure p_0 and temp. T_0 , and T the abs. temp. of the gas during transpiration. The same tube was used as in C. A. 7, 3876, having the value $1/R^4 = 3.763 \times 10^{-8} \text{ cm.}^{-4}$ at 13° . At $124^\circ \eta \times 10^4$ was 1.84, at 170° it was 2.04, at 205.5° 2.20, and at 247.1° it was 2.40. These values agree well with those calcd. from Sutherland's formula $\eta = KT^{1/2}/(1 + C/T)$, where C is a const., 590, and K is another const. E. B. MILLARD.

Vapor pressure of iodine between 50 and 95° . G. P. BAXTER AND M. R. GROSE. Cambridge, Mass. *J. Am. Chem. Soc.* 37, 1061-72(1915); cf. *ibid* 29, 127(1907).—A measured vol. of air, usually 5 to 7 liters, was passed over I, then into Na_2CO_3 soln. to absorb the I. This was then reduced with hydrazine and the iodide pptd. with pure AgNO_3 . Values were given for every 5° over the range covered, with 3 to 10 expts. for every temp. The results were lower than those of Wiedermann, Stelzner and Niederschulte (*Verh. deut. physik. Ges.* 3, 159(1905)), but formed a satisfactory extension of the earlier Harvard expts. for temps. below 50° . The results may be expressed very closely by either of the formulas: $\log p = -106.3930 + 46.611 \log T - 0.031677T$, or $\log p = 9.7522 - 2863.54(T - 19)$. The av. mol. heat of sublimation at these temps. was calcd. to be 14,700 cal., or 61.6 kilojoules. E. B. MILLARD.

Carbon molecule. F. DELLA-GROCE. *Mon. sci.* [5] 5, 25-7(1915).—The d. of a gaseous compd. is never less than the mean of the ds. of its gaseous components. Then the d. of C vapor may be calcd. from that of O_2 and CO; $x/2 + 1.10523/2 = 0.9670$, whence $x = 0.8287$. From this the ds. of various C. compds. have been calcd. and found to agree with exptl. values. Hence the vapor is C_2 , or the mol. wt. is 23.85. It was assumed that the formation of CO was from 1 mol. of O with one of C. E. B. MILLARD.

Crystallization processes in ternary systems of chlorides of univalent and divalent metals. T. LIEBISCH. *Sitzb. kgl. preuss. Akad.* 1915, 160-76; cf. C. A. 8, 3143.—Consideration of systems of 3 components A, B, and C, from which a binary compd. A_xB_y , seps. Figures and projections of space diagrams are given; together with conc.-temp. diagrams and a theoretical treatment which cannot be briefly abstracted. E. B. MILLARD.

Experiments on emulsions: Adsorption of soap in the benzene-water interface. T. R. BRIGGS. *J. Phys. Chem.* 19, 210-31(1915).—Condensation of solute in the surface segg. liquid from vapor or liquid from liquid is to be considered as a special case of adsorption. Na oleate was removed from solns. of different strengths during the process of emulsifying C_6H_6 and the amt. of this removal depended on the strength of the soap soln. and the specific surface of the C_6H_6 phase. The amt. of soap removed increased rapidly at first with small increases in conc. of the soln. then remained nearly const., showing a strong similarity to adsorption. Further work is to be done. E. B. MILLARD.

The quantitative determination of the precipitation value of hydrosols. O. HAUSER AND A. LEWITE. Berlin. *Kolloid-Z.* 16, 33-6(1915); cf. Freundlich, C. A. 4, 2764; 7, 723.—The pptn. value of different electrolytes, and varying concs. of each was detd.

by dropping the electrolyte soln. from a buret into a measured amt. of tannic acid hydrosol and stopping at the point at which a flocculent ppt. settles out rapidly, leaving a clear supernatant liquid, instead of the cloudy appearance which is maintained up to that point. With equivalent ions the pptn. power is approx. proportional to the mobility of the cation. This is preferable to the Freundlich method of adding a fixed amt. of electrolyte soln. of varying concs., allowing to stand 2 hrs. and choosing that conc. which just gives complete pptn. as the significant value, since it takes account of the speed of coagulation as well as the conc. of the electrolyte, in characterizing the electrolyte. Tables and figures show that as the conc. of the electrolyte soln. decreases there is not a proportional increase in the quantity of soln. required, so that pptn. is accomplished by less salt if in dil. soln. than in conc. up to a certain diln. beyond which pptn. cannot be accomplished.

H. I. MATTILL.

Observations on the work by O. Hauser and A. Lewite. (Cf. preceding abstract.) H. FREUNDLICH. Braunschweig. *Kolloid-Z.* 16, 36-9(1915).—The work of H. and L. simply confirms for tannic acid sol., the general statement of F. (cf. *C. A.* 7, 3874) that with decreasing electrolyte conc. the speed of coagulation rapidly decreases. It is incorrect to refer the speed to the total electrolyte conc. as the course of coagulation has removed a part of the electrolyte by adsorption. The speed of coagulation should be referred either to the quantity of adsorbed ion or the equil. conc. in the soln. The values found by the Freundlich method (conc. necessary just to give complete pptn. in 2 hrs.) are comparable with those found by a method similar to that of Hauser and Lewite, namely the conc. necessary to cause a rise of 10% in viscosity in $\frac{1}{2}$ hr. Applying this method to $\text{Al}(\text{OH})_3$ sol and NH_4Cl , $\text{K}_4\text{Fe}(\text{CN})_6$ and K benzoate the molar concs. for equal speeds are 100, 0.09 and 14 molar, showing the difference between a monovalent, a tetravalent anion (adsorbed by basic $\text{Al}(\text{OH})_3$) and a little adsorbed inorganic, and a highly adsorbed organic monovalent anion. The method of H. and L. is open to criticism in that with the large quantities of very dil. electrolyte there is a marked progressive change in the conc. of the sol and electrolyte, during one detn.

H. I. MATTILL.

Coagulation and peptization of albumin sols by means of suspension colloids in solutions containing electrolytes. A. BROSSA AND H. FREUNDLICH. Brunswick. *Z. physik. Chem.* 89, 306-37(1915).—A number of the properties of albumin solns. (from cow serum) which are as free as possible from electrolytes have been detd., and the negative charge and the non-precipitability by heavy metals (FeCl_3 , ZnSO_4 , HgCl_2), have been confirmed. Further, it has been shown that the precipitability of albumin solns. by a positive $\text{Fe}(\text{OH})_3$ sol, as well as by a negative MoO_3 sol, increases proportionately with the decrease of the electrolyte in the liquid; finally only a slight turbidity makes its appearance which, on further addition of the pptg. sol, dissolves again. The properties of albumin- $\text{Fe}(\text{OH})_3$ sols have been investigated, and it has been found that the small particles of these sols are positively charged, but to a much less extent than is the case with pure $\text{Fe}(\text{OH})_3$ particles. It is evident from this that an albumin- $\text{Fe}(\text{OH})_3$ sol behaves like a positive suspension colloid that is pptd. in small concns. of electrolytes, in connection with which the nature of the anion, its valence and adsorbability are of marked importance. However, the concns. necessary to bring about pptn. are markedly smaller than in the case of pure $\text{Fe}(\text{OH})_3$ sols. At higher concns. of electrolyte, the particles which first coagulate peptize again. The nature of the anion is of special importance in this connection. It is shown that the albumin is not quant. united to the $\text{Fe}(\text{OH})_3$, but is distributed between the latter and the soln. It has been found that the adsorption isotherm does not hold, but that, for small albumin concns., the amt. of the latter adsorbed is proportional to the quantity in the soln., while for higher concns. a satn. value is reached. With increasing $\text{Fe}(\text{OH})_3$ content

the upper non-pptn. zone disappears, and the albumin-Fe(OH)₃ sols. become more and more like the pure Fe(OH)₃ sols. The albumin-Fe(OH)₃ sols are much more turbid to the eye than the pure Fe(OH)₃ sols.

H. JERMAIN CREIGHTON.

Observations on "colloidal arsenates" by G. Klemp and J. Gyulai. E. DEISS. Berlin-Steglitz. *Kolloid-Z.* 16, 16(1915); cf. *C. A.* 9, 1142.—Deiss has shown (cf. *C. A.* 8, 2658) contrary to the conclusions of Klemp and Gyulai, that "manganous arsenate gel can be formed only in the presence of NH₄ salts and AcOH," that a transparent gel can be formed in the absence of these materials when KH₂AsO₄ is used instead of Na₂AsO₄.

H. I. MATTILL.

Ultramicroscopy and colloidal solutions. W. BACHMANN. Goettingen. *Naturwissensch.* 3, 181-4(1915).—A criticism of present methods.

C. G. F.

Osmotic pressure of alcoholic solutions. I. Vapor pressures and densities. T. W. PRICE. *J. Chem. Soc.* 107, 188-98(1915); *Proc.* 30, 269-70.—Vapor pressures of solns. of carbamide in EtOH at 40, 50, 60 and 70°, and of PhNO₂ at 20, 30, 40, 50 and 60° for several concns. have been made by the method of Perman and Price (*C. A.* 7, 929). Results by this (air bubbling) method agree with the detns. of others well enough to show that Dalton's law of partial pressures holds, and that the vapor d. of EtOH is normal. Babo's law, according to which $(p - p')/p$ is independent of temp., was found to hold. Osmotic pressures of the solns. have been calcd.

E. B. MILLARD.

Superficial tension and hydration in solution. M. PADOA AND G. TABELLINI. Univ. Bologna. *Gazz. chim. ital.* 45, I, 99-106(1915); see *C. A.* 8, 2092. E. J. W.

Diffusion in solutions. J. THORVERT. *Ann. phys.* 2, 369-427(1915).—A long introduction is followed by data on the diffusion of NaCl at different temps. from 7.4 to 31.4°. The diffusion coeff. increased from 0.94×10^{-5} at the lower temp. to 1.88×10^{-5} at the higher temp. The diffusion of one substance in the presence of another was also investigated for EtOH, sugar, acids, bases and salts; then the diffusion of PhOH in several solvents. The diffusion coeffs. of a large number of organic substances in H₂O, MeOH and C₆H₆ are presented in a long table, and the results are discussed.

E. B. MILLARD.

The coefficient of diffusion in dilute solutions. BASIL W. CLACK. Birkbeck College. *Proc. Phys. Soc. London* 27, 56-68(1914); cf. *C. A.* 4, 400.—The app. previously described (*Ibid* 21, 863 (1908) and 24, 40(1911)) has been modified so that detns. of the coeff. of diffusion, K , of salts through H₂O may be quickly made, the steady state obtaining in about 1 day. The following values were observed, the first row indicating normality and the following rows $K \times 10^5$:

Normal.	0.05.	0.10.	0.20.	0.40.	0.60.	0.80.	1.0.	1.5.	2.0.
KCl.....	1.388	1.430	1.467	1.493	1.504	1.515	1.527	1.555	1.584
KNO ₃	1.453	1.421	1.374	1.319	1.276	1.233	1.190	...	...
NaCl.....	1.165	1.170	1.177	1.188	1.198	1.208	1.216	1.235	1.253

PAUL D. FOOTE.

Ionization equilibrium. JAMES KENDALL. Columbia Univ. *J. Phys. Chem.* 19, 193-209(1915).—The increase in the dissociation const. of acids in aq. soln. when the ionic concn. is large was represented for acids of all strengths by the empirical equation $\gamma/(1 - \gamma) v = k + c(1 - \gamma)/\gamma$. The decrease in the dissociation const. when the total concn. is large was found to disappear under the assumption that ionization is not spontaneous, but induced by the solvent. The assumption is defended, and the dissociating power of the solvent ascribed to its unsatd. character, i. e., free valences.

E. B. MILLARD.

Equilibrium in the system: water-alcohol. N. A. PUSHIN AND A. A. GLAGOLEVA. *J. Russ. Phys. Chem. Soc.* 47, 100-113(1915).—A study of the diagram of state of the system $\text{H}_2\text{O}-\text{EtOH}$ by the fusion method, using liquid air as cooling agent, gave the following results: The diagram consists of 2 curves intersecting at the eutectic point -118° (85 mol. % of alc.). H_2O forms with cryst. alc. solid solns. whose limit of concn. is 15 mol. %, while alc. forms no such solns. with ice. Contrary to the statements of several investigators, there are no definite chem. compds. of H_2O and alc. either in the liquid or the solid phase. The mol. depression of alc. (for 1 g. mol. of substance in 1000 cc. of alc.), as found by expts. with solns. of CHCl_3 or C_6H_6 in alc., is probably 3. For H_2O as solute it is about 1.9. The difference is due to the formation of solid solns. in the latter case.

H. M. GORDIN.

The solution velocity of molecular layers. GEORG V. HEVESY AND E. RONA. Budapest. *Z. physik. Chem.* 89, 294-305(1915).—The soln. velocity of mol. (infinitely thin) layers shows the same qual. behavior as layers of finite thickness. The soln. velocity of Pb and Bi isotopes in HNO_3 increases with the acid concn., with diminution of the viscosity and with the abs. solubility of the substance. The presence of Pb ions in the soln. decreases the soln. velocity of the Th B which is isotopic with the Pb, while it does not influence that of the Th C which is isotopic with Bi.

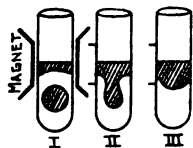
H. JERMAIN CREIGHTON.

The mobility of some polyvalent cations in water. A. HEYDWEILLER. Rostock. *Z. physik. Chem.* 89, 281-6(1915).—The electrolytic mobility of the polyvalent cations, Be^{++} , Al^{+++} , Cr^{+++} , Mn^{++} , Fe^{++} , Fe^{+++} , Ni^{++} , Co^{++} , La^{+++} , Sm^{+++} and Th^{++++} , have been detd. by a graphic method. The method is based on the following: If instead of the special concns., m , (g. equiv. per l. soln.), the so-called linear concns., $\sqrt{V/m}$, are plotted as abscissas against the equiv. conds. as ordinates, there is obtained for an electrolyte, within wide limits of concn., an approx. straight line curve. The point where this curve cuts the axis of ordinates represents the equiv. cond. at infinite diln. of the electrolyte. The values obtained in this way for a number of electrolytes have been found to agree, within a few %, with those obtained by other methods. From the values for the equiv. cond. at infinite diln., the electrolytic mobilities have been calcd. in the usual way.

H. JERMAIN CREIGHTON.

Magnetic susceptibility and electrolytic dissociation. A. QUARTAROLI. R. Ist. Tecnico, Pisa. *Gazz. chim. ital.* 44, II, 43-63(1914).—The methods used in the detn. of magnetic susceptibility of solns. are applicable only in cases in which the solns. are not excessively dil. and accurate detns. are only obtained in strong fields (5000-30000 gauss). Quincke (*Wied. Ann.* 24, 347(1885)) used a U-tube, the 2 arms of which had unequal diams., the smaller arm being placed between the poles of the electromagnet. The level of the liquid rises or falls depending on whether it is dia- or paramagnetic in a way proportional to the magnetic susceptibility and the square of the field intensity. In aq. solns. the diamagnetic properties of H_2O must be considered in detg. the susceptibility of the soln. A soln. of FeCl_3 (2.85 g. per l.) shows a susceptibility of -1.20×10^{-7} , in abs. units; that of H_2O is -7.8×10^{-7} , so that of the solute is 6.6×10^{-7} . The general results for organic compds. are briefly reviewed. In the inorg. compds. the question of the effect of electrolytic dissociation arises. With the complex derivs. especially the results are incomplete. Quincke observed a lower magnetic susceptibility for EtOH solns. of magnetic salts. Pascal (cf. *C. A.* 2, 2762) found that solns. of FeCl_3 , $\text{Fe}_2(\text{P}_2\text{O}_7)_3$, in NH_4OH and $\text{K}_3\text{Fe}(\text{CN})_6$ containing 2.85 g. Fe per l., resp., gave -1.20×10^{-7} , -3.71×10^{-7} and -6.55×10^{-7} as the constants of susceptibility, showing that a decrease of the chem. property of Fe from an analytic point of view is accompanied by an analogous decrease in magnetic property. Drapier (*C. A.* 4, 273) followed the diminution and extinction of the magnetic property with salts of Fe, Cr, Mg and Ni

in which the metal was combined in a complex anion, and found that in Et_2O soln. FeCl_3 is not paramagnetic. He tried to establish a relation between the conc. of the Fe ion and the susceptibility. Q. has extended the observations to solns. of Fe, Mn, Ni and Co salts alone and in the presence of mannitol, NH_4Cl , citrate or tartrate. The quant. method of Quincke was used and qual. expts. with the author's own method were made; a field of 3000 gauss was sufficient for dil. solns. If a tube 9–10 mm. wide 0.5 full of a mag. soln. is placed between the poles of an electromagnet, and if a little H_2O colored with the same substance is placed upon the liquid with a pipet, and if the line of sepn. is in the center of the field, nothing is observed. When the tube is lowered in a strong field the surface of sepn. remains between the poles, this surface bulges downward until it forms a bubble of colored water in a magnetic liquid. A little KMnO_4 in the dil. soln. shows the effect more strikingly. If the diamagnetic soln. is more dense than the magnetic the phenomenon is reversed; the bubble projects upward. The magnet best adapted for these expts. was a hollow cylinder which was beveled off with hollow cones with a generatrix 45° with the plane of the base. Knowing the d. of the solns. used, quant. results may be obtained which compare favorably with those obtained by Quincke's method. *Expts. with a weak magnetic field.* These expts. were made with a small electromagnet (110 v.) which had a field of 3500 gauss. The degree of magnetism of solns. of salts of Mn, Fe, Co and Ni vary as 6:5:4:2. Ten cc. of MnCl_2 (4.80 g. Mn per 100) were made up to 50 cc. and tested in the field as described and gave the bubble (Fig. I). To this soln. (d. 1.026)



KNO_3 was added until d. 1.040; Fig. II was obtained. When the soln. was dild. to 25 vols. the effects were distinct. At a dild. of 250 vols. the soln. contained 0.0192% Mn or 1 g. in 5200 g. H_2O , and still showed the effect as in Fig. III. Solns. of KMnO_4 and K_2MnO_4 do not show the effect. Variable results were obtained with colloidal MnO_2 . Ten cc. of the MnCl_2 soln. + 10 cc. of N NH_4 tartrate + 5 cc. NH_4OH (d. 0.92) placed on an NH_4 tartrate soln. containing NH_4OH and phenolphthalein showed the typical figures. Using NH_4 citrate instead of tartrate gave the same result. Using FeCl_3 (1.792 g. Fe per 100) the figures were like II. When NH_4 citrate or tartrate were added as above the figs. were like II. When mannitol was added instead of the above the figs. were like III, *i. e.*, the polyvalent alcs. cause a marked decrease in susceptibility. A FeSO_4 soln. (1.792 g. Fe per 100) shows a weaker effect than FeCl_3 , but in the NH_4 citrate and tartrate solns. the mag. susceptibility changes owing to oxidation. With solns. of CoCl_2 and NiCl_2 (3.855 and 3.060% Co and Ni, resp.) the effects are much the same but weaker especially for Ni. The same is true in the presence of NH_4 citrate and tartrate. With NH_4Cl + NH_4OH the susceptibility changes on standing; this change is hastened by adding PbO_2 . *Expts. with a strong magnetic field.* This magnet was capable of 30000 gauss. The expts. were made (1) to det. the sensibility of the qual. method in an intense field; (2) to follow the expts. at different intensities in order to obtain the same figs. and thus follow more approx. the comparison of various solns.; (3) to verify results obtained by the classical U tube method which disagree with principles that have been proposed on the relation between dissociation and mag. susceptibility. The strength of the field was detd. for known currents so that when the intensity was changed the strength of field could be known. The FeCl_3 soln. dild. to 2500 vols. showed a fig. like III at 15600 gauss. MnCl_2 hydrolyzes less easily than FeCl_3 and shows Fig. III at a dild. of 16625 with a field of 16650 gauss. With 1 part Mn per 1000000 a field of 30000 gauss gave Fig. III. If NH_4 citrate, tartrate or quinate were added to FeCl_3 solns. stronger fields were required to give the same effect as without; still stronger ones were required when mannitol was added. The same relations hold for MnCl_2 , CoCl_2 and NiCl_2 . Quant. data

and other details are given that cannot be abstracted briefly. In general, the results throughout show that the relation between electrolytic dissociation and magnetic susceptibility is not simple as some authors, who state that susceptibility depends on the conc. of the free ions of the magnetic elements, have thought. It seems clear that one condition necessary for magnetic elements to show considerable susceptibility in soln. is the presence of an elec. charge either free or not. This is shown by the low susceptibilities of magnetic salts in EtOH or Et₂O soln., and by the fact that Fe²⁺ shows only about $\frac{1}{2}$, as much susceptibility as Fe³⁺ salts. Pascal (*l. c.*) found a gradual change in susceptibility as complexity increased. Q. says that what is called greater or less complexity of ions really refers to a greater or less partial dissociation. Complex ions are weakly dissociated so that sometimes they fail to give certain characteristic reactions. In most cases when one passes from an ordinary salt of a metal to the less complex of its complex salts a diminution of conc. of the free ions occurs in which the difference in conc. between the complex and the other is negligible. If the susceptibility of Fe₃(P₂O₇)₂ and K₂Fe(CN)₆ is due to free Fe ions that of the 1st should be many times less than that of FeCl₃. So that it has been detd. that there is apparently no relation between the conc. of free ions and susceptibility; it depends solely on the chem. comp. of the complex. Admitting now that the susceptibility depends solely on the comp. of the complex ion containing the magnetic element the question as to the explanation of the action of the other elements or groups arises. Q. suggests that in org. chemistry the constitutive constns. of susceptibility must be changed for each group of compds. examd. and that there should be no surprize that the same holds true for inorg. compds. The atomic contribution to the phys. constns. of compds. is a variable that depends on the other atoms and probably on the nature of their arrangement. The fact that inorg. compds. undergo electrolytic dissociation simply complicates the problem somewhat when complex compds. are under consideration.

E. J. WITZEMANN.

Anomalous electrolytic dissociation. A. SAKHANOV. *Z. Elektrochem.* 20, 529-37 (1914).—S. discusses the most important regularities observed among electrolytes showing anomalous electrolytic dissociation and the various theories proposed to account for their behavior. Part of the paper is polemical in nature and devoted to a paper of Kraus (*cf. Z. Elektrochem.* 20, 524-7) in which S. concludes that the explanation of the anomalous phenomena presented by Kraus and Bray (*cf. C. A.* 8, 854) is very dubious.

E. C. MCKELVY.

Electrolysis of glass. A. SPERANSKII. *J. Russ. Phys. Chem. Soc.* 47, 52-8 (1915).—An elec. current was passed through glass immersed in conc. H₂SO₄ at 230-320°, and the changes in the comp. of the glass and the liquid and in the strength of the current were examd. The results are summarized as follows: With H₂SO₄ as anode liquid there is a radical difference in the behavior of ordinary Na glass and other varieties (Jena, Pb glass, etc.), the latter behaving exactly as with Hg as anode liquid (Warburg, *Wied. Ann.* 21, 622), while the Na glass becomes opaque, and the cond. at first drops, but then quickly rises above the original value.

H. M. GORDIN.

Absorption of hydrogen by sodium-potassium electrodes. R. C. GOWDY. Univ. Cincinnati. *Phys. Rev.* 4, 401-8 (1914).—The rate of absorption of H by Na-K cathodes in glow discharge tubes has been measured for currents of 0.2 to 4.7 milliamp. for a cathode 30 mm. in diam.; and for currents of 0.2 to 2.0 milliamp. for a cathode 16 mm. in diam. At c. d. less than 0.5 milliamp. per sq. cm. the rate of absorption is approx. 10 times that at which H is liberated in electrolysis by an equal current. With greater c. ds. the rate of absorption becomes const. The rate of absorption increases with increasing temp. of the cathode. An "equil." pressure has been found at which Na-K electrodes neither absorb nor evolve gas. This pressure depends on the current and the quantity of hydride on the surface of the alloy. At pressures of 1 to 2 mm.,

Na-K anodes absorb H, and at low pressures evolve it. The rate of this evolution for various pressures and current strengths has been measured. NaH and KH are decompd. by cathode rays. The cathode absorption and anode evolution are regarded as due to the formation or decompn. of the hydrides by local heating effects of the impinging charged particles, according as the temp. is favorable to one or the other of these processes.

E. B. MILLARD.

The molecular magnitude of metals in the solid phase. M. PADOA AND F. BOVINI. Univ. Bologna. *Gazz. chim. ital.* 44, II, 528-34(1914).—A knowledge of the mol. magnitude of substances in the solid state is important for possible deductions on phys. properties and serves as a basis of the kinetic theory of solids. Tammann (C. A. 6, 819, 1388) has offered some criteria based on the diagram of state which however are difficult to apply in certain interesting cases. The results of Heycock and Neville by the cryoscopic method show that the metals and certain metalloids are monatomic in liquid solns.; the data seem to indicate that C is monatomic in soln. in Fe. The results of Rudolphi (*Z. anorg. Chem.* 53, 218) for Cu-Si show Si to be monatomic in this alloy. It is clear that once the mol. wts. under such conditions are certainly known it will be possible to compare the phys. properties of monatomic and polymerized Si which will be advantageous in settling various questions. By this means the deduction of the law of Dulong and Petit and deviations which it undergoes will be explained, and it may be found that the elements showing the greatest deviations are those with small at. vols. that have a greater tendency to polymerization and that give allotropic forms easily. When from a dil. soln. C_1 one seps. a solid soln. of conc. C_2 and the ratio $C_2:C_1$ is constant then it may be said that the substance dissolved has the same mol. magnitude in the solid as in the liquid state. A 3rd substance must be present in order to make a detn. of the amt. of mother liquor present in the solid possible. Not many ternary alloys are adapted to this work. Alloys of Sn, Cd and Bi were used. Sn-Cd forms a eutectic and limited solid solns. which at a little above 100° are transformed into a compd., Sn_4Cd . Sn-Bi and Cd-Bi also give eutectics but no solid solns. The 3 alloys examd. solidified at about 200° but showed no further complications. With Sn 90.27, Cd 4.79, and Bi 4.94% the ratio of $C_2:C_1$ is 0.986; with Sn 88, Cd 8 and Bi 4% the ratio is 0.985; with Sn 85, Cd 10 and Bi 5%, the ratio is 0.957. This shows that the solid solns. sepg. from different liquid solns. of Cd in Sn have approx. the same conc., showing that the coeff. of distribution is practically constant. It is concluded that Cd has the same mol. magnitude in solid soln. in Sn as in liquid soln., i. e., it is monatomic. These results confirm Stoffels data concerning these ternary alloys.

E. J. WITZEMANN.

Studies in catalysis. II. Inversion of sucrose. ALFRED LAMBLE AND WM. C. McC. LEWIS. Univ. Liverpool. *J. Chem. Soc.* 107, 233-48(1915); cf. C. A. 9, 262.—The rates of inversion of sucrose by means of HCl at 25° , 35° , and 45° were measured, using the polarimetric method. Five concs. of HCl were used in each set of expts., varying from 0.0502 *N* to about 1.2 *N* in the measurements taken at 25° and 35° , and from 0.0502 *N* to 0.9 *N* in the expts. at 45° . From the velocity consts. k_i the values of the temp. coeffs. k_{35}/k_{25} and k_{45}/k_{35} and their change with change in concn. of catalyst were detd., taking into consideration the total catalytic effect due to H^+ and to undissociated HCl (the latter being about twice that of the H^+ at 25° and 1.5 times as great at 45° (cf. McBain, C. A. 8, 3141)). The mean value $k_{35}/k_{25} = 4.13$; the mean value $k_{45}/k_{35} = 3.73$. Transforming the Marcellin-Rice formula, $d \log k/dT = E/RT^2$, where E is the "critical increment" for sucrose (i. e., the extra amt. of energy which 1 gram-mol. of the system requires) into the equation $\log_e (k_{35}/k_{25}) = (E/R)(1/298 - 1/308)$, the value for $E = 26000$ cal. per gram-mol. and each sucrose mol., in order to enter the reaction requires $26000/6.85 \times 10^{23}$ cal. or 1.6×10^{-12}

egs. Applying Einstein's law that 1 mol. reacts by absorbing 1 quantum ($h\nu$, where h = Planck's const. and ν = vibration frequency of the radiant energy absorbed), $\nu = 1.6 \times 10^{-12} / 6.55 \times 10^{-27} = 2.44 \times 10^{14}$. Since the wave length corresponding with this is 1.23μ which lies in the region of marked absorption of the infra-red absorption spectrum of sucrose, the mechanism whereby velocity of reaction is increased by raised temp. may be accounted for by a radiation hypothesis. The H ion probably emits radiations of wave lengths lying between 1 and 10μ which in the case of this reaction may be absorbed by the sucrose. The value E falls slightly as the concn. of catalyst increases and a review of the literature (given in full by L. and L.) shows that for reversible reactions the greater the value of k the smaller the value of E , and *vice versa*. Both of these conclusions are in agreement with the Marcellin-Rice equation and with the theory that chem. reactivity is due to infra-red radiation. L. and L. also discuss the possible catalytic action of the undissociated mol. from the radiation point of view.

LOUIS E. WISE.

Use of nickel and its oxides in catalysis. J. B. SENDERENS AND J. ABOULENC. *Bull. soc. chim.* 17, 14-9(1915).—Discussion of the work of Ipat'ev (*J. Russ. Phys. Chem. Soc.* 38, 75-92; 39, 693-703(1907)) on hydrogenation with Ni and NiO catalyzers. At 180° a mixt. of H (in excess) and C_6H_6 vapor reacted to form cyclohexane almost completely in the presence of Ni (formed from the reduction of NiO) and in the absence of moisture; in the presence of NiO there was practically no reduction. With moist H and some of the same NiO, the reduction of PhOH at 180° proceeded rapidly and with the evolution of much heat. As much as 125 l. of H were absorbed in 2 min. Finely divided Ni acted equally well with or without moisture in the hydrogenation.

E. B. MILLARD.

Velocity of saponification of linalyl, terpenyl and geranyl acetates. C. L. BARILLET AND R. BERTHELE. Geneva. *Bull. soc. chim.* 17, 20-8(1915).—Expts. on the speed of saponification at 78° , 0° and at $15-16^\circ$ by $0.5 N$ KOH of the esters mentioned. The amts. saponified in a given time by different amts. of KOH were: 73% with 25 cc., 78% with 50 cc., and 82% with 100 cc. at room temp.

E. B. MILLARD.

Piezochemical studies. XIII. The influence of pressure on the reaction velocity in condensed systems. II. ERNST COHEN AND H. F. G. KAISER. Utrecht. *Z. physik. Chem.* 89, 338-64(1915); cf. C. A. 7, 3056(1913).—The influence of pressure on the esterification velocity of $0.01 N$ Et acetate by $0.01 N$ NaOH has been studied at 2.40° between 1-1500 atms. Two methods have been employed in the investigation, which give the same results. The velocity of reaction at 1500 atms. is 37.4% greater than at 1 atm. It has been found that the influence of pressure on the velocity of reaction may be as well described by the linear equation, $k_p = a + bp$, as by the van't Hoff equation, $d \ln k / dp = \text{const.}$, in which k is the reaction velocity, a is the % increase in concn. due to compressibility, p is pressure, l is the reciprocal of the measured resistance of a $0.01 N$ NaOH or NaOAc soln.

H. JERMAIN CREIGHTON.

Mercury iodide. I. A. SMITS AND S. C. BOKHORST. Amsterdam. *Z. physik. Chem.* 89, 365-73(1915); cf. C. A. 5, 1861(1911).—The system HgI_2 has been studied in the light of the theory of allotropy, and the retardation expts. continued. The continuous change from yellow to red which HgI_2 exhibits above 127° , combined with the fact that molten HgI_2 is a dark red liquid, which on sudden cooling gives a homogeneous solid red phase that cannot be distinguished from the usual red modification, when taken in conjunction with the fact that HgI_2 vapor is yellow, leads to the same T, X diagram as given in the previous communication. The results of the expts. are readily explained by means of this diagram.

H. JERMAIN CREIGHTON.

Mercury iodide. II. A. SMITS AND S. C. BOKHORST. Amsterdam. *Z. physik. Chem.* 89, 374-82(1915); cf. previous abstract.—The fusion lines of HgI_2 in the binary

systems nitrobenzene-HgI₂ and nitrotoluene-HgI₂ have been detd. The transition point is 127.5° and 128°, resp. The fusion lines are continuous from this temp. to the fusion point of the HgI₂, and show from $\approx 240^\circ$ to $\approx 250^\circ$ a very marked increase of dX/dT . It has been demonstrated that the transition of HgI₂, which is associated with the color change above 127°, progresses continuously, and that in the temp. region in which the color change is greatest, the value of dX/dT of the fusion line experiences the greatest change, as would be expected on theoretical grounds.

H. JERMAIN CREIGHTON.

Fractional distillation with regulated still heads. II. M. A. ROSANOFF, J. F. W. SCHULZE AND R. A. DUNPHY. Pittsburgh. *J. Am. Chem. Soc.* 37, 1072-9(1915); cf. *C. A.* 8, 3523, 3735, 3742; 9, 877.—Further expts. in ternary mixts. of CCl₄, C₆H₆-CH₃, and C₂H₄Br₂ distd. with heads at regulated temps. At each temp. the vapors had the same comp. as the vapors evolved would have if the mixt. were boiling at the temp. of the still head. Variations in the comp. of the distillate during a single expt. were slight, but always present. In a binary mixt. the comp. of the distillate was const. for each expt. An important limitation of the rule for ternary mixts. was reserved for the next paper of the series.

E. B. MILLARD.

Heats of combustion of aromatic hydrocarbons and hexamethylene. T. W. RICHARDS AND FREDERICK BARRY. Harvard. *J. Am. Chem. Soc.* 37, 993-1020 (1915); cf. *C. A.* 4, 1465; 8, 1048, 3734.—An Atwater bomb (*J. Am. Chem. Soc.* 25, 659(1903)) wholly lined with Pt was used. The Pb gasket was replaced with one of soft Au bearing on a double ridge. Heats of combustion have been detd. for sucrose, C₆H₆, MePh, EtPh, mesitylene, pseudocumene, *i*- and *n*-propylbenzene, tertiary butylbenzene, and cyclohexane, in the adiabatic calorimeter previously described. The max. deviations from the means for the 5 or 8 expts. with each substance were about 0.05%. Data are given in 18° Cals., using sucrose as a standard (heat of combustion 3.945 Cals. per g.), as follows: C₆H₆ 9.993, MePh 10.166, *o*-xylene and *m*-xylene 10.277, *p*-xylene 10.241, C₆H₅C₂H₅ 10.273, 1,3,5-C₆H₂Me₃ 10.340, *n*-C₆H₅C₃H₇ 10.364, cumene 10.371, 1,2,4-C₆H₃(CH₃)₃ 10.316, C₆H₅C(CH₃)₃ 10.427, cyclohexane 11.164.

E. B. MILLARD.

Formula connecting pressure and temperature of saturated steam. S. GODBEER. *Engineering* 99, 290(1915); cf. *C. A.* 7, 1314.—The previous 6 const. equation has been replaced by another empirical one in which only 5 const. are used. If *p* is in mm. of Hg, the formula is $\log p = 25.08199929 - [(43833 - 13t)/(73386 + 110t)^2/3885969 - 0.876(9112 + 3t)(273 + t)]$. Below 7° the exptl. results fit the formula $\log(p + 0.91216) = 0.7396675 + 0.0265617t$.

E. B. MILLARD.

Electrically heated full radiator. H. B. KERNE. Univ. Birmingham. *Proc. Roy. Soc. London (A)* 91, 190-7(1915).—Pt strips wound directly on alumina crucibles adhered to the walls and were broken on cooling. Strips which had been crimped between 2 cog wheels were wound on a bottle-shaped crucible with a small circular aperture opposite the conical bottom. The stiff strips were wound into a cage-like structure held in place by mica and placed over the conical end of the "bottle." These were then packed in alumina, and the sides of the bottles were packed with infusorial earth about 10 cm. deep. A small opening was made in the side for the thermo-junction. Using 1750 watts, the temp. of the furnace was maintained uniformly at 1150°. The radiation from the aperture differed from the full radiation at that temp. by an amt. probably not exceeding 0.2%.

E. B. MILLARD.

Thermodynamic considerations on photochemical equilibrium. A. SCHIDLÖF. *Arch. sci. phys. nat.* 38, 31-5(1914).—S. shows that the law of photochem. equil. can depend only on the expression ν/T , where ν is the frequency and *T* is temp. of the mono-

chromatic radiation. The only assumptions used are (1) the thermochem. equil. of a system is independent of the temp. and (2) the equil. is independent of the pressure. It is then shown that the analytical expression given in a previous paper (C. A. 8, 265) for the influence of radiation on photochem. equil. is a function of ν/T .

O. A. RANDOLPH.

Experiments on ammonia. F. HABER. II. Redetermination of the ammonia equilibrium under thirty atmospheres pressure. S. TAMARU AND CH. PONNAZ. Berlin-Dahlem. *Z. Elektrochem.* 21, 89-106(1915); cf. C. A. 1, 2342; 2, 2326; 3, 11; 4, 1653, 2356; 8, 3101.—A new study of the equil. $N_2 + 3H_2 \rightleftharpoons 2NH_3$ at 30 atm. between 560° and 950°, using Os as a catalyzer. Results agree fully with those of Haber and Le Rossignol carried out at the same pressure but in a narrower range of temperature. The formula $\log K_p = (13200/4.571T) - 6.134$ was found to apply, in which K_p is defined by the partial pressures of the three gases involved: $K_p = P_{NH_3}/P_{H_2}^{3/2} P_{N_2}^{1/2}$.

A. F. O. GERMANN.

The stability of thermodynamic equilibrium and statistical mechanics. A. SCHIDLOF. *Arch. sci. phys. nat.* 39, 25-46(1915).—Using the hypothesis that the state of the smallest elements of a body is defined by the same variables as the state of the entire body, S. is able to proceed from abstract thermodynamics to some of the chief results of statistical mechanics.

O. A. RANDOLPH.

Thermodynamics of normal elements. VI. ERNST COHEN AND W. D. HELDERMAN. Utrecht. *Z. physik. Chem.* 89, 287-93(1915); see C. A. 9, 879. H. J. C.

Entropy of vaporization as a means of distinguishing normal liquids. J. H. HILDEBRAND. Univ. Calif. *J. Am. Chem. Soc.* 37, 970-8(1915); cf. C. A. 8, 3734.—The entropy of vaporization (i. e., the mol. heat of vaporization divided by the abs. temp. at which the vaporization takes place) is the same for all normal liquids, when the evapn. takes place "at the same conc. of vapor," but not when (as in Trouton's rule) it takes place at the same pressure. This fact was expressed in a vapor pressure equation contg. a single const. characteristic of the liquid, the const. being detd. from the temps. necessary to give the same conc. of vapor in the different cases.

E. B. MILLARD.

The Schroeder paradox. L. K. WOLFF AND E. H. BÜCHNER. Univ. Amsterdam. *Z. physik. Chem.* 89, 271-80(1915).—The phenomenon, observed by Schroeder (cf. *Z. physik. Chem.* 45, 75), connected with the swelling of gelatin that seems inconsistent with the 2nd law of thermodynamics, has been investigated. The expts. performed lead to the conclusion that the supposed contradiction of the second law of thermodynamics is erroneous.

H. JERMAIN CREIGHTON.

On the metastable continuation of the fusion line and the mixed crystal line, and on the connection with the phenomena of monotropy and enantiotropy. A. SMITS. Univ. Amsterdam. *Z. physik. Chem.* 89, 257-70(1915); see C. A. 9, 1266.

H. JERMAIN CREIGHTON.

Electromotive forces in alcohol. IV. Combinations of the hydrogen and calomel electrodes. R. FURNESS, R. T. HARDMAN AND E. NEWBERRY. Manchester. *J. Chem. Soc.* 105, 2302-9(1914); *Proc.* 30, 233-4; cf. C. A. 6, 1565; 7, 1652.—Expts. are described on the e. m. f. of cells in which satd. solns. of NaCl in EtOH contg. HCl at various concns. have been measured in various combinations with H and calomel electrodes. All of the experiments were at 25°. Several LiCl cells were measured. With the use of other data (to be given later) the thermodynamic potential of HCl at very great dilns. will be calcd. in both H₂O and EtOH, and the 2 values compared. A theoretical analysis of the data shows that 3 of the 4 cells above are probably correctly detd., and that the calomel electrode is not satisfactory in acid-alc. solns., but that it is trustworthy in alc. solns. of NaCl.

E. B. MILLARD.

Liquids of constant boiling point for use in constant temperature heating baths. A. GOLODETZ. *Chem. Ztg.* 38, 1253(1914); *J. Soc. Chem. Ind.* 34, 167-8.—In the following list 2 classes of liquids with const. b. ps. are included: (a) mixts. in definite proportions of 2, or 3, miscible liquids; (b) heterogeneous mixts. (in any proportion provided 2 liquid phases are present) of 2 immiscible liquids. The b. ps. given in the list are the temps. of the vapors when the liquids are in ebullition; these are followed by a statement of the comp.: 33°, H₂O and ether (heterogeneous); 36.5-37.5°, alc. (3), EtBr (97); 38°, CS₂ (87), MeOH (13); 39-40°, CS₂ (71), AcOMe (29); 42.5°, CS₂ (91), alc. (9); 53.5-54.5°, MeOH (12), CHCl₃ (88); 55.5°, MeOH (20.6), CCl₄ (79.4); 58°, MeOH (38.4), C₆H₆ (61.6); 59-59.5°, alc. (6), CHCl₃ (94); 62°, MeOH (47), AcOEt (53); 64.8°, C₆H₆ (74.1), alc. (18.5), H₂O (7.4); 68°, alc. (32.4), C₆H₆ (67.6); 71.5° alc. (31), AcOEt (69); 74.8°, CCl₄ (77.15), alc. (22.85); 79.5°, C₆H₆ (90.5), isobutyl alc. (9.5); 84.5°, H₂O and toluene (heterogeneous); 87.7°, H₂O (28.3) propyl alc. (71.7); 91-91.5°, propyl alc. (53), toluene (47); 92.5°, H₂O (41), pyridine (59); 94-94.5°, H₂O and turpentine (heterogeneous); 95°, H₂O (7), chloral (93); 98.5°, H₂O and ethylaniline (heterogeneous); 99°, H₂O and diethylaniline (heterogeneous); 104°, toluene (70), AcOH(30); 113-113.5°, AcOH (27), xylene (73); 121-122°, amyl alc. (30), ethylene dibromide (70); 125-126°, amyl alc. (52), *m*-xylene (48).

F. W. SMITHER.

Wheatstone bridge for resistance thermometry. C. W. WADNER, H. C. DICKINSON, E. F. MUELLER AND D. R. HARPER. *U. S. Bur. Standards Sci. Paper* 241, 20 pp. (1915).—The bridge described was designed with special reference to flexibility for use in measurements with resistance thermometers, either Siemens or Callender type, or with the potential terminal type with Thomson double bridge. It was arranged so that it could be completely self-calibrated. The accuracy was about 1 in 300,000 with resistances of an ohm or more, corresponding to about 0.001° with a Pt resistance thermometer.

E. B. MILLARD.

Theory of Becquerel effect. Electrical methods of photochemistry. A. GOLDMANN. Leipzig. *Z. Elektrochem.* 21, 73-80(1915); cf. *C. A.* 9, 15.—Discussion.

E. B. MILLARD.

Variability of spectrum lines in the iron arc. C. E. ST. JOHN AND H. D. BABCOCK. *Proc. Nat. Acad. Sci.* 1, 131-6(1915).—Photographs of the entire visible Fe spectrum and part of the ultraviolet were made from 2 sep. Fe arcs operated with different current strengths. Of 1600 lines measured, 1300 showed no determinable difference, 249 were displaced toward the red and 64 toward the violet, the larger shifts being +0.025 and -0.030 Å., resp. The variations in wave length appear not to be due to a general increase of pressure in the vicinity of the negative pole, but work is still in progress on this point. The energy distribution in the arc has been shown for 2 types of lines.

E. B. MILLARD.

Interference measurements of wave lengths in the ultraviolet part of the iron spectrum. KEVIN BURNS. *Compt. rend.* 160, 243-4(1915).—Wave lengths of 126 lines of the Fe spectrum in air at 15° and 76 cm. pressure, referred to the red Cd line as $\lambda_{6438.4696}$ have been made, covering the range between λ_{2851} and λ_{3701} .

E. B. MILLARD.

Flicker photometer measurements by a large group of observers on a monochromatic green solution. H. E. IVES AND E. F. KINGSBURY. *Phys. Rev.* 5, 230-5 (1915); cf. *C. A.* 8, 3639.

E. B. MILLARD.

Electrical, photoelectrical and electromechanical properties of certain crystals of selenium, with applications to crystal structure. F. C. BROWN. *Phys. Rev.* [2] 5, 167-75(1915); cf. *C. A.* 8, 1233, 3264, and the expts. of Bragg (*C. A.* 8, 1235, 3745).—

When light illuminated a crystal in one part, there was a change in elec. cond. throughout the whole crystal, and this effect could be transmitted from one crystal to another when they were grown together. The essential difference between the transmitted effect and the direct was that for a given energy intensity the max. effect in the former case occurred at a greater wave length. The action was just as rapid when transmitted 0.5 mm. or 10 mm.; thus it can not be a mere temp. disturbance, for the major portion of the recovery after the light was removed was instantaneous. The elec. cond. may be increased several hundred times by the application of pressure to either lamellar or acicular crystals, but the pressure merely makes it easier for the light to change the cond. and does not act except at the point of application. Since the pressure effect cannot be transmitted, pressure does not increase the cond. by adding free electrons. The extreme variation of cond. with change of potential applied was somewhat greater for higher pressures. The ratio of cond. in the light and dark with different potentials favors the view that the light renders a const. number of electrons in a quasi-stable equil. and the apparent increase in sensibility with higher potentials is the result of pulling out a greater number of semi-stable electrons. A Se crystal may change its resistance along one axis without changing that on a perpendicular axis. This may be explained on the ground that free electrons are not the carriers of current in non-illuminated Se.

E. B. MILLARD.

A qualitative method of investigating thermionic emission. F. L. HOPWOOD. *Phil. Mag.* 29, 362-9(1915).—When an electrified rod, charged with electricity of either sign, is brought near an unlighted 200-v. C-filament lamp, the loops diverge in a manner similar to the leaves of an electroscope, the divergence disappearing on the removal of the charged rod. If a negatively charged rod is brought near the lamp when the filament is glowing, the loops diverge; the effect is also produced by rapidly removing a positively charged rod from the neighborhood of the glowing filament; bringing it near produces no effect. When in the displaced position, the loops respond very readily to the movement of any bodies, whether charged or uncharged. An explanation of these effects is given, based on the passage of ions from the glowing filament to the walls of the bulb until a limiting difference of potential is attained. When the filament is heated above its ordinary temp. by running the lamp above its normal voltage, no effects are produced by bringing a charged body near the lamp. The fact that a glowing filament is attracted by a rod charged with electricity of the same sign as the ions emitted by the filament, etc., is used as a basis of a qual. method of investigating thermionic emission. Metal filaments were tested in air, and in a few cases in H and in CO₂. The following were tested: Fe, Ni, Cu, nichrome (alloy of Ni and Cr), brass, phosphor-bronze, Si-bronze, platinoid, eureka, turned Cu, and galvanized iron. All gave a positive emission.

A. T. CAMERON.

Application of a theory of ionization by impact to the experiments of Franck and Hertz. BERGEN DAVIS. *Phys. Rev.* [2] 5, 118-25(1915).—The theory developed in C. A. 8, 611 has been applied to the expts. described in C. A. 8, 614, 1534. E. B. M.

Ionization by impact. H. W. FARWELL. Columbia Univ. *Phys. Rev.* 5, 149-51 (1915); cf. preceding abst.—Further discussion of the Davis theory. E. B. M.

Foundation of the elementary radiation theory. DAVID HILBERT. *Nachr. K. Ges. Wiss. Göttingen* 1914, 275-98; *Chem. Zentr.* 1915, I, 34-5; cf. C. A. 9, 749.—Mathematical.

E. B. MILLARD.

Electric resolution of series lines in the mercury spectrum. G. WENDT AND R. A. WETZEL. *Phys. Rev.* [2] 4, 549(1914).—In the sharp subordinate series of Hg triplets, no appreciable splitting or displacement of the lines $\lambda\lambda 2925, 2894, 2576$ and $2464 \text{ \AA.}$ was observed. All but $\lambda 2967$ of 8 diffuse subordinate series lines of Hg triplets

showed splitting, or displacements due to the action of the field. Stark's series laws for elec. effect were confirmed. E. B. MILLARD.

Transverse Stark effect upon aluminium doublets. R. A. WETZEL. Aachen. *Phys. Rev.* [2] 4, 550 (1914).—Elec. fields of 50,000 to 90,000 v. per cm. show no appreciable effect upon the doublet $\lambda\lambda 2660-2652 \text{ \AA.}$ of the sharp subordinate series under the dispersion used. In the diffuse subordinate series the line $\lambda 2373$ shows a small displacement towards the red, both in vectors oscillating parallel to the field and perpendicular to it. No effect was produced on $\lambda\lambda 3093-3082$, 2575-2568, or the last line of 2373-2367.

E. B. MILLARD.

A system of wave frequency in the scandium spectrum. EMIL PAULSON. *Physik. Z.* 15, 892-4 (1914); *Chem. Zentr.* 1915, I, 127.—P. indicates several pairs of lines with regularly repeated differences. The differences increase in passing to other elements, e. g., La, with increasing at. wt. E. H.

New type of series in the band spectrum associated with helium. A. FOWLER. S. Kensington. *Proc. Roy. Soc. London (A)* 91, 208-16 (1915).—Preliminary analysis of the spectrum as measured by Curtis (*C. A.* 8, 7) and Goldstein (*C. A.* 7, 3267). Tables are given showing the details of the doublets $\lambda\lambda 4625$, 4648, and the main and 2nd series of doublets. The doublets do not follow the ordinary law of band spectra, but can be arranged in 2 series of the type hitherto exclusively associated with line spectra, and can be approx. represented by the usual formulas involving the Rydberg const. Nine brands of the main series and 4 of the fainter 2nd series have been identified. The 2 series are similar to the principle and diffuse series in line spectra, but the usual relation between such series is not certainly indicated, and no equiv. of the Sharp series has yet been traced. The doublet sepns. are not in accordance with those associated with line spectra; they diminish in passing along the series, but do not vanish at the limit.

E. B. MILLARD.

Influence of molecular constitution and temperature on magnetic susceptibility.
III. Molecular field in diamagnetic substances. A. E. OXLEY. Cambridge. *Proc. Roy. Soc. London (A)* 91, 216-8 (1915); cf. *C. A.* 8, 2524, 3265.—The change of sp. susceptibility accompanying crystn. may be produced by a local mol. field of 10^7 gauss which comes into operation on crystn. This intense local field distorts the mols. and alters the period of vibration of the electrons. The field is of alternating character, the distance over which it is unidirectional being comparable to the distance between mols. The extent of change of the period of vibrating electrons is the Zeeman effect of the local field. The local mol. field must be large in comparison with that producible in the lab. in order to account for the augmented double refraction of the cryst. state. The large potential energy (magnetic) associated with a diamagnetic cryst. structure (expressed in thermal units per g.) is a measure of the latent heat of fusion of the substance. Change of vol. on crystn. may be interpreted as a magneto-striction effect of the mol. field, if its local intensity is 10^7 gauss.

E. B. MILLARD.

Electromagnetic field in an anisotropic medium. MASSARDI FRANCESCO. *Nuovo cimento* 8, 331-61 (1914).—Mathematical. S. LEVY.

The thermo-electromotive force of certain iron alloys. T. S. FULLER. *Trans. Am. Electrochem. Soc.* 27 (1915) (advance copy).—Most of the alloys in this investigation were melted *in vacuo* or in an atm. of H. The measurements were made against Cu as a standard. The welded joint of each couple served as the hot junction and was placed inside a glass tube closed at the bottom and immersed in boiling H_2O . The cold junctions were placed in melting ice. The zero method of measuring the e. m. f. was used. Of the 9 Fe-Ni alloys tested, 83% Fe gave -0.64 milliv.; 66.5% Fe gave -0.48 ; 18.8% Fe, -2.45 ; 3.2% Fe, -2.00 . Of the 5 Fe-Cr alloys: 90% Fe, 1.20

milliv.; 80% Fe, $+0.43$. The addition of Co to Fe has a very marked effect thermoelectrically: with 10% Co, -0.64 milliv.; 20% Co, -3.70 ; 30% -3.50 . Of the 16 Fe-Ni-Cr alloys tested, 79% Fe, 4% Cr, gave -0.12 milliv.; 35% Fe, 10% Cr, 0.00 ; 25% Fe, 20% Cr, $+0.07$; 20% Fe 25% Cr, -0.08 ; the alloys containing 80 to 90% Ni and the balance Fe and Cr have $+thermo\ e. m. f.$ ranging from 1.00 to 1.70 milliv., whereas pure Ni is -2.38 milliv. For curves and further details see original.

C. G. F.

Initial magnetization as a function of the temperature. P. WEISS AND J. DE FREUDENREICH. *Arch. sci. phys. nat.* 39, 125-48(1915).—W. and F. investigated Fe_2Ni . The curve between the initial susceptibility and the temp. using a const. field of 0.05345 gauss shows a decided max. at 144° when about 10 hrs. is taken to heat the sample from $20-400^\circ$. As the heating is more rapid, the max. is shifted to a lower temp. Quite a detailed study is given to the coeffs. a and b of the relation $k = a + bH$ and a potential relationship is found to exist between the two. The paper is to be concluded.

O. A. RANDOLPH.

Variety of selenium especially sensitive to light. Applications to the construction of selenium cells for photometry. L. ANCEL. *Bull. soc. chim.* 17, 10-4(1915).—Vitreous Se melts at 220° . If this melt is slowly solidified under pressure, there appears another modification of Se which is light gray-violet, formed of very fine crystals extremely sensitive to light, but extremely unstable. These crystals may form a sort of solid soln. on the exterior of the vitreous Se; this is stable and unites the small crystals into a light-sensitive covering over the vitreous Se. Gradual application of both heat and pressure allows the formation of a covering of any desired comp. Great sensibility is observed only when the Se covering is extended to the metal electrodes (generally Cu) between which the Se forms a semi-conductor. It then forms a selenide of the metal which, in the presence of the solid soln., forms a sensitizing agent. The CuSe must be present in very small amt., for if some fine Cu powder was sprinkled on the Se, a melt was obtained which was a good conductor, but which was no longer sensitive to light. Cu was found superior to all other substances for electrodes. Details of expts. using the cell in connection with eclipses of the sun are described.

E. B. MILLARD.

Crystal forms of selenium and some of their physical properties. F. C. BROWN. Univ. Iowa. *Phys. Rev.* [2] 4, 85-98(1914).—A large number of new crystals of Se have been formed, some of which are of great size. All of these forms except one are very transparent selectively to light, a large amt. of light penetrating to a depth greater than 0.2 mm.; all are conducting, with sp. conds. between 200 and 10^7 ; all but one have been observed to be doubly refracting; and all of the forms increase in cond. when illuminated. The action of light is in the Se itself and not in the contacts. Mechanical pressure produces a genuine change in the Se which may alter its cond. more than 1000 times. The absolute change in cond. in one crystal by const. illumination was proportional to the cond. in the dark, when that cond. was altered by pressures between 1 and 180 atms. The temp. at which the crystals sublime in mass has been shown to influence the character of the wave-length sensibility curves. The production of individual crystals of Se of large size opens up a field of investigation which promises to be free from some of the possible complexities of Se cells.

E. B. MILLARD.

Influence of annealing on the characteristics of light-sensitive selenium. E. O. DIETERICH. Univ. Iowa. *Phys. Rev.* [2] 4, 467-76(1914).—The resistance of Se cells depends to a great degree on the treatment to which they have been subjected while annealing them. The location of the max. in the wave-length sensibility curve can be controlled by a variation of the conditions under which the Se in the cell was crystd. In this the temp. variations play the most important part. The various types of cells

can be explained by assuming the presence of various types of crystals or of different positions of the same kind of crystals within the cell; the temp. at which one kind is formed may not be favorable for the formation of another kind, hence the production of the different kinds of cells. E. B. MILLARD.

Wave-length sensibilities of certain crystals of selenium. Complexity of light action in selenium cells. L. P. SIEG AND F. C. BROWN. *Phys. Rev.* [2] 4, 507-16(1914); cf. preceding absts. E. B. MILLARD.

Complications at the anode in the silver coulometer (RICHARDS) 4.

CHAZEL, A.: *Lehrbuch der Chemie und chemische Technologie für Handelsakademien*. 2 Vols. Wien: 231 + 353 pp. 8 M.

SADTLER, S. S.: *Chemistry of Familiar Things*. Philadelphia: J. B. Lippincott Co. 320 pp. \$1.75.

WASHBURN, E. A.: *Hydrates in Solution*. New York: Longmans, Green & Co.

WILSON, H. A.: *The Electrical Properties of Flames and of Incandescent Solids*. New York: G. H. Doran Co. 119 pp. \$2.25.

3. RADIOACTIVITY.

WILLIAM H. ROSS.

Experiments on the production of helium by radioactive substances. A. DEBIERNE. *Ann. phys.* [9] 2, 428-88(1914).—A review. W. H. ROSS.

Experiments on radioactive emanations. A. DEBIERNE. *Ann. phys.* [9] 3, 18-61(1915).—A review. W. H. ROSS.

Investigations on the atomic weights of the radioactive emanations. A. DEBIERNE. *Ann. phys.* [9] 3, 62-96(1915).—A review. W. H. ROSS.

Radioactivity and the periodic system. FRANCIS P. VENABLE. *Science* 41, 589-94(1915).—A discourse. W. H. ROSS.

Acquired radioactivity. SIR WILLIAM CROOKES. *Trans. Roy. Soc. London (A)* 214, 433-45(1914).—A yellow diamond which had served as an anticathode in a vacuum tube for 40 yrs., and which had been subjected to repeated bombardment during that time, was tested to see if the bombardment had conferred radioactivity on it but none could be detected. Negative results were also obtained when other substances, as U glass, and crystals of ruby, garnet and quartz were likewise exposed to the cathode rays. The coloration produced in a diamond exposed to a Ra prep. is due to the α -rays, and the phosphorescence to the β - and γ -rays. The active deposit on a diamond after exposing in a tube of RaBr_2 for 78 days was not removed when heated to 50° in a mixt. of fuming HNO_3 and powdered KClO_3 for 10 days, the acid mixt. being daily renewed. The deposit, however, could be readily removed by grinding the surface of the crystal. W. H. ROSS.

Radioactive content of certain Minnesota soils. J. C. SANDERSON. Univ. Minnesota. *Am. J. Sci.* 39, 391-7(1915).—A detn. was made of the Ra Em and Th Em freely emanated from 13 typical Minnesota soils. The values obtained for the former in terms of the equil. amt. of Ra varied from 13 to 80×10^{-14} g. per cc. of soil; and for the latter in terms of the equil. amt. of Th from 25 to 71×10^{-7} g. per cc. Without exception the very fertile soils were found to be richer in both Ra Em and Th Em than soils of inferior fertility. W. H. ROSS.

The condensation of thorium and radium emanations. A. FLECK. Glasgow Univ. *Phil. Mag.* 29, 337-62 (1915).—When Th Em and Ra Em are mixed with air at atm. pressure, the former appears to be condensed about 5° above the Ra Em. This apparent difference is probably due to the Ra Em in the gaseous phase over the condensed phase being swept away by the air current. As the conc. of the Em in a highly exhausted tube diminishes, the Em becomes more easily condensed. In certain circumstances the condensation curve of Ra Em exhibits 2 maxima, one about -75° , the other about -161° . It is suggested that the existence of this property may be dependent on the presence of H_2O vapor. At liquid-air temp. in a highly exhausted tube, 0.0915% Ra Em remained uncondensed. With a mixt. of the 2 emanations in such a tube, Ra Em appears to be condensed more easily. The difference is probably caused by the rapid disintegration of Th Em. A. T. CAMERON.

The ionization of metals by cathode rays. N. CAMPBELL. Univ. Leeds. *Phil. Mag.* 29, 369-83 (1915).—Expts. described in a recent paper on the ionization of Pt by cathode rays (*C. A.* 8, 3757) have been extended to other metals and to higher speeds of the incident rays. The changes in the ionization (considerable reduction) previously found to take place on heating the Pt can be produced in that metal, and in Cu and Ni, by making the metal one electrode of an elec. discharge in air, O, H or petrol vapor, at about 2 mm. pressure. The changes were greatest in Cu; in Al hardly any change could be produced. The changes seem connected with "spluttering." With regard to this ionization, it would appear that the surface of the metal can be in the following states: (1) state *A*, that of the metal after it has been polished; (2) a series of states *B'* which are produced after the discharge. The ionization in the states *B'* is smaller for all speeds of the incident rays than in state *A*. Of the states *B'*, one *B*, is distinguished because the ionization in that state is greater (for all speeds of the incident rays) than in any other of the states *B'*, and because it can always be reproduced from any of the states *B'* by subjecting the surface to cathode ray bombardment. State *A* cannot be reproduced from state *B* by such treatment. It is uncertain whether the ionization potential in states *B'* is different from that in state *A*; if different, it is lower. It is uncertain whether the speed of the electrons liberated varies with the state of the surface; it does not vary with the metal (in state *A*), nor with the speed of the incident rays. As the speed of rays is increased the ionization produced by them in a metal in the various states *B'* becomes more nearly equal, and less nearly equal to the ionization by those rays in the metal in state *A*. C. suggests that the difference between state *A* and the states *B'* lies in the fact that in the former the metal is covered with a layer of gas, and in the latter it is not. If this is the case the ionization potential of a metal may be less but is certainly not greater than that of H (11 v.). This view however affords no explanation of the difference between the various states *B'*. These differences cannot be due to the presence of the "double-layers" of Seeliger. If such double-layers were formed at all in these expts., it seems that the ionization must take place at the outer surface of them. A. T. CAMERON.

The relation between certain X-ray wave lengths and their absorption coefficients. W. H. BRAGG. Univ. Leeds. *Phil. Mag.* 29, 407-12 (1915).—Figs. are given showing the X-ray spectrum of Rh, given by the (111) planes of calcite, and of Pd and Ag given by the (111) planes of diamond. Each spectrum contains 4 lines, α_1 and α_2 , β and γ . The first 2 in combination compose the strong line which Moseley (*C. A.* 8, 2307) has observed to be given by a great number of substances, and which constitute the principal part of the K series of characteristic radiations. The third is the outer well known constituent of the K series. The fourth is new. The spectra of all 3 metals are of exactly the same kind. From the results with calcite it is calc. that the spacing of the (111) planes is 2.845 Å. U., giving λ equal to 0.613 Å. U. This agrees well with

the value $0.614 \text{ \AA}$. U. previously found by the use of diamond (C. A. 8, 2308). The values of the wave lengths of the 3 spectra are calc. Logarithmic plotting shows that the absorption coeff. by a given absorber is proportional to $(\text{wave length})^3$ rather than $(\text{wave length})^{3/2}$ as required by theory, but the range of wave lengths found is too narrow for an exact deduction.

A. T. CAMERON.

The tracks of the alpha particles in sensitive photographic films. S. KINOSHITA AND H. IKEUTI. Imperial Univ., Tokio. *Phil. Mag.* 29, 420-5(1915); cf. C. A. 5, 241.—A number of photographs are shown of the tracks produced in a sensitive photographic film when it had been previously touched with a needle point smeared with Ra active deposit. When such a plate, after development, is examd. under the microscope the spot of contact is seen to consist of a multitude of radial trails of Ag grains around a circular dark nucleus, the cavity in the gelatin produced by the needle point. There are two sets of trails, the first emerging at the rim of the nucleus and ending very nearly at the circumference of a circle outside the nucleus, thus presenting themselves as a halo, the second spreading out around the nucleus over a wide region with no sharply defined boundary. The latter are all found in the uppermost layer of the sensitive film, and are attributed to the β -rays. The halo is produced by the α -rays by a process similar to that causing the pleochroic haloes seen in minerals such as biotite and investigated by Joly. In magnetic fields no curvature of the trails was observed, but the minuteness of the path under observation might prevent its detection. Numerous cases of deflexions of α -particles in passage through the emulsion are shown in the photographs.

A. T. CAMERON.

The average thorium content of the earth's crust. J. H. J. POOLE. *Phil. Mag.* 29, 483-9(1915).—Expts. supplementing those of Joly (C. A. 7, 23) using the same methods and the same composite rock mixts. The mean results from all the values obtained are: for acid rocks, 2.13×10^{-8} g.; for intermediate rocks, 1.50×10^{-8} g.; and for basic rocks 0.51×10^{-8} g. of Th per g. of rock, the general mean being 1.38×10^{-8} g. per g. of rock. If the results are weighted according to the number of rocks taken in the sample powders used for the analyses, slightly higher figures are obtained, viz., 2.08, 1.60 and 0.56×10^{-8} g. per g. of rock, resp., the general mean being 1.50×10^{-8} g. per g. of rock. The values are obtained from 86 acid, 48 intermediate, and 56 basic rocks.

A. T. CAMERON.

The nature of the large ions in the air. J. A. POLLOCK. Univ. Sydney. *Phil. Mag.* 29, 514-26(1915).—The large ions in the air, discovered by Langevin (*Compt. rend.* 140, 232(1905)), have a mobility which at const. atm. pressure is a function of the relative humidity only. At standard pressure the mobility varies from $1/1280$ when the humidity is 4%, to $1/3440$ when the pressure is that of satn. The ions do not exist in dust-free air, so the picture most readily formed is that of a collection of H_2O mols. surrounding a dust particle, the whole being electrified by the attachment of a small ion, the ion thus affording an example of the adsorption of H_2O vapor at a rigid surface. A thermodynamic argument, based on the relation between mobility and relative humidity, leads to the conclusion that the adsorbed moisture is in the liquid state with a latent heat and d. little different from that of H_2O . The order of magnitude of the diam. of the ion, calc. on usual kinetic theory lines, varies from 3 to 4×10^{-7} cm. according to the atm. conditions.

A. T. CAMERON.

Ionized gases. E. SALLES. *Ann. phys.* [9] 2, 273-346(1914); cf. Townsend, *Trans. Roy. Soc.* 193, 129(1900).—Review, followed by new expts. of high precision in an app. which allowed the use of pressure higher than 1 atm. Using walls of steel, German silver and brass, it was shown that the walls of the surrounding vessel have no influence on the coeff. of diffusion of the ions, confirming the previous results with tubes of steel and tin (Eve, *Phil. Mag.* 19, 657(1910)). The coeff. of diffusion of

ions at atm. pressure has been measured in air, N, CO₂, O and H, and in air and N at higher pressures. A method of detg. k/D , the ratio of mobility to diffusion coeff., has been worked out (cf. Langevin, *C. A.* 7, 3076). When the ionization is produced by γ -rays, the ions do not appear to carry multiple charges. E. B. MILLARD.

CROOKES, WM.: *Acquired Radioactivity*. London: Dulau. 14 pp. 1s., 6d.

4. ELECTROCHEMISTRY.

COLIN G. FINK.

Commercial nitrogen fixation. S. PEACOCK. *Trans. Am. Electrochem. Soc.* 27 (1915) (advance copy).—A polemical note. A commercially successful N-fixation process must give as an end product KNO₃, NH₄NO₃ or (NH₄)₂HPO₄; the factory cost must not materially exceed 5 cents per lb. of combined N figured as NH₃. The strongest present competitor is the NH₃ produced as a by-product in the distn. of coal.

C. G. F.

Complications at the anode in the silver coulometer. T. W. RICHARDS AND F. O. ANDEREGG. Cambridge, Mass. *J. Am. Chem. Soc.* 37, 675-93(1915); cf. *C. A.* 9, 559.—Further expts. to test the effect of the anode liquor on the wt. of Ag deposited at the cathode. In this series of expts. the coulometers were so arranged that the access of anode liquor to the cathode was greatly varied. The porous cup models agreed with each other to 0.0004%; the Kohlrausch form (no septum, but a glass dish to catch anode slime) always gave deposits 0.001 to 0.006% higher. By using a permeable alundum (Al₂O₃) cup, or filter paper, distinctly heavier deposits were obtained, which showed that (if weighed before ignition) the deposits contained included mother liquor and excess Ag. A plate of pure Ag immersed in liquid from the anode (obtained by using an alundum cup inside of a porcelain cup and withdrawing liquid from between the 2 cups) gained in wt. 0.62 mg. in 9 expts. The surface was covered with fine brilliant cryst. laminae, probably due to the deposition of Ag. The "complex ion" theory of anode slime formation (cf. *Proc. Am. Acad.* 37, 432(1902)) is again stated to explain the fine dust formed during the disintegration of the anode. The best results were obtained by using a small porous cup coulometer with a highly burnished cathode and pure electrolyte, the deposit being ignited to incipient redness before weighing.

E. B. MILLARD.

Influence of alternating current on electrolysis by a direct current. JNANENDRA C. GHOSH. Calcutta. *J. Am. Chem. Soc.* 37, 733-52(1915); cf. *C. A.* 8, 3760.—In 2 expts. d. c. was passed through a coulometer, then through another coulometer in which a. c. was superimposed on the d. c. For d. c. alone the wts. of Ag were 0.2451 and 0.2873; for a. c. + d. c. the corresponding values were 0.2415 and 0.2904, showing "that there is practically no difference in the amt. of electrolytic decomp. in the 2 cases." In perfectly reversible cells the a. c. has no influence, but in irreversible cells the a. c. greatly increases the current through the circuit. The increase is due to the diminution in the back e. m. f. of polarization.

E. B. MILLARD.

Electroplating with cobalt. H. T. KALMUS, C. H. HARPER AND W. L. SAVELL. *J. Ind. Eng. Chem.* 7, 379-99(1915); *Trans. Am. Electrochem. Soc.* 27 (1915) (adv. copy, 46 pp.).—This paper presents a large amt. of exptl. data. Theoretical considerations are reserved for a separate publication. Several Co solns. were found to be suitable for com. plating. The best ones are: Soln. 1B: 200 g. CoSO₄.(NH₄)₂SO₄.6H₂O in 1 l. of H₂O, d_{15} = 1.053; and soln. 13B, CoSO₄ 312 g., NaCl 19.6 g., boric acid nearly to satn., H₂O 1 l., d_{15} = 1.25. Co plates from these solns. on brass, Fe, steel, Cu, Sn

German silver, Pb, and Britannia metal; deposited under conditions identical with those met with in general Ni-plating practice. The plate is firm, adherent, hard and uniform. The plated articles may readily be buffed; the luster, although brilliantly white, possesses a slightly bluish cast. The elec. cond. of both solns. is considerably higher than that of the standard com. Ni solns., so that, other things being equal, they may be operated at a lower voltage for a given speed of plating. Soln. 1B will plate 4 times as fast as the fastest Ni soln., soln. 13B, 15 times as fast. Plates from both of these solns. on various stock pieces satisfactorily withstood the various bending, hammering and burnishing tests to which com. Ni work is ordinarily submitted. The 2 solns. are remarkable for their throwing power: they readily and satisfactorily deposit Co in the indentations of the work. They can be operated at a high speed without any mechanical stirring. With soln. 13B operating at 150 amp. per sq. ft. a sufficient wt. of Co is deposited in 1 min.; with the best Ni baths it takes 1 hr. at about 10 amp. per sq. ft. to deposit a plate equally satisfactory, i. e., the actual wt. of metal is 1 of Co to 4 of Ni. In spite of the higher cost of Co it is cheaper to plate with Co than with Ni. Heavy deposits from the 2 Co solns. are vastly superior to any that were produced from Ni solns. Practical tests carried out at the Russell Motor Car Co. shops are cited. In every instance the Co-plated wares were superior to the Ni-plated ones. The paper was discussed at great length. MATHERS showed samples of plate of Fe, Cu, Ni, deposited under conditions recommended by K., H. and S. for Co. M. used 147 amp. per sq. ft. for Fe on brass at 24°, time, 2 min.; for Cu plate, 163 amp. per sq. ft., 2 min.; for Ni 170 amp. per sq. ft., 2 min.; for Co 160 amp. per sq. ft., 2 min. Thirty g. boric acid were added to each soln. Ni-Co alloy plate was found to be more resistant to corrosion than Ni in tests made by HOGABOOM. RICHARDS and BAXTER (*Proc. Am. Acad.* 34, 359(1889)) attributed the non-corrosion of Co to the structure of the metal. PROCTOR found that Co-plated Zn was better and cheaper than Ni-plated Zn.

C. G. F.

Formation of metallic alloys by electrolysis. G. BRUNI AND M. AMADORI. *Atti accad. sci. lett. ed arti, Padova* 30, 349 fol.(1913-14); through *Ann. chim. applicata* 3, 147.—Expts. were made on the pairs of metals Cu-Ni, Fe-Ni, Fe-Co, Ni-Co, and mixts. of the 2 metals in each case were obtained by electrolysis. The comp. of the deposits varies as the ratio of the metals in soln. This ratio is practically equal to that in the deposits, when the c. d. and tension at the electrodes are high. When the c. d. and the tension are diminished the deposits contain that metal in larger proportion which is lower in the e. m. f. series. NH_4 salts and NH_3 tend to increase the deposit of Ni in the Cu-Ni alloy. The % of the Ni diminishes on using a rotating cathode. Analogous results are obtained with Cu-Co. The pair Fe-Ni shows more complex phenomena with weak c. d. (0.05 amp. per sq. dm.). Solns. contg. 40-75% Fe give deposits of const. comp. with about 52% Fe, while for solns. of other comp. the deposits vary in comp. with variation of comp. of the soln. Co-Fe mixts. behave in a similar manner; solns. contg. from 33.3-50% Fe give deposits of a const. comp.

S. LEVY.

The preparation of ammonium persulfate. N. KAMEYAMA. *J. Chem. Ind. Tokyo* 17, No. 191; *Chem. Tech. Rept.* 38, 102-3(1914).—In the electrolysis of neutral $(\text{NH}_4)_2\text{SO}_4$ to form $(\text{NH}_4)_2\text{S}_2\text{O}_8$, the soln. should be kept satd. with the former salt. The current efficiency increases with the c. d. at the anode. Room temps. are desirable. HCl , KClO_3 and various CN compds. aid the oxidation in dil. but not in conc. solns.

J. S. G.

Electrolytic action on gas and water mains. HARRY E. YERBURY. *Surveyor* 47, 318(1915).—Summary of a paper dealing with general principles and some British governmental regulations.

W. D. COLLINS.

Chemistry in the development and operation of flaming arc carbons. (A correction.)

W. C. MOORE. *Met. Chem. Eng.* 13, 52-5(1915); *Trans. Am. Electrochem. Soc.* 27 (1915) (advance copy); cf. *C. A.* 9, 757.—In a C arc most of the light comes from the incandescent electrode tips. *Flaming arc* carbons contain admixts. of salts which cause the arc proper to become intensely luminous. In cored flame carbons the core hole is filled with a mixt. of C, flame material such as CaF_2 , and a binder. Reliability of the flaming arc is detd. by the constancy of light distribution, the constancy of light flux, the constancy of color and the ability to start with cold points after the carbons have been in use. In general, flaming arcs have very high efficiency. The c. p. depends upon the amt. and kind of flame material; it passes through a max. as we increase the relative amt. of other salt added to CaF_2 . Flaming arcs may be roughly divided into the 2 classes: arcs with a luminous *sheath* and arcs with a luminous *core*. The CaF_2 arc is of the first type; Cr_2O_3 arc is of second. In general, thermo-luminescence, chemical-luminescence and electro-luminescence are all responsible for the emission of light from a flaming arc. Oldenberg's spectroheliographic work (cf. *C. A.* 8, 1052) shows that the band spectra of CaF_2 arise in the sheath of the arc, while the cyanogen bands seen in an ordinary C arc are due to the collision of C and N atoms in the high temp. core of the arc. A long discussion of the paper followed.

W. C. MOORE.

Operating costs of gas-filled tungsten and flaming arc lamps. E. W. TOMPKINS. *Practical Eng.* 19, 396-7(1915).—Twenty amp. 300 w. gas-filled W lamps allow a more flexible operating system, produce more light and cost less to instal and maintain under existing conditions than 465 w. flaming arc lamps. The saving in trimming and patrolling is 45% and the total annual saving is over 4%. Renewal cost favors the W lamp.

W. H. BOYNTON.

Beck's projector arc lamp. W. WEDDING. *Elektrotechn. Z.* 35, 901(1914); *Electrician* 75, 61(1915); see *C. A.* 9, 1153.

C. G. F.

Isolated storage battery plants. BECKMANN AND HEISIG. *Elektrotechn. Z.* 35, 884(1914).—In Berlin 54 storage battery plants connected with the elec. system, having a storage capacity of approx. 14,400 kw.-hr.; are used in place of isolated plants. Eighty installations of this type in Munich have a capacity of 4500 kw.-hr. per day. The batteries are designed to supply the max. demand during peak load and they are charged when energy can be purchased at a low rate from the city supply. Details of costs of the Kaiser Hotel installation shows a total operating, interest and depreciation expense of \$22,008.00 per yr. against \$26,680.00 without battery. This represents a saving of 16.6% of the original cost of battery installation. Now part of the energy is sold due to an excess capacity since metal filament lamps were introduced and a 33 1/4% saving is realized. Insured continuous operation is another point in favor.

W. E. RUDER.

Examination of litharge (BECK) 7. Colloidal graphite lubrication (ACHESON) 18. Experimental electrochemistry in 1914 (GUTBIER) 6. Thermo-electromotive force of certain iron alloys (FULLER) 2. Copper leaching (RICKETTS) 9.

Manufacture of Electric Arc Carbons. London: The Electrician. 66 pp. 2s., 6d.

U. S., 1,135,154, Apr. 13. F. BEAU. Removing carbon from pressed tungsten filaments, etc., by heating electrically in an atm. of H and N or NH_3 . The C is volatilized in the form of CN and HCN.

U. S., 1,135,499, Apr. 13. A. L. CHAMBERLIN. Storage battery plate (structural features).

U. S., 1,136,424, Apr. 20. N. V. HYBINETTE. Electrolytic extraction of copper from mixed oxide and sulfide ores. See Brit., 22,745, 1913 (C. A. 9, 1012).

U. S., 1,136,483, Apr. 20. L. E. PORTER. Electrolytic diaphragm cell and agitator for electrolyzing ores (e. g., complex ores of Cu and Zn). The ore suspended in CuSO_4 soln. is passed through the anode compartment and the soln. of extd. values is then passed through the cathode compartment.

Brit., 28,629, Dec. 11, 1913. DETTIFOSS POWER CO. and J. H. LIDHOLM. In a furnace for the manuf. of N compds. of carbides, such as calcium cyanamide, the charge is contained within a casing supported on a hearth which can be lowered from the furnace for the charging operations. A finished charge can thus be removed and immediately replaced by a fresh one before the furnace has time to cool. Cf. C. A. 8, 2444.

Brit., 28,630, Dec. 11, 1913. A. HEINZ. In an electrolytic rectifier, an electrode of Pb-Sb alloy surrounding an Al electrode is made of cellular form to allow circulation of the electrolyte.

Brit., 29,156, Dec. 17, 1913. O. C. RUDOLPH. Complex sulfide ores are melted in an elec. furnace to form a mat which is run into a converter and blown for the complete removal of zinc and lead. The fumes from the converter, together with any Zn, Ag, Pb and S volatilized in the furnace, are treated in a wet-condensing plant for the recovery of the metals as sulfites or sulfates. The liquor, after removal of any pptd. Pb salt, is treated in an elec. plant having perforated anodes. After deposition of the Zn, the liquor is returned to the condenser. The residual mat may be worked directly to blister Cu, or it may be used as a flux in the furnace; Cu ores may also be mixed with the original charge to ensure the production of a high-grade mat. The condenser comprizes a series of compartments, the 1st compartment acting as a depositing-chamber, the 2nd being filled with checker-work bricks, and subsequent compartments containing staggered rows of baffle-rods arranged alternately at right angles. Liquor is supplied through a roof or covering of perforated tiles.

Ger., 280,906, Dec. 17, 1913. EUGEN DIETZ. Process of working up into magnesium oxychloride cement the ppt. resulting from the electrolysis with or without diaphragms, of MgCl_2 solns. such as the end lyes of the potash manuf. Cl seps. at the anode, and $\text{Mg}(\text{OH})_2$ seps. at the cathode and, depending upon the time the hydroxide remains in the electrolyte and upon the temp., it is converted into oxychloride. After removal from the cells, the ppts. are freed from adhering moisture in centrifuges or filter presses to such an extent that the MgO and MgCl_2 in the residue are in such proportions, considering the Cl and HCl lost in the subsequent ignition, that the final product has the constitution of magnesia cement. After such preliminary drying the pasty residue is ignited until more or less completely dehydrated. After cooling, a mass remains which consists of MgO and MgCl_2 , which may be worked up with H_2O to make a strong cement.

5. PHOTOGRAPHY.

LOUIS DERR.

New two-color process. G. E. BROWN. *Chem. News* 111, 156(1915).—The Kodachrome process. Two panchromatic plates are exposed, through red and green filters, resp. After the usual development and fixing the Ag image is dissolved out, and the plate which has been exposed behind the red filter is bathed in a green dye, while the other plate is bathed in a red dye. The plates take up the dye in inverse

proportion to the original Ag deposit. After drying, they are bound in register and viewed by transmitted light. For portrait work the flesh tints are very good, and there are no dots or rulings to mar the detail. Retouching is possible, and duplicates can be made by means of an intermediate glass positive, from which duplicates of the original plate are printed.

L. DERR.

6. INORGANIC CHEMISTRY.

H. I. SCHLESINGER.

Experimental inorganic chemistry and electrochemistry in 1914. A. GUTBIER. *Z. angew. Chem.* 28, I, 77-91, 93-111, 113-26, 131-44, 153-60, 173-6(1915).

E. J. C.

Photochemical phenomena in solutions of nitroprusside with thiocyanates and thiosulfates. A. CASOLARI. *Rend. soc. chim. ital.* [2] 5, 294-6(1914).—A soln. of $\text{Na}_2\text{S}_2\text{O}_3$ added to a little newly prepd. nitroprusside soln. and exposed to direct sunlight develops a blue color at once; this is clearly developed with solns. of 0.01 N $\text{Na}_2\text{S}_2\text{O}_3$. The reaction is accelerated by heat and also takes place *in vacuo*. Prolonged action of light decolorizes the lower layers, and a yellow-brown sediment is deposited. In the dark it is decolorized but becomes blue again on exposure to sunlight until the decolorization is complete. With KOH or NaOH the blue soln. becomes green, then yellow and on boiling seps. $\text{Fe}(\text{OH})_3$ and the filtrate gives a reaction for ferrocyanide. Thiocyanate solns. similarly treated with nitroprusside soln. give a blue-violet coloration which is permanent when placed in the dark. The reaction is very slow in the dark but is hastened by the action of heat. It is more rapid *in vacuo* and is accompanied by the evolution of gas. On prolonged exposure the soln. is decolorized with the sepn. of a bluish ppt. Expts. seem to indicate that this ppt. resembles Berlin blue in its properties. The reaction may be obtained with 1 cc. of the thiocyanate at a diln. of 1:10,000.

E. J. WITZEMANN.

Acid sodium borates. J. PONOMAREFF. Göttingen. *Z. anorg. Chem.* 89, 383-92 (1914).—By making use of Tammann's method (cf. C. A. 8, 2971) for inducing spontaneous crystn., P. crystd. mixts. of $\text{Na}_2\text{B}_4\text{O}_7$ and B_2O_3 containing up to 64.5% excess B_2O_3 , and by observing the temp. of the boundary between crystals and glass in mixts. of various compn., detd. the fusion curve of a portion of the system. The m. p. of $\text{Na}_2\text{B}_4\text{O}_7$ was found to be 732° , that of the compound $\text{Na}_2\text{O} \cdot 3\text{B}_2\text{O}_3$, 694° , that of the compound $\text{Na}_2\text{O} \cdot 4\text{B}_2\text{O}_3$, 783° ; the 1:2-1:3 eutectic is at about 10% B_2O_3 and 580° , the 1:3-1:4 eutectic at about 30% B_2O_3 and 658° ; the latter compd. was still the primary phase at the B_2O_3 -richest point detd., 64.5% B_2O_3 and 585° . The cryst. phases could not be sepd. from the glasses and analyzed, so the crystals were detd. by optical means, and a few cryst. details are given. P. concludes, without giving proof, that in the above system an unbroken series of solid solns. is formed.

GEORGE W. MOREY.

Conductivity study of the reaction between calcium nitrate and dipotassium phosphate in dilute solution. W. A. WITHERS AND ALEX. L. FIELD. West Raleigh, N. C. *J. Am. Chem. Soc.* 37, 1091-1105(1915).—A const. conc. of 1 g. per l. of K_2HPO_4 was maintained, and $\text{Ca}(\text{NO}_3)_2$ equiv. to 0 to 500 mg. N per l. was used. From a break in the curve at 120 mg. N per l., the conclusion was drawn that the reaction which obtained at the end of 24 hrs. (practically after 2 hrs.) was $4\text{K}_2\text{HPO}_4 + 3\text{Ca}(\text{NO}_3)_2 = \text{Ca}_3(\text{PO}_4)_2 + 2\text{KH}_2\text{PO}_4 + 6\text{KNO}_3$. A short time after mixing, there occurs another reaction, probably $4\text{K}_2\text{HPO}_4 + 4\text{Ca}(\text{NO}_3)_2 = \text{Ca}_3(\text{PO}_4)_2 + \text{Ca}(\text{H}_2\text{PO}_4)_2 + 8\text{KNO}_3$. This is an unstable condition which exists for about 7 min. after mixing the solns. The concs. of KH_2PO_4 and K_2HPO_4 in the liquid phase were detd. by a cond. titration,

and confirmed the first equation given above. $\text{Ca}_3(\text{PO}_4)_2$ undergoes partial hydrolysis on pptn., and the extent of this hydrolysis was roughly proportional to the conc. of KH_2PO_4 . It was slightly diminished by the presence of excess $\text{Ca}(\text{NO}_3)_2$.

E. B. MILLARD.

Peroxides of the alkaline earth metals. I. E. H. RIESENFELDT AND W. NOTTEBOHM. Freiburg i/Br. *Z. anorg. Chem.* 89, 405-12(1914).—When H_2O_2 is added to an excess of $\text{Ba}(\text{OH})_2$, or when Na_2O_2 is added to an appropriate Ba salt, $\text{BaO}_2 \cdot 8\text{H}_2\text{O}$ is obtained as a silky, white ppt.; when H_2O_2 is added to a cooled Ba salt soln. and NH_4OH added, small, white crystals of *barium peroxide diperoxyhydrate*, $\text{BaO}_2 \cdot 2\text{H}_2\text{O}_2$, are obtained; above 30° , under otherwise the same conditions, $\text{BaO}_2 \cdot \text{H}_2\text{O}_2$, white crystals, with a trace of yellow is obtained; anhydrous BaO_2 could not be prepd., nor could the compd. $\text{BaO}_2 \cdot 10\text{H}_2\text{O}$. When $\text{SrO}_2 \cdot 8\text{H}_2\text{O}$, prepd. similarly to $\text{BaO}_2 \cdot 8\text{H}_2\text{O}$, is allowed to stand in the cold with a large excess of H_2O_2 , *strontium peroxide diperoxyhydrate*, $\text{SrO}_2 \cdot 2\text{H}_2\text{O}_2$, is obtained; treating a conc. soln. of a Sr salt with H_2O_2 and NH_4OH at elevated temp. yields an impure SrO_2 ; pure SrO_2 can be obtained by heating $\text{SrO}_2 \cdot 8\text{H}_2\text{O}$ at 280° . CaO_2 is obtained from dil. solns. above room temp.; below room temp. $\text{CaO}_2 \cdot 8\text{H}_2\text{O}$ forms. CaO_2 can be obtained at lower temp. in conc. solns. $\text{CaO}_2 \cdot 2\text{H}_2\text{O}$ can be prepd. by hydrating CaO_2 ; $\text{CaO}_2 \cdot 2\text{H}_2\text{O}_2$ from a Ca salt and H_2O_2 in the cold. From observations on the color change on heating CaO_2 , it is concluded that 2 modifications exist. II. *Ibid* 90, 371-7(1915).— $\text{CaO}_2 \cdot 8\text{H}_2\text{O}$ heated in O did not lose O appreciably below 220° , but at 273° the decompn. takes place at an appreciable rate, which increases rapidly with temp. Heated in O under high pressure the rate of decompn. was still small; expts. showed that the dissociation pressure of CaO_2 is greater than 190 atms. at 255° . Attempts to form CaO_2 by heating CaO (prepd. by heating $\text{CaO}_2 \cdot 8\text{H}_2\text{O}$ at 315° until completely decompd.) in O at temps. up to 255° and pressures up to 190 atms. failed, confirming the above lower limit for the dissociation pressure of CaO_2 ; the prepn. of CaO_2 on a com. scale is impracticable because of the high pressure required. It is pointed out that the results of Bergius (cf. C. A. 7, 740) refer to CaO dissolved in NaOH-KOH , and that the active O found was probably due to K_2O_2 formed.

GEORGE W. MOREY.

Constitution of some nitrogen and phosphorus compounds. Constitution of elementary phosphorus. G. LEBAS. *Chem. News* 111, 113-4(1915).—A proof that N_2O contains a 3-numbered ring from the theory of mol. vols. The constitution of N_2O_5 is deduced similarly. It is shown that the constitution of elementary P may be explained by a cross linked formula, equiv. to a tetrahedron with a P atom at each corner. It follows that the directions of the valency links are along the edges of the tetrahedron, a view which may be applied to all trivalent atoms, and which permits configuration of the mols. of their compds.

W. H. S.

Hexabromoselenates. A. GUTBIER AND F. ENGEROFF. Stuttgart. *Z. anorg. Chem.* 89, 307-13(1914).—Prepn. of a number of compds. by a method similar to that previously used (cf. C. A. 6, 2367). As in the previous case the compds. were easily decompd. by solvents, especially H_2O , with sepn. of red colloidal Se, and could only be recrystd. from concd. HBr soln. All the compds. are red and anhydrous. *Tetramethylammonium hexabromoselenate*, $(\text{Me}_4\text{N})_2\text{SeBr}_6$, is easily prepd.; *triethylammonium* tends to give an oily reaction product, but cryst. needles can be obtained by working with small amts. and stirring violently, after which the oil can be crystd. by seeding; *tetraethylammonium* behaves similarly; *i-propylammonium* is more stable than any of the above; *dipropylammonium* forms large crystals; *di-i-butylammonium* tends to form an oily mass; *pyridinium* forms a bluish red microcryst. powder; α -*picolinium* seps. easily as bluish red crystals; β -*picolinium* forms a yellow oil which slowly forms dark red glittering crystals.

GEORGE W. MOREY.

Unstable chromium sesquioxide, and corrections of previous work on the heat effect of chromium and aluminium sesquioxides in fusions with sodium peroxide. W. G. MIXTER. *Am. J. Sci.* 39, 295-9(1915).—Corrected value for heat effect of 1 g. of amorphous Cr_2O_3 reacting with Na_2O_2 is 720 cal., instead of the value previously reported. Heating $\text{Cr}(\text{OH})_3$ in a current of H for a day at 420° gives an unstable dark olive green oxide, which changes in O to the stable green oxide. The unstable form glows when heated in a closed tube, and long heating at a temp. below that at which it glows, changes it to the stable oxide. The heat of reaction of unstable Cr_2O_3 reacting with Na_2O_2 is 865 cal., an approx. value, since some of the stable oxide may have been present. New detns. of the heat effect of Al_2O_3 in fusions with Na_2O_2 give higher results than were previously obtained. The difference is in the O given off, little or none having been observed in previous expts. The av. of results obtained when 1 g. of amorphous Al_2O_3 reacts with Na_2O_2 is 539 cal., an approx. value because of the wide variations in the results. W. H. S.

Compounds of chromates and dichromates with mercuric cyanide. D. STRÖMHOLM. Upsala. *Z. anorg. Chem.* 90, 361-70(1915).—The following chromates were prepd. by dissolving the components in H_2O and cooling; all are yellow. The Rb compound, $2\text{Rb}_2\text{CrO}_4 \cdot 3\text{Hg}(\text{CN})_2 \cdot 2\text{H}_2\text{O}$, long needles; Cs compound, $\text{Cs}_2\text{CrO}_4 \cdot 2\text{Hg}(\text{CN})_2 \cdot \text{H}_2\text{O}$, needles; crystals of the Na compd. could not be obtained pure, but probably have a formula similar to the above Cs compd.; NH_4 compound, $2(\text{NH}_4)_2\text{CrO}_4 \cdot 3\text{Hg}(\text{CN})_2 \cdot 2\text{H}_2\text{O}$, flakes; methylammonium compound, $(\text{MeNH}_2)_2\text{CrO}_4 \cdot 2\text{Hg}(\text{CN})_2$; dimethylammonium compound, $(\text{Me}_2\text{NH})_2\text{CrO}_4 \cdot 2\text{Hg}(\text{CN})_2 \cdot 2\text{H}_2\text{O}$, needles (a higher compd. is probably formed, but it could not be isolated); trimethylammonium compound, $(\text{Me}_3\text{NH})_2\text{CrO}_4 \cdot 2\text{Hg}(\text{CN})_2 \cdot \text{H}_2\text{O}$; tetramethylammonium compound, $(\text{Me}_4\text{N})_2\text{CrO}_4 \cdot 2\text{Hg}(\text{CN})_2 \cdot \text{H}_2\text{O}$; ethylammonium compound, $2(\text{EtNH}_2)_2\text{CrO}_4 \cdot \text{Hg}(\text{CN})_2 \cdot \text{H}_2\text{O}$; the diethylammonium compound, $(\text{Et}_2\text{NH})_2\text{CrO}_4 \cdot 2\text{Hg}(\text{CN})_2$, is difficult to prepare pure, and a higher compd. may exist; compds. with Et_4NH and Et_4N could not be isolated; trimethylsulfonium compound, $(\text{Me}_3\text{S})_2\text{CrO}_4 \cdot 2\text{Hg}(\text{CN})_2 \cdot 2\text{H}_2\text{O}$. The following dichromate compds. were prepd.: Cs compound, $\text{Cs}_2\text{Cr}_2\text{O}_7 \cdot \text{Hg}(\text{CN})_2$, long, yellowish red difficultly sol. needles; methylammonium compound, $(\text{MeNH}_2)_2\text{Cr}_2\text{O}_7 \cdot \text{Hg}(\text{CN})_2$, large, reddish brown crystals; trimethylammonium compound, $(\text{Me}_3\text{NH})_2\text{Cr}_2\text{O}_7 \cdot 2\text{Hg}(\text{CN})_2$, long, red needles; tetramethylammonium compound, $(\text{Me}_4\text{N})_2\text{Cr}_2\text{O}_7 \cdot 2\text{Hg}(\text{CN})_2 \cdot \text{H}_2\text{O}$, long, red prisms; the tetraethylammonium compound, $(\text{Et}_4\text{N})_2\text{Cr}_2\text{O}_7 \cdot 3\text{Hg}(\text{CN})_2$, was difficult to prepare, as the hexagonal yellowish red cryst. kernels did not always sep. and probably are metastable; trimethylsulfonium compound, $(\text{Me}_3\text{S})_2\text{Cr}_2\text{O}_7 \cdot \text{Hg}(\text{CN})_2$, long, red needles. The H_2O in the above hydrated compds. seems to be lost continuously rather than in steps and it is probable that a continuous series of solid solns. is formed in each case. GEORGE W. MOREY.

Ferrocyanides and mercuric cyanide. D. STRÖMHOLM. Upsala. *Z. anorg. Chem.* 90, 370(1915).—In addition to the compds. previously described (C. A. 8, 878), the following have been prepd.: Cs compound, $\text{Cs}_3\text{Fe}(\text{CN})_6 \cdot 3\text{Hg}(\text{CN})_2$, small, hexagonal or triangular crystals; trimethylammonium compound, $(\text{Me}_3\text{NH})_3\text{Fe}(\text{CN})_6 \cdot 3\text{Hg}(\text{CN})_2$, tablets of quadratic, rectangular, or hexagonal outline. G. W. M.

Hydrous ferric oxide. W. D. BANCROFT. *J. Phys. Chem.* 19, 232-40(1915).—It is possible to prepare any number of hydrous Fe_2O_3 solns., if the Fe_2O_3 used has different amts. of H_2O in the particles. The colloidal Fe_2O_3 prepd. according to Péan de St. Gilles (*Compt. rend.* 40, 568, 1243(1855)) by boiling dil. $(\text{AcO})_2\text{Fe}$, is sandy and contains little H_2O . That prepared according to Graham (*J. Chem. Soc.* 15, 249(1862)), by dialysis, is gelatinous and more hydrous. The Fe_2O_3 of Graham tends to change slowly into the less hydrous form. The coarser particles of the Péan de St. Gilles oxide, owing to their sandy character, coalesce with less ease and they are peptized more readily after pptn. with HCl or HNO_3 . The ppt. is gelatinous resembling

the Graham oxide. The irreversibility appears to be due to coalescence of the gelatinous particles, rather than to the difficulty of washing out excess precipitant. The coarse particles of the Péan de St. Gilles oxide are less readily attacked by cold acids than the fine particles of the Graham oxide. The yellow color of the hydrous limonites is probably not caused by a hydrous hydrated oxide, and there is no proof that the color is due to the adsorption of an Fe salt, which is a possibility. By heating the Graham oxide with HCl, Fischer obtained both limonite and hematite, which is undoubtedly due to the lack of uniformity of the Graham oxide. Cf. C. A. 8, 3739.

W. H. S.

Complex ions of nickel and cobalt with cyanogen. G. Rossi. Univ. Bologna. *Gazz. chim. ital.* 45, I, 6-10(1915).—When a soln. of a Ni or Co salt is treated with KCN a ppt. sol. in excess KCN is formed. The $\text{Ni}(\text{CN})_2$ and $\text{Co}(\text{CN})_2$ at first formed is dissolved to form complex nickelo- and cobaltocyanides. R. studied the formation of these complexes by following the variations in elec. cond. In dil. solns. of NiCl_2 and KCN the cond. will be due to K, Ni, CN and Cl ions. But by the formation of $\text{Ni}(\text{CN})_2$ because of its low solubility there is a drop in the cond. Little by little as KCN is added the complex ion $\text{Ni}(\text{CN})_n$ is formed and the difference between the observed and calc. values becomes const. From the data the values of n can be deduced. The cond. of 0.0518 g. $\text{NiCl}_2 + 0.02608$ g. KCN (1 mol.) in 100 cc. H_2O was found to be 113.51^{-8} (calc. 159.72^{-8}); with 2 mols. KCN it was 134.41^{-8} (calc. 222.36^{-8}); with 3 mols. 187.70^{-8} (calc. 285^{-8}); with 4 mols. 242.60^{-8} (calc. 347.64^{-8}); with 5 mols. 305.20^{-8} (calc. 410.28^{-8}); with 6 mols. 367.60^{-8} (calc. 472.92^{-8}). Since the difference between the observed and calc. values produced by adding KCN becomes const. with 4 mols. it is deduced that in the case of Ni n is 4 and the complex ion is $\text{Ni}(\text{CN})_4$; the mol. is $\text{K}_2\text{Ni}(\text{CN})_4$. With 0.0520 g. $\text{CoCl}_2 +$ the same KCN soln. under the same conditions the cond. with 1 mol. KCN was 121.96^{-8} (calc. 159.18^{-8}); 2 mols. 129.95^{-8} (calc. 221.82^{-8}); 3 mols. 179.18^{-8} (calc. 284.46^{-8}); 4 mols. 236.65^{-8} (calc. 347.10^{-8}); 5 mols. 293.86^{-8} (calc. 409.74^{-8}); 6 mols. 350.79^{-8} (calc. 472.38^{-8}); 7 mols. 412.81^{-8} (calc. 535.02^{-8}). The difference here becomes const. only when the 6th mol. KCN is added so that the complex ion becomes $\text{Co}(\text{CN})_6$ and the mol. is $\text{K}_4\text{Co}(\text{CN})_6$.

E. J. WITZEMANN.

Compounds of iridium chloride with organic bases. A. GUTBIER. (With D. HOYERMANN.) Stuttgart. *Z. anorg. Chem.* 89, 340-3(1914).—When a soln. of IrCl_4 is evapd. with excess pyridine, and an excess HCl added, a light brown cryst. powder of *pyridinium hexachloroiridate*, Py_2IrCl_6 , seps.; by the slow action of pyridine vapor on dil. HCl soln. of IrCl_4 , the compound $\text{HPy}_2\text{IrCl}_6$, dark reddish brown crystals, was obtained; the latter compd. on standing with pyridine in a desiccator is converted into the compound IrPy_2Cl_6 , which is also obtained by the action of pyridine on an EtOH soln. of IrCl_4 . Quinoline added to an EtOH soln. of IrCl_4 gives the compound $\text{Ir}[\text{C}_8\text{H}_7\text{N}]_2\text{Cl}_4$; α -picoline added to an EtOH soln. of H_2IrCl_6 gives deep red crystals of the compound $[\text{C}_8\text{H}_7\text{N}]_2\text{H}_2\text{IrCl}_6$; by the action of α -picoline on a warm soln. of Na_2IrCl_6 , a yellow powder of the compound $\text{Ir}(\text{C}_8\text{H}_7\text{N})\text{Cl}_4$ was formed.

GEORGE W. MOREY.

Hexachloroiridates. A. GUTBIER AND BERTA OTTENSTEIN. Stuttgart. *Z. anorg. Chem.* 89, 344-51(1914); cf. C. A. 4, 729.—The following compds. were prepd. by adding the chloride of the base to a soln. of H_2IrCl_6 ; they are sol. in H_2O to not very stable solns., and can be recrystd. from HCl soln.; all are anhydrous lustrous crystals. *Tetramethylammonium hexachloroiridate*, $(\text{Me}_4\text{N})_2\text{IrCl}_6$, dark red needles; *benzylmethylammonium*, dark reddish brown needles; *benzylmethylammonium*, blackish brown needles; *tetraethylammonium*, dark brownish red crystals; *benzalethylammonium* seps. as an oil, which crystallizes as broad, deep brown to black needles; *benzylethylammonium*,

broad, black needles; *tripropylammonium* seps. slowly as brownish black crystals; *tri-*i*-butylammonium* seps. slowly as ruby red crystals; *allylammonium*, delicate felted needles; *di-*i*-amylammonium*, blackish brown, delicate leaves and needles; *tri-*i*-amylammonium* forms an oil which crystallizes as blackish brown crystals; *guanidinium*, dark brown leaves; *triphenylguanidinium*, brown, silky needles which could not be recrystd.; *benzalanilinium*, dark reddish brown crystals which could not be recrystd.; *p-chloroanilinium*, blackish brown needles which could not be recrystd.; *m-bromoanilinium*, blackish brown needles; *p-bromoanilinium*, dark reddish brown needles; *tribenzylammonium*, fine, dark red needles; *dimethyl-*o*-toluidinium*, dark red crystals; *pseudo-camidineum*, small, dark brown needles which could not be recrystd.; *β -picolinium*, dark brown needles; *lutidineum*, black crystals, which sep. slowly; *collidineum*, deep black crystals; *piperidineum*, fine, reddish brown crystals; *i-quinolinium*, difficultly sol., long and broad, dark reddish brown needles.

GEORGE W. MOREY.

Hexabromo-osmates. A. GUTBIER AND L. MEHLER. Stuttgart. *Z. anorg. Chem.* 89, 313-33 (1914).—The following hexabromo-osmates were prepd. by adding the bromide of the base to a HBr soln. of Na_2OsBr_6 ; they are easily decompd. by H_2O , and are best recrystd. from strong HBr soln.; all are anhydrous and have a metallic luster. (With O. EDELHAUSER.) *Methylammonium hexabromo-osmate*, $(\text{MeNH}_2)_2\text{OsBr}_6$, dark brown, 6-sided leaves; *dimethylammonium*, small, dark brown crystals; *trimethylammonium*, crystallizes slowly as dark brown octahedra; *tetramethylammonium*, dark brown octahedra, color (Radde's scale) 26b; *benzalmethylammonium*, dark red crystals, color 27e; *benzylmethylammonium*, color 25b; *ethylammonium*, dark reddish brown, 6-sided leaves; *diethylammonium*, dark brownish red tablets containing many inclusions of dark octahedra; *nirosodiethylammonium*, black, triclinic crystals, difficult to crystallize; *triethylammonium*, poorly formed, black crystals; *tetraethylammonium*, dark reddish brown crystals, color 28c; *benzalethylammonium*, dark reddish brown crystals formed from an oil which first seps.; *benzylethylammonium*, dark brown ramified crystals formed from a reddish brown oil; *n-propylammonium*, reddish violet isotropic scales; *i-propylammonium*, delicate brownish black felted needles; *dipropylammonium*, copper red, rectangular quadratic tablets; *tripropylammonium*, dark reddish brown crystals, color 27b; *n-butylammonium*, blackish brown, 6-sided, probably isotropic tablets; *di-*i*-butyl*, dark brown to black, monoclinic crystals; *tri-*i*-butylammonium*, delicate red needles, color 25e; *allylammonium*, seps. slowly as dark reddish brown cryst. powder; *i-amylammonium*, dark brownish red crystals, hard to obtain and easily decompd.; *di-*i*-amylammonium*, dark brownish red to black, glittering, probably tetragonal prisms; *tri-*i*-amylammonium*, dark reddish brown crystals, color 26c; *ethylenediammonium*, black crystals; *propylenediammonium*, bundles of dark violet needles; *guanidinium*, bronze-colored leaves; *triphenylguanidinium*, deep red crystals; *anilinium*, black needles; *methylanilinium*, reddish to black-brown tablets with rhombic outline; *dimethylanilinium*, forms an oil which thickens to a resin-like mass, and yields 6-sided plates on warming with EtOH; *ethylanilinium*, deep black cryst. skeleton; *diethylanilinium* and *i-amylanilinium*, behaves similarly to the above, the 1st giving black lath-shaped crystals and the 2nd black, kernel-like aggregates of pyramidal crystals; *benzalanilinium*, dark reddish brown crystals; *benzylanilinium*, dark reddish brown to black rhombic tablets; *methylbenzylanilinium*, forms an oil which quickly solidifies to black crystals; *ethylbenzylanilinium*, solidifies from an oil as black, apparently monoclinic crystals; *m-chloroanilinium*, dark brown powder, color 29a; *p-chloroanilinium*, brownish black cryst. felt; *1,2,4-dichloroanilinium*, slowly forms black needles; *o-bromoanilinium*, black needles; *m-bromoanilinium*, black crystals; *p-bromoanilinium*, black needles; *benzylammonium*, broad, black plates; *tribenzylammonium*, dark reddish brown crystals, color 26b; *o-toluidinium*, small, silky, birefringent needles; *m-toluidinium*, black-brown

cryst. skeleton; *p*-toluidinium, black, intergrown needles; *dimethyltoluidinium*, aggregates of black leaves and needles; *dimethyl-p*-toluidinium, forms a dark oil which quickly crystallizes as thick black blocks with rounded corners; *1,2,4*-xylylidinium, deep brown intergrown needles; *1,3,4*-xylylidinium, dark brown, distaff-like aggregates of needles, probably rhombic; *1,4,5*-xylylidinium, deep black, opaque needles; *pseudocumidinium*, dark red to reddish brown cryst. powder; *m*-phenylenediammonium, deep black, opaque, lath-like prisms with domes; *1,2,4*-toluylenediammonium, black needles; *1,3,4*-toluylenediammonium, black leaves; *o*-anisidinium, deep black, flat crystals; *p*-anisidinium, deep black monoclinic needles with terminations; *o*-phenetidinium, bronze-colored needles, color 25b; *p*-phenetidinium, large, broad, black leaves, showing fluorescence on the faces; *pyridinium*, dark reddish brown rhombic leaves; α -picolinium, black leaves with slight birefringence, β -picolinium, dark brown cryst. powder, color 25a; *lutidinium*, black, felted needles; *collidinium*, black, triclinic tablets and needles; *piperidinium*, dark brown needles, color 27b; *i*-quinolinium, dark brownish red probably amorphous powder, color 25b.

GEORGE W. MOREY.

Hexachloro-osmates. A. GUTBIER AND L. MEHLER. Stuttgart. *Z. anorg. Chem.* 89, 333-9 (1914).—The following compds. were prepd. from the chloride of the base and Na_2OsCl_6 in HCl soln.; they are all anhydrous, decompd. by H_2O , and can be recrystd. from HCl soln. *Tetramethylammonium hexachloro-osmate*, $(\text{Me}_4\text{N})_2\text{OsCl}_6$, small, reddish yellow octahedra, color (Radde's scale), 3k; *triethylammonium*, forms slowly on careful evapn. as thick, red monoclinic crystals; *tetraethylammonium*, reddish yellow glittering crystals, combinations of cubes and octahedra; *tripropylammonium*, clear, red monoclinic crystals, color 30k; *di-i-butylammonium*, poorly formed, bright, glittering, red crystals, with slight pleochroism, from yellow to orange, color 29i; *tri-i-butylammonium*, large, red, glittering, triclinic crystals, color 30k; *allylammonium*, reddish brown, glittering, rhombic leaves, with a tendency toward twinning, color 28e; *di-i-amylammonium*, orange-yellow, knotty needles with terminations, color 50; *tri-i-amylammonium*, straw-yellow needles, color 5n; *guanidinium*, dark brown, glittering crystals with micaceous structure; *triphenylguanidinium*, yellowish brown cryst. ppt., color 6q; *i-amylanilinium*, orange-red, delicate, felted needles, monoclinic, often showing twinning parallel to the elongation, color 40; *m-chloroanilinium*, reddish brown, glittering, triclinic needles, weakly pleochroic, color 25c; *o*-bromoanilinium, ruby-red, glittering, monoclinic needles, color 28f; *m*-bromoanilinium, reddish brown, much ramified needles, with inclined extinction and slight pleochroism, orange to red, color 27e; *p*-bromoanilinium, long, dark red, rhombic needles, with pleochroism orange to red; *tribenzylammonium*, small, weakly, slightly brownish yellow, rhombic needles, color 70; *pseudocumidinium*, extremely fine, felted, orange-red, rhombic needles, color 4l; α -picolinium, reddish brown, monoclinic crystals, showing slight pleochroism yellow to orange, color 1h; *lutidinium*, broad, yellowish brown, probably monoclinic needles, color 4m; *collidinium*, brown, glittering, monoclinic crystals, color 1i; *piperidinium*, light brownish red, rhombic needles, weakly pleochroic, color 2k; *i*-quinolinium, long, light reddish brown, glittering needles, probably monoclinic, slightly pleochroic, show a slight tendency toward twinning, color 1h.

GEORGE W. MOREY.

System: anorthite-forsterite-silica (ANDERSEN) 8. Silicon compounds (MARTIN) 10.

SPENCER, J. F.: *The Rare Earth Metals*. New York: Longmans, Green & Co.

7. ANALYTICAL CHEMISTRY.

E. G. R. ARDAGH.

The teaching of analytical chemistry. A. C. CHAPMAN. *Analyst* 40, 77-89 (1915).—Annual address of the president, the Soc. of Public Analysts. P. B. D.

General principles governing the complete analysis of minerals and ores. W. R. SCHOELLER. *Analyst* 40, 90-106(1915).—Outline of a scheme of quant. analysis, including a bibliography. P. B. DUNBAR.

Method of estimating the volume of solid matter in muds. W. H. COLEMAN. *J. Soc. Chem. Ind.* 34, 209-10(1915).—The method was devised for detg. the amts. of C_2N_2 in the sol. $((NH_4)_4Fe(CN)_6)$ and insol. (complex double ferrocyanide of Fe and NH_4) form in the muddy liquid obtained in its recovery from coal gas by passage through a mud obtained by adding $FeSO_4 \cdot 7H_2O$ to gas liquor. Finding it impossible to filter off and dry the mud without altering its comp., C. adopted the following procedure: Shake the muddy liquid till well mixed, measure out, let settle and det. the $(NH_4)_4Fe(CN)_6$ in the clear liquid (= A). To another equal portion of muddy liquid add 50 cc. of H_2O , shake well, let settle, and det. the $(NH_4)_4Fe(CN)_6$ in the clear liquid (= B). The total $(NH_4)_4Fe(CN)_6$ contained in the original muddy liquid was detd. (= C). *Calculation:* let x = cc. of liquid in the 50 cc. of mud taken for B before diln.; then as 50 cc. of H_2O was added, $50 + x$ = cc. of liquid in the 100 cc. after diln., and this would contain the same total amt. of ferrocyanide as was contained in the x cc., provided none of the insol. ferrocyanide went into soln. on diln. Then $Ax = (50 + x)B$ or $x = 50B/(A - B)$ cc., or $50 - x$ cc. = vol. of solid matter in 50 cc. of the original mud. If the quantities were weighed out, the wt. of soln. and of dry solid matter would be obtained. *Conditions for accuracy:* Solid matter must be quite insol. and must not be rendered sol. or altered in amt. by diln. The liquid must contain some sol. substance that can be easily detd. and which is not altered by diln.; adsorption must not occur. *Applications:* to vat waste, C_2N_2 liquor, sewage, etc.; and in many cases where an approx. result only is required, a detn. of the decrease in d. after diln. will suffice. To insol. muddy deposits in solns. for crystn.; in vol. analysis to ascertain the vol. of a ppt. when a portion of clear liquid is taken for analysis. To the detn. of naphthalene in creosote by heating latter till quite liquid and then detg. N by Kjeldahl method; cool and let the naphthalene crystallize, filter and det. N in the clear oil; calc. vol. of the deposited material. F. W. SMITHER.

Separation of gold and platinum from other metals. A. CHRISTENSEN. *Z. anal. Chem.* 54, 158-9(1915).—To a weak HCl soln. of the metals add a moderate excess of hydrazine sulfate and let stand in boiling H_2O about 1 hr. (should the mixt. contain Ba or other metals that form insol. sulfates, they can be first removed by pptn. with H_2SO_4 or hydrazine-HCl may be used as the pptnt.). The ppt. may contain Hg and a little Cu besides Au and Pt; all other metals, including As, Sb and Sn are not pptd. Filter off the ppt., wash, and boil with HNO_3 to dissolve Hg and Cu; filter and wash. The filtrate may be examd. separately or mixed with first filtrate. Dissolve the residue of Au and Pt in *aqua regia*, evap. off excess of solvent and in the weak HCl soln. ppt. the Au with SO_2 and then the Pt with NH_4Cl . The filtrate from the hydrazine pptn. can be treated with H_2S and $(NH_4)_2S$ in usual manner. After removing any ppts. by H_2S , $(NH_4)_2S$, or $(NH_4)_2CO_3$, the hydrazine salts may be expelled along with the NH_4 salts by evapn. and ignition. In the method, Au is pptd. as such at once, while $PtCl_4$ is reduced to $PtCl_2$ and finally quant. to Pt on warming. F. W. S.

Determination of platinum, palladium and gold. A. M. SMOOT. *Eng. Mining J.* 99, 700-1(1915).—Scorify the Pb buttons from 2 or more $1/2$ assay ton fusions with

6 times as much Ag as the combined wt. of Pt, Pd or Au, and cupel hot. Part with HNO_3 . Pd goes into soln. The residue which is Au with some Pt, is dissolved in *aqua regia* and set aside as soln. A. Ppt. the Ag from the HNO_3 soln. (containing Ag, Pd and some Pt) with HCl. Pt remains in soln. Scorify and cupel the AgCl which is colored pink by Pd, and part, repeating the process until all Pd is in soln. Unite the filtrates from the AgCl, add them to soln. A, and evap. to dryness. Take up with dil. HCl (1:3) and evap. again, taking up with 5 drops HCl and 40 cc. H_2O , neglecting any AgCl residue. Ppt. Au with 3 g. oxalic acid with boiling, allow it to stand overnight and filter. Scorify the residue with Ag and det. Au in the usual way. To the oxalic acid filtrate add 5 cc. HCl and make up to 150 cc., heat to boiling and ppt. the Pt and Pd with H_2S . Filter, wash the ppt. into the original beaker, and dissolve it with *aqua regia* allowing the acid fumes to dissolve any traces of Pt and Pd remaining on the paper. Evap. the soln. to dryness with HCl to remove HNO_3 , take up the residue with 3 drops HCl and 2 cc. H_2O , add 5–10 cc. of satd. soln. of NH_4Cl , stir and set it away overnight. Ppt. Pt as $(\text{NH}_4)_2\text{PtCl}_6$. Filter and wash with 20% NH_4Cl soln. Pd goes into the filtrate which is set aside as soln. B. Dissolve the Pt ppt. in boiling 5% H_2SO_4 and ppt. with H_2S as before. Burn the filter and proceed as for Pt assay. To soln. B add 7 times as much dimethylglyoxime dissolved in HCl (2:1) as there is Pd present. Dil. to 300 cc., heat on a steam bath for 30 min. and set away overnight. The $(\text{C}_6\text{H}_{14}\text{N}_4\text{O}_4)_2\text{Pd}$ is filtered through a Gooch, washed with dil. HCl, H_2O and EtOH and dried at 110° . It contains 31.686% Pd.

H. L. OLIN.

Volumetric determination of silver. C. DEBRUN. *Ann. fals.* 7, 407–9(1914); through *J. Soc. Chem. Ind.* 34, 251.—In the Gay-Lussac method the detn. of Ag by titration with NaCl soln., 100 cc. of which at 15° is equiv. to 1 g. of Ag, a correction must be applied if the titration is made at another temp. than 15° . D. gives the necessary corrections to be applied to the NaCl soln. in tabular and graphic form. Thus, at 0° , 100 cc. of the soln. will have an apparent vol. of 99.953 cc.; at 5° , 99.938 cc.; at 10° , 99.956 cc.; at 20° , 100.092 cc.; at 25° , 100.205 cc.; at 30° , 100.328 cc.; and at 35° , 100.484 cc.

H. A. LEPPER.

Determination of silver in ores and concentrates containing platinum and palladium. A. M. SMOOT. *Eng. Mining J.* 99, 701(1915).—Make the usual crucible fusion but, instead of cupelling, dissolve the button in dil. HNO_3 . Most of the Ag dissolves, together with Pd and a trace of Pt. Filter and wash the residue, scorify with a little Pb and dissolve the button as before. Combine the filtrates, ppt. the Ag with NaCl and add 2 cc. of conc. H_2SO_4 . Filter off the AgCl and PbSO_4 and scorify with Pb to det. Ag.

H. L. OLIN.

A sensitive iron reaction and a method for the colorimetric estimation of iron. L. CHUGAEV AND B. ORELKIN. Petrograd. *Z. anorg. Chem.* 89, 401–4(1914); *J. Russ. Phys. Chem. Soc.* 46, 1874–6(1914).—A very sensitive test for Fe is given by the characteristic intensely red compd. formed by Fe^{++} with dioximes, e. g., dimethylglyoxime; Fe^{++} compds. may be reduced with hydrazine, an excess of which tends to be beneficial. For the colorimetric estn. of Fe, add to 50–70 cc. of the soln. 1 g. $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{SO}_4$ and 5 cc. of a satd. EtOH soln. of dimethylglyoxime, heat the soln. to boiling, add 10 cc. 25% NH_4OH soln., continue the boiling $\frac{1}{2}$ min., cool the soln. rapidly, dil. with H_2O to 100 cc. and compare in a colorimeter with a standard Fe soln. The method permits the detection with safety of 6×10^{-8} g. Fe in 1 cc.; the minimal abs. amt. of Fe detectable is less than 5×10^{-8} g.; quant. the method permits the estn. within 1–2% of the Fe content of solns. 0.0001–0.00005 N. Large amts. of Zn and Al interfere.

GEORGE W. MOREY.

The estimation of potassium by the perchlorate method. R. G. THIN AND A. G. CUMMING. *J. Chem. Soc.* 107, 361–6(1915).—Low results with the HClO_4 method for

K, obtained by Davis (cf. *C. A.* 7, 394), were found to be due to the soln. of KClO_4 in the wash liquid (95% EtOH containing 0.2% HClO_4). The authors found that a freshly prepd. washing soln. of 95% EtOH satd. with KClO_4 gave accurate results. In this detn. NH_4 salts must not be present in quantity but other salts even up to 2 g. of chlorides have no effect. The evapn. with HClO_4 must be carried far enough to insure complete conversion of chlorides into perchlorates. H. L. OLIN.

Examination of litharge. P. BECK. *Z. anal. Chem.* 54, 137-47(1915).—The processes for mfg. PbO are briefly discussed in order to indicate the source of the various impurities (SiO_2 , Fe_2O_3 , Al_2O_3 , CaO , MgO , PbSO_4 , etc.). **Flake litharge:** In most cases Cu is the only detn. required; dissolve 100 g. of material in excess of dil. HNO_3 , ppt. Pb as PbSO_4 , filter, and make filtrate up to 1 l.; take an aliquot of 10, 50, or 100 cc. according to Cu content, add excess of NH_4OH , filter off $\text{Al}(\text{OH})_3$ + $\text{Fe}(\text{OH})_3$, acidify filtrate with dil. H_2SO_4 and electrolyze or ppt. CuS with H_2S . The deposit of Cu, if not pure, is dissolved in a little HNO_3 and any Bi removed with NH_4OH and $(\text{NH}_4)_2\text{CO}_3$ and this filtrate acidified and electrolyzed as before. For very accurate work, a subsequent pptn. with H_2S is necessary. A complete analysis may be made by usual methods using a 10 to 100 g. sample. **Ceramics and glass making:** PbO or Pb_3O_4 should not contain over 0.004% Cu or 0.006% Fe. **Gravimetric detn. of Cu and Fe:** Dissolve 100 g. of material in 750 cc. of H_2O and 80 cc. of HNO_3 (d. 1.40), cool (if PbO_2 is present, add 15 cc. of perhydrol), add 40 cc. conc. H_2SO_4 dild. with 200 cc. of H_2O , cool, filter through a double 18.5 cm. filter into a 1.5 l. dish; treat the ppt. of PbSO_4 with 10 cc. of conc. HNO_3 and 250 cc. of H_2O , filter, receiving filtrate in dish with main filtrate and wash once by filling funnel with H_2O . Evap. filtrate to SO_3 fumes, cool, add 100 cc. of H_2O , filter off PbSO_4 and wash with 1 to 2% H_2SO_4 . Pass H_2S into the warm soln. until cold, let stand 12 hrs., filter into a 750 cc. Erlenmeyer flask and wash the ppt. 3 times with H_2O containing H_2S . Return paper with ppt. to the flask used for the pptn., treat with 50 cc. of hot H_2O , 25 cc. conc. HNO_3 and a few drops of H_2O_2 ; heat on water-bath about 1 hr., filter, wash 3 times with hot H_2O , catching filtrate in a 200 cc. dish; to filtrate add 20 cc. dil. H_2SO_4 , heat till all HNO_3 is expelled. Any traces of PbSO_4 are filtered out and washed with 1-2% H_2SO_4 ; to the filtrate in a 200 cc. Erlenmeyer flask, add an excess of NH_4OH and a few drops of $(\text{NH}_4)_2\text{CO}_3$, heat on water-bath about 2 hrs., filter out any $\text{Bi}(\text{OH})_3$, washing 3 times with cold H_2O . Acidify the filtrate with H_2SO_4 and ppt. CuS with a current of H_2S ; filter and wash as usual, finally igniting and weighing as CuO . To the filtrate from the first H_2S pptn. add 25 cc. of satd. tartaric acid soln., an excess of NH_4OH , and then $(\text{NH}_4)_2\text{S}$; fill the flask (750 cc.) up to the neck with hot H_2O , cork loosely with a cork covered with a filter paper and let stand in a warm place for 12 hrs. Filter off the FeS , wash twice with H_2O + $(\text{NH}_4)_2\text{S}$ and then dry, ash and ignite in a Pt crucible, weighing as Fe_2O_3 . Since both Fe and Cu in most cases must be detd. the grav. is to be preferred to the colorimetric method. A modification of the Lunge colorimetric method (cf. *Z. angew. Chem.* 1896, p. 3) for Fe is executed as follows: 2 g. of a normal PbO of known Fe content and 2 g. of sample are each dissolved in 5 cc. of H_2O + 5 cc. of conc. HNO_3 ; to the hot solns. add 5 cc. of dil. H_2SO_4 , filter and wash the PbSO_4 4 times with hot H_2O , receive the filtrate in the measuring cylinders; add NH_4CNS and compare in usual manner. **Accumulator plates:** The PbO must be of high purity, containing traces only of metals of the H_2S group (especially Cu) and a minimal Fe content. These detns. are made by usual methods. Nitrates must be absent and are tested for by leaching 100 g. of the PbO (or Pb_3O_4) with several portions of hot H_2O , concg. the filtrate, then filtering through double paper and testing with diphenylamine or brucine and conc. H_2SO_4 . The PbO formed in the manuf. of nitrites gives a decided test for nitrites. The Cl content should not exceed 0.05% to determine it; dissolve 100 g. of the PbO in 600 cc. of H_2O and 100 cc. conc.

HNO_3 in a l. flask with shaking, avoiding any heating. Add 150 cc. H_2SO_4 (d. 1.15) to ppt. PbSO_4 , cool, make up to mark, mix, and filter off 700 cc., to which are added 52 cc. of AgNO_3 soln. (0.3333 g. AgNO_3 per l.). Two portions of 250 cc. each of the turbid liquid are measured into Erlenmeyer flasks and heated simultaneously till each soln. is clear; then to one of the flasks add 50 cc. of the above AgNO_3 soln. and to the other 50 cc. of a HCl soln. of same normality (1/311) and note which of the 2 solns. is the more turbid. If the addition of the HCl produces the greater turbidity, the sample contains less than 0.05% Cl ; if the addition of the AgNO_3 causes the greater turbidity Cl is more than 0.05%; same turbidity in each soln. indicates exactly 0.05% Cl . (It is assumed that the sample is practically free of Pb_2O_3 .) *Chemical, color, and varnish industries:* PbO of high purity is demanded; should dissolve to a clear soln. and contain very little insol. matter or metallic Pb . To det. the metallic Pb , rub up 100 g. of the sample with 700 cc. of H_2O and 70 cc. of conc. HNO_3 , added portionwise, avoiding any warming (dil. AcOH may be used instead of HNO_3). When all of the PbO has been dissolved, let settle till clear, and decant or filter. Dissolve the residue of Pb in dil. HNO_3 and det. the Pb electrolytically or gravimetrically. A very pure PbO is required for use in a light, clear varnish; darker products and some driers are made with lower grade article. A practical test is made by heating the PbO with linseed oil to 210° and pouring on glass; should give at once a brittle layer that peels off with the finger nail and yields a clear, yellow soln. with turpentine oil. Only pure PbO should be used in the prepn. of cements, although many manufacturers specify a product containing 10 to 25% of BaSO_4 . Various specifications are issued by the rubber manufacturers for PbO ; however, the higher the PbO content, the greater the working value. B. reports a series of expts. on the same sample of PbO showing the variation of the insol. matter with the amt. and conc. of the HNO_3 used for soln. and recommends the following procedure: rub up 100 g. of the sample with 750 cc. of H_2O and add 80 cc. of conc. HNO_3 ; stir cold till no more PbO dissolves, then boil 30 min. and let stand in a warm place till clear; siphon off supernatant soln., filter through a double paper, wash 6 times with hot H_2O , ignite and weigh. The use of HNO_3 is considered more advantageous than AcOH , since some metallic Pb might escape soln. Should significant amts. of metallic Pb be present, it is detd. as given above. (Cf. C. A. 2, 2767.)

F. W. SMITHER.

Determination of formic and acetic acids and the separation of these acids in very dilute solutions. E. HEUSER. Darmstadt. *Chem. Ztg.* 39, 57-9(1915).—The determination of HCO_2H and AcOH by acidifying with H_2SO_4 and distg. with steam requires too much time for ordinary use, and if the H_2SO_4 be replaced by H_3PO_4 , the results are vitiated by the latter passing over into the distillate. Good results are obtained by passing the vapors through a flask filled with glass beads and heated by a water bath, on their way to the condenser (cf. Wenzel, *Monatsh.* 1897, p. 659). The sample is mixed with 50 cc. of H_2O and 50 cc. of H_3PO_4 (d. 1.2) and distd. at 44° (56 mm. pressure) until the vol. is reduced to 50 cc. A further 50 cc. of H_2O is then added and the mixt. again distd. to a vol. of 50 cc. A current of CO_2 -free air is drawn through the app. during distn. The use of a flask filled with glass beads is also necessary in detg. AcOH by distn. in a mixt. of $\text{H.CO}_2\text{H}$ and AcOH after destroying the former by oxidation with $\text{K}_2\text{Cr}_2\text{O}_7$ and H_2SO_4 . (Cf. McNair, *Z. anal. Chem.* 27, 398(1888).)

F. W. SMITHER.

Estimation of yellow phosphorus (ENGELHARDT) 17. The microspectroscope in mineralogy (WHERRY) 8.

LUNGE, G., et al.: *Technical Methods of Chemical Analysis*. Vol. III, Part 2. London: Gurney & Jackson. 587 pp.

THOMAS, J.: *Muter's Short Manual of Analytical Chemistry*. Tenth edition. London: Baillière, Tindall & Cox. 232 pp. 6s.

8. MINERALOGICAL AND GEOLOGICAL CHEMISTRY.

EDGAR T. WHERRY.

The laws of formation and transformation of minerals. A. v. FERSMANN. *Trav. Soc. Nat. Petrograd* 43, 255-73 (1912); *Neues Jahrb. Min. Geol.* 1914, II, Ref. 347-8. —F. prefers the Ostwald law of transformation stages to the Goldschmidt mineralogical phase-rule. The processes of mineral transformation are divisible into 4 types: (1) Mineral *A* changes into mineral *B* without intermediate stages, a mixt. of the two resulting. (2) *A* changes to $A_1, A_2, \dots A_n$, the last being the stable end-species, although intermediate stages may be capable of separate existence. (3) Several of the intermediate states of (2) may form simultaneously. And (4) *A* may show continuous alteration into *B*, all properties showing corresponding continuous variation. The term "mutable" is proposed for such compds. A given mineral may, in consequence of these rules, be stable under certain conditions and unstable in others. E. T. W.

The microspectroscope in mineralogy. EDGAR T. WHERRY. U. S. Nat. Museum. *Smithsonian Misc. Coll.* 65, No. 5, 16 pp. (1915).—W. recommends the use of a Crouch binocular stand fitted with a 37 mm. objective, an Abbe-Zeiss "spectral-ocular" in the right-hand tube and in the other an ordinary low power eyepiece marked on the lower lens at the point where the image of a mineral grain falls when it is visible through the spectroscopy slit; the prism which diverts part of the light into the left-hand tube is withdrawn after the mineral grain has been centered so as to increase the light passing through the spectroscopy. A Welsbach or Nernst lamp is used in preference to sunlight to insure the absence of Fraunhofer lines. Illumination by reflected light is employed except for specimens in thin sections; this gives more intense absorption spectra and permits the exam. of crystals on the matrix, gems in their settings, etc. The scale is adjusted by bringing the 058.9 (589 μ) division of the graduation to the D line shown by a Na flame. This method is especially useful in detg. the genuineness of various gems, in picking out corundum, zircon and garnet from gem gravels, in distinguishing greenockite from other yellow coatings, and in the identification of a number of other minerals. It may be employed to detect the presence of Nd, Pr, Er, U^{vi}, U^{iv}, etc.; and in particular has indicated that the red colors of some garnets are due to Cr and perhaps V. Results of exam. of about 200 minerals with the microspectroscope are given in classified tabular form, followed by an analytical key. The elements causing the colors and absorption bands of some minerals are as yet unknown.

L. W. RIGGS.

Studies on the etched figures of Japanese quartz. SHIMMATSU ICHIKAWA. *Am. J. Sci.* 39, 455-73 (1915).—Illustrations are given of etchings of quartz crystals with 55% HF. The grooves on the edges formed by etching are barely visible to the naked eye and the pits on the faces need low magnification. Different faces of a crystal show varying resistance to the action of the acid, and the extremities at the vertical axis are more quickly dissolved away than at the lateral axes, also those of the + lateral axes more readily than — ones. The resulting form in the etching resembles a trigonal trapezohedron. The etching of spheres of Japanese rock crystal shows figures which det. the axes of the crystals from which the spheres were produced. The etching of basal sections cut perpendicular to the vertical axis of twin crystals reveals the revolved or interpenetrated areas and also the direction of the rotation; this affords an important method for the detn. of a twin crystal. The development of etching

figures at the poles of the vertical axis of a sphere or basal section of a quartz crystal is closely connected with atm. pressure and the temp. and conc. of the solvent, so that precisely concordant results are difficult to produce. Natural etched figures of Japanese quartz are illustrated and described, also a study of vicinal faces accompanied by natural etching on a rhombohedral face. Theoretical figures showing the mol. structure of rock crystal and use of models is described. An appendix gives a sketch of quartz work in Japan, showing that the crystal sculptors are governed by principles which correspond to those developed by the etchings.

L. W. RIGGS.

The system: anorthite-forsterite-silica. OLAF ANDERSEN. *Geophys. Lab. Am. J. Sci.* 39, 407-54 (1915); cf. *C. A.* 3, 2925; 5, 54, 1982, 3213; 7, 755, 760, 1339, 1827, 3255, 3731; 8, 2856, 3543.—This paper deals with that part of the quaternary system $\text{CaO-MgO-Al}_2\text{O}_3\text{-SiO}_2$ in which the comp. of mixts. can be expressed in terms of the components anorthite-forsterite-silica. The expts. were made on artificial mixts. of pure components without fluxes and the heating was done in air under ordinary pressure. The methods used have been described in various previous papers, the results are stated in 5 tables. "The following solid phases were observed and their thermal and optical properties described: anorthite, forsterite, cristobalite, tridymite, clinoenstatite, and spinel. Among the binary mixts. those of anorthite and silica form a simple eutectic system, those of forsterite and silica form a system with an unstable compd., clinoenstatite (MgSiO_3) and those of anorthite and forsterite form no true binary system, as spinel is the primary phase in some of the mixts. In a theoretic discussion the general qualities of some ternary systems without solid soln. are reviewed with reference to temp.-conc. diagrams. The quant. relations of the diagrams are pointed out and types of crystn. curves discussed. As some of the ternary mixts. anorthite-forsterite-silica contain spinel as a primary phase, the relations of the whole system cannot be properly expressed more simply than in terms of the 4-component system $\text{CaO-MgO-Al}_2\text{O}_3\text{-SiO}_2$. After a brief discussion of the spinel field the ternary part of the system is described. The system has 2 quintuple points, one of which is a ternary eutectic, the other an alteration point. Of the boundary curves one is an alteration curve, the others ordinary melting curves. The crystn. curves in different sections of the diagram are discussed. The resorption of forsterite as a result of cooling with equil. between liquid and solid is pointed out. Some cases of crystn. with lack of equil. are also discussed. It is shown how the results may be applied to actual rocks, more especially the olivine-bearing rocks."

L. W. RIGGS.

Zonal structure in synthetic fayalite. H. MICHEL. *Min. petrog. Mitt.* 32, 541-2 (1914).—M. observed zonal structure in pure artificial fayalite, and shows that zonal structure in the olivine group is not necessarily due to variation in Mg content.

A. D. BROKAW.

Contributions on the chemical composition of Russian minerals. K. A. NENADKEVICH. *Trav. mus. geol. acad. sci. Petrograd* 5, 37-56 (1911); *Neues Jahrb. Min. Geol.* 1914, II, Ref. 364-5.—III. **Zinc-dibraunite.** An earthy brown alteration product of a zinc ore-deposit was analyzed, and after subtracting the PbO and PbO_2 found, the comp. of the main portion was calc. as $\text{ZnO} \cdot 2\text{MnO}_2 \cdot 2\text{H}_2\text{O}$. [It is probably a mixt.—ABSTR.] As the mineral braunite belongs to the same class of salts, it is proposed that all members of the class (metamanganites) be called braunites; this particular one is accordingly Zn dibraunite. Chalcophanite is a Zn dibraunite with partial replacement of Zn by Mn. IV. **Copper-gold.** Au of the 2nd generation at Karabash, Kish-tim, Ural Mts., has the comp.: Au 74.33, Ag 4.49, Cu 20.39, insol. 0.26, Fe trace, sum 99.47%; sp. gr. 15.17. V. **Powellite.** Occurs at the Karysch Mine, Yeniseisk, and has the comp. CaO 28.85, MoO_3 71.14%. VI. **Cs-beryl.** Cf. Vernadskii, *C. A.* 5,

1049. The methods of analysis applied to all of these minerals are described in detail.
E. T. W.

The mineralogy of Volhynien. L. IVANOV. *Arb. Ges. Erforsch. Volhynien* 6, 225-32 (1911); *Neues Jahrb. Min. Geol.* 1914, II, Ref. 365-6.—Description of occurrences of topaz, goethite, graphite, and hisingerite are given. The last has the comp. (mean of 3 analyses): SiO_2 36.64, TiO_2 tr., Fe_2O_3 36.88, FeO 5.51, MgO 1.26, CaO 0.83, H_2O 18.57, sum 99.69%. This corresponds to $\text{H}_4\text{Fe}_2\text{Si}_2\text{O}_8 \cdot \text{H}_2\text{O}$, but the material was not entirely pure, containing inclusions of magnetite and rutile. The material is an isotropic gel, showing faint double refraction near magnetite dendrites. The sp. gr. is 2.58.
E. T. W.

Greenockite in the d'Herens Valley, Wallis, Switzerland. G. HIEFLEITNER. *Min. petr. Mitt.* 32, 544 (1914).—This mineral occurs as a film on sphalerite, by the alteration of which it has been derived.
E. T. W.

The supposed vanadic acid from Lake Superior is copper oxide. WALDEMAR T. SCHALLER. U. S. Geol. Survey. *Am. J. Sci.* [4] 39, 404-6 (1915).—Tschermacher (*Am. J. Sci.* [2] 11, 233 (1851)) described a natural occurrence of " VO_3 " in the Lake Superior region. S.'s exam. of a similar specimen shows it to consist of felted masses of minute prismatic crystals so thin that under the highest magnification the black borders of total reflection cover the entire crystal. Chem. tests showed absence of V and only Cu_2O present. Even H_2O was not found, though from the small amt. of the specimen available it may have escaped detection. Comparative chem. tests with hydrocuprite from Penn. gave identical results. Two other recent reports of V oxide minerals are also probably erroneous.
L. W. RIGGS.

Orthoclase containing barium. G. TSCHERMAK. *Min. petrog. Mitt.* 32, 543-4 (1914).—Specimens of sanidine and adularia yielded resp. 1.17 and 0.78% BaO .
A. D. BROKAW.

The chemical composition of aluminous augite. G. TSCHERMAK. Vienna. *Min. petrog. Mitt.* 32, 520-34 (1914).—The comp. of aluminous augite has previously been explained by supposing the presence of an aluminosilicate in isomorphous mixt. with diopside. Boeke showed statistically the analyses of alkali-free aluminous augites including those with up to 5% alkali, considering these to be isomorphous mixts. of the oxides. The projections show, however, that diopside (CaMgSiO_6) is the fundamental compound, while isomorphous mixt. of any or all of the following compds. occur: $\text{MgAl}_2\text{SiO}_6$, $\text{CaAl}_2\text{SiO}_6$ and $\text{Mg}_3\text{Si}_2\text{O}_6$.
A. D. BROKAW.

Anthophyllite from Podoli near Bobrau, Mähren. KARL SCHIRMEISEN. Brunn. *Min. petrog. Mitt.* 32, 512-9 (1914).—S. describes anthophyllite found near the contact of granite and serpentine and suggests its contact metamorphic origin. A somewhat incomplete analysis is given.
A. D. BROKAW.

Analysis of rumpfit. G. TSCHERMAK. *Min. Petr. Mitt.* 32, 542-3 (1914).—As the optical properties of this mineral indicate its identity with clinocllore, a new analysis has been made by T. Panzer, yielding SiO_2 31.31, Al_2O_3 20.07, Fe_2O_3 0.82, FeO 1.36, MgO 33.30, K_2O 0.85, Na_2O 0.39, H_2O 12.87, sum 100.97. This is compared with a typical analysis of clinocllore, both directly and after combining Fe_2O_3 with Al_2O_3 and FeO with MgO , and the compns. found to be quite similar, although the rumpfit contains somewhat more Al_2O_3 and alkalis, and less H_2O , indicating admixture of mica.
E. T. W.

The mineral rumpfit. KARL A. REDLICH. Prague. *Centr. Min. Geol.* 1914, 737-40.—The significance of the presence of this chlorite mineral in the alpine talc deposits having been pointed out by R. and Cornu (*C. A.* 2, 1950) its exact comp. becomes of interest, especially since Tschermak (preceding abst.) has suggested its identity

with clinocllore. Material from 3 localities was analyzed in duplicate by separate analysts, and the results show essential agreement and indicate that rumpfite is a distinct species, composed, according to T.'s theory of the chlorites, of from 2 parts serpentine to 3 amesite to 3 to 7 of each, resp. Other analyses indicate admixts. of sericite, talc, etc., with the rumpfite. E. T. W.

The Fisher, Polk Co., Minnesota, meteorite. GEORGE P. MERRILL. *Proc. U. S. Nat. Mus.* 48, 503-6(1915).—The history and whereabouts of specimens of this fall are given, and the superficial and microscopic features described. The metallic and silicate portions were analyzed separately by J. E. Whitfield, the combined result yielding the bulk comp.: SiO_2 38.70, Al_2O_3 4.39, FeO 16.18, MnO 0.336, NiO 0.204, CaO 1.939, MgO 26.018, chromite 0.708, Fe 9.724, Ni 1.618, Co 0.084, sum 99.901; traces of S and Na were present, but no Ba, Sr, Zr, or K. The sp. gr. = 3.37. The stone is an intermediate chondrite, Ci or Cia of Brezina's classification. E. T. W.

Preliminary note on the meteorites in the Bloemfontein Museum. W. A. DOUGLAS RUDGE. *Trans. Roy. Soc. S. Africa* 2, 211-21(1912); *Neues Jahrb. Min. Geol.* 1914, II, Ref. 378.—Descriptions with partial analyses of specimens from Kroonstadt and Winburg (cf. C. A. 8, 2329). E. T. W.

The iron-ore deposits of eastern and western France. PAUL NICOU. *Iron Coal Trades Rev.* 89, 385-6, 413-4(1914).—Statistical and descriptive. H. L. OLIN.

Molybdenite and wolframite in New South Wales. ANON. *Iron Coal Trades Rev.* 88, 914(1914).—A promising field at Winglebong is being developed.

H. L. OLIN.

Wolframite in lower Burma. E. M. LEFROY. *Eng. Mining J.* 99, 684(1915).—A description of the geography of the region, the market for the ores, the geological relations, the mining costs and the output. The wolframite occurs in quartz veins traversing granite, in association with cassiterite, molybdenite, and various sulfides.

E. T. W.

Geologic-petrographic studies in the region of the fracture zone of the Erzgebirge west of Bodenbach. HERMANN MICHEL. *Min. petr. Mitt.* 32, 281-401(1914).—Includes descriptions of occurrence and optical properties, with some discussion of comp. or mode of formation, of the minerals analcite, apophyllite, bronzite, chabazite, fluorite, iddingsite, limonite, natrolite, olivine, pyroxene, scolecite, thomsonite, and zeophyllite; and petrographic descriptions of basalt, gaulteite, glassy basalt, granite-porphyry, leucite-nepheline-tephrite, nepheline-basalt, quartzporphyry, rhönite-basalt (with chem. analysis), sodalite-analcite-phonolite, sodalite-tephrite, amphibolite, and gneiss.

E. T. W.

Analysis of a "bread-crust-bomb" from Santorin. LUISE KICHLER. *Vienna. Min. petr. Mitt.* 32, 265(1913).—The analysis of this volcanic bomb given shows it to be identical in comp. with the ordinary lavas of the island.

E. T. W.

New occurrences of rocks of the alkali series in Timor. H. A. BROUWER. *Batavia. Centr. Min. Geol.* 1914, 741-5; continuation of C. A. 7, 3949.—An alkali-rhyolite is described as to occurrence and microscopic petrography, and a complete analysis by E. W. Morley is given. Norms are calc. from this and the rock found to fall in the sub-rang Pantellerose: II.(3).4.1.4. Two new analyses, less complete, by F. Pisani of other rocks from Timor are also given, and their classification discussed. E. T. W.

Inclusions in the south Styrian basalt tuffs and their minerals. J. SCHADLER. *Graz. Min. petrog. Mitt.* 32, 485-507(1914).—S. describes the mineralogy of the inclusions with optical studies and 6 analyses, one each of olivine, bronzite, Cr-bearing diopside, bombs made up of these 3 minerals, same, altered, hornblende, and pyroxene.

A. D. BROKAW.

Diopside(malacolite)-rock from Mixnitz. J. STINY. Bruck. *Centr. Min. Geol.* 1914, 745-6.—The rock is described petrographically and an analysis given. This is recalcd. according to Becke (*C. A.* 8, 1255) and the relation of the rock to previously described ones discussed.
E. T. W.

Quartzite-schist from the Veitsch and rumpfte-schist from Neuberg. H. MICHEL. *Min. Petr. Mitt.* 32, 175-6(1913).—An analysis of each of the rocks is given.
E. T. W.

Quantitative chemical composition of the Stassfurt salt deposits. M. RÓZSA. Budapest. *Z. anorg. Chem.* 90, 377-86(1915).—A discussion of the comp. of salt deposits of various ages at Adachi Dayà-Busen, from which data it is argued that Ochsenius' bar hypothesis as applied to the explanation of the abnormal thickness of anhydrite layers, is in contradiction to physicochem. principles. R. explains the periodic differentiation between anhydrite and NaCl layers chiefly by climatic variations.
G. W. MOREY.

The investigation of deep-sea deposits. J. JOLY. *Sci. Proc. Roy. Dublin Soc.* 14, 256-67(1914).—A description and working diagram of a hydraulic engine which utilizes the pressure of water prevailing at great depths and which is intended to bore into the soft sediments and oozes on the ocean floor. The machine is constructed with a strong cylinder fitted with a piston and discharges into a receptacle which retains the working substance (water) after it has done its work in the engine which is of the ordinary reciprocating type with the usual directions of the pressures reversed and acting from without inwards. If the receptacle holds 10 l. and the plunger of $\frac{1}{2}$ cm². in area has a stroke of 30 cm., then 666 strokes at a force of 110 kg. (242 lbs.) are possible at a depth of 1000 fathoms. At the rate of one stroke per second, this amounts to the development of about 0.4 h. p. for 11 minutes.
R. L. SIBLEY.

The exhalations of Etna. I. G. PONTE. Univ. Catania. *Atti accad. Lincei* 23, II, 341-7(1914).—The new theory of Brun on the anhydrous state of magmatic gas has opened a vast and new field of exptl. research on volcanic exhalations from the geochem. and geophysical point of view. A volcanic rock raised to the m. p. behaves like lava in its paroxysmal phase; the gases exhaled from it are anhydrous, independent of the geographic position of the volcano and of the petrographic nature of its magma. Deville (1856) said that the nature of the smoke of an active volcano in a given period varies with the distance from the eruptive center. The nature of the exhalations of an active volcano in a given place varies with the time elapsing between the beginning and end of an eruption. The 3 recent eruptions of Etna (1908, 1910, 1911) have permitted observations on the truth of the above generalizations. It was demonstrated that the recent lateral eruptions have a direct relationship with the eruptive chimney and that the central crater is always the center of volcanic manifestations. In 1910 enormous masses of ashes were emitted. The temp. 30 m. below the edge was 85°, but sublimed S at this point showed that the vapors had been above 113°. The ashes showed CaSO₄ 2.40 and NaCl 0.34% and traces of HCl, SiO₂, Mg, Al, KCl, Fe and NH₄ and liquid hydrocarbons. In Sept., 1908, Mt. Rosso was active. CO₂, SO₂, HCl, trace of chlorides and H₂O were found qualitatively in the exhalations. Samples collected near the mouth showed CO₂ 84.5, N₂ 8.2, SO₂ 1.2, H₂S 1.6, H₂ 1.5, CO 2.3 and CH₄ 0.7%; and as a sublimate in the tube the chlorides and fluorides of Na, K and Fe were found. Gas evolved from the flowing lava (600°) showed CO₂ 32.7, N₂ 63.3, SO₂ 3.8%, H₂S, CH₄ and CO in traces, rare gases 0.2%; also fluorides, chlorides and sulfates of Na, NH₄ and Fe in the sublimate. The rivulet of lava had a pasty crust. A blue flame was seen in the tube while the gas was being collected so that it was not analyzed in its unoxidized form. The observations verify the generalizations previously made.
E. J. WITZEMANN.

Mine gases. FRANK HAAS. *Colliery Eng.* 35, 375-9(1915).—New view points on the origin, occurrence and behavior of gases usually found in mines are presented.
C. A. COLE.

Mine of United Verde Copper Co. (TUPPER) 9. New crystal-grinding goniometer (WRIGHT) 1.

DOELTER, *et al.*: *Handbuch der Mineralchemie*. Vol. 11, No. 6. Dresden: T. Steinkopff. 6.50 M.

9. METALLURGY AND METALLOGRAPHY.

WILLIAM BRADY, WILLIAM T. HALL.

The development of continuous countercurrent decantation in cyanidation of slime. W. J. PENTLAND. *Met. Chem. Eng.* 13, 105-7(1915).—A review and general discussion of the subject.
J. S. G.

Grinding ore for cyanidation: A suggested modification for all-slime practice. W. J. PENTLAND. *Met. Chem. Eng.* 13, 205-6(1915); cf. *C. A.* 9, 48.—P. believes that advantages would result by providing sep. treatment for the slime and for the sand with the accompanying concentrate, and combining the 2 portions at some later stage after sand and concentrate had received special treatment. Suggestions are given for a simple arrangement of a plant for accomplishing this.
C. A. NOWAK.

A chart for determining tailings value. W. J. MCCAULEY. *Engineering Min.* 99, 575(1915).—An illustrated description of a chart for the quick solution of the equation usually employed in detg. tailings value in terms of cents per ton of dry pulp. The general form of chart may also be used for the detn. of cyanide in lbs. per ton of dry pulp and is useful in pulp problems.
J. S. G.

Separation of white metal and gunmetal borings. R. H. WALTON AND G. T. BAILEY. *Met. Chem. Eng.* 13, 204(1915).—The small borings pass from bin to a magnetic separator, are picked up by a revolving belt fitted with pockets, and conveyed to a bin above classifiers. From this bin the borings gravitate to classifiers and are sepd. into 3 grades. From bins No. 1 and No. 2 containing the coarse material, the borings gravitate on to a short revolving belt fitted as above and are delivered into a bin over the furnaces and here gravitate to the furnaces. These furnaces are constructed of Fe tubes, one fitting inside the other. The outer one, being several in. larger in diam. than the inner one, is supported by means of brackets to the floor and carries in the intervening space between the 2 tubes a coil of iron pipe with suitable size perforations for heating the walls of the inner tube by gas. The inner tube is revolved and the hot borings and liquid white metal pass into the revolving screens, smaller in mesh than the last classifier, and the liquid white metal mixed with the borings allowed to escape through the screen into an outer vessel surrounding the screen, heated by a gas coil. In this way the white metal does not cool, but collects at the bottom and can be run into molds. The clean borings pass along the screen into a hand truck on wheels; this can be taken to the foundry and the borings smelted and utilized for ordinary gunmetal castings.
C. A. NOWAK.

Problems in copper leaching. L. D. RICKETTS. *Mining Press* 110, 515-9(1915).—A general discussion with specific reference to R.'s experiences with the Ajo ore in S. W. Arizona; (cf. Croasdale, *C. A.* 8, 3409 and following abstr.). Ajo ore is an oxidized chalcocite in a matrix of granite with a large % of secondary quartz replacing feldspar. Ca, Fe and Al are present in sol. form. Cuprite is found in small amts.

only partly sol. in dil. H_2SO_4 . The amt. of Ag is small. The experiences of Croasdale, Saist, Wedge and others, with Ajo ore are given and the following deductions drawn: Dil. H_2SO_4 gives a very high extn. in which time is more important than strength of acid. A max. size of 6 mm. cube permits percolation and the production of a clear soln. with practically no slime. The ore mined at a cost of between \$0.25 and \$0.50 per ton is commercial on a \$0.12 market, even if leached with H_2SO_4 and the Cu pptd. with pig Fe, leading to waste of acid and Fe and the production of an impure cement Cu requiring further treatment. R. gives results of expts. on electrolytic recovery of Cu from leached CuSO_4 with hard Pb anodes and composite anodes of hard Pb and coke. These and the removal of Fe and Al from the sulfate liquor have proved practicable.

J. S. G.

Considerations which govern leaching-plant operation. S. CROASDALE. *Engineering Min. J.* 99, 575-6(1915); cf. C. A. 8, 3409.—A detailed account with tabulated results obtained in leaching Cu ores. The importance of studying the gang even if it is not acid-consuming is emphasized. Conditions of max. yield are discussed.

J. S. G.

Hydrometallurgical treatment of Michigan copper tailings. R. D. LEISK. *Met. Chem. Eng.* 13, 133-4(1915).—The Calumet & Hecla Mining Co. is developing a combination regrinding and leaching treatment for the accumulation of tailings below its great mill on Torch Lake. If successful, the method will probably be applied to all the old mill dumps in the Cu country which can be profitably worked. The process may also solve the problem of treating mine rock in which the Cu is so finely divided and flaky that losses in ordinary milling treatment are excessive. It is planned to complete the leaching treatment in a 91 to 96 hr. cycle. In treating tailings containing 12 to 13 lbs. of Cu per ton it is expected to recover $5\frac{1}{2}$ to 6 lbs. on the tables and from $4\frac{1}{2}$ to 5 lbs. by leaching. The cost of leaching is estd. at about 35 cents per ton, and the recovery upwards of 70%. An accompanying diagram gives the cycle of treatment.

C. A. NOWAK.

Aluminium precipitation at Nipissing. E. M. HAMILTON. *Eng. Mining J.* 99, 568-71(1915).—A discussion of the Al methods of pptn. in use at the Nipissing low-grade mill with a metallurgical and monetary comparison of Zn and Al as precipitants. The paper is an answer to the criticisms of Johnston and of Clevenger (cf. C. A. 8, 892, 3176). Al is not desirable as precipitant in the treatment of all-gold ores. Its use means a saving in fluxes and fuel in melting the ppt. and a saving in cyanide. In estimating the dissolving efficiency of a soln., H. objects to the use of KI as indicator and since double zinc cyanide has no solvent effect on Ag. compds., he recommends titrating the soln. in terms of free instead of "total cyanide."

J. S. G.

Ore-treatment system of Nevada-Douglas Con. Copper Co. A. J. OREM. *Mining Eng. World*, 42, 770(1915).—The sulfide is treated in a digester with HNO_3 to form sulfates of Fe and Cu, and the HNO_3 is regenerated from the NO formed. The digester mass is discharged into a tank and allowed to settle, after which the Fe'' and Cu'' sulfates soln. is decanted to a stock tank; the residue is thoroughly washed. Part of the washings containing small amts. of Cu and Fe'' sulfates are returned to the NO absorption towers, and are later sent to the digester, after proper acidification. The soln. of sulfates in the stock tanks, containing much H_2SO_4 , is applied to mixed ores containing chalcocite and to oxidized calcareous ores, resulting in the reduction of a portion of the Fe'' to Fe' sulfate and an enrichment of the soln. in Cu. The Cu is pptd. on scrap or pig Fe, the soln. being evapd. and the $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ dehydrated in a special drier; the FeSO_4 is ignited in muffles to Fe_2O_3 , the S gases forced through a H_2SO_4 tower and the acid produced either marketed or used in the treatment of oxidized ores. The residual gases are forced through a tower into which a thick pulp is discharged

from a compartment tank actuated by air lifts, and arranged so that oxidized or roasted ore is continuously fed to the app., and the tailings continuously discharged to a replacement tank. The resultant solns. are mixed with the liquors originating in the digesters as they pass to pptn. launders, reducing to some extent the $\text{Fe}_2(\text{SO}_4)_3$. *Advantages claimed:* Regeneration of HNO_3 and of H_2SO_4 , cheap method of evapn. and drying, the means devised for utilizing the mixed gases and the SO_2 arising from the furnaces, Fe_2O_3 obtained is a marketable product. A process is being developed for the electrolytic pptn. of Cu from solns. heavily charged with Fe. F. W. SMITHER.

Mine and smelter of the United Verde Copper Co. C. A. TUPPER. *Mining Eng. World* 42, 717-27(1915).—A detailed description with numerous illustrations. "The ore bodies are in the form of lenticular lenses and occur in a large shear zone of schist and porphyry. The country rock is diorite and the schist is an alteration of this rock. The porphyry is siliceous and is an intrusive in the schist. The ores are mostly chalcopryite, except on the upper levels where considerable amts. of chalcocite, black oxide and other secondary minerals occur." The Cu ore is classified according to the gang rock: (a) most important, termed "iron raw", assays 32-40% Fe, 35-45% S, 4-10% SiO_2 , Cu varies from a low to a high grade ore; there are immense lenses of low-grade FeS_2 enriched along the lines of contact of the schist and porphyry and along intrusions (locally termed "water courses") to com. ore. These ore bodies extend to within 150 ft. of the surface, over which oxide ores occur carrying good values in Au and Ag and small values in Cu. (b) Chalcopryite in a schist gang; these ore bodies extend almost to the surface with but little alteration or enrichment. (c) Ores in a quartz and quartz porphyry gang, extending to the surface as an Fe-stained quartz cropping. Portions of this latter class of ore are so siliceous that it is used for converter flux, as are parts of the oxide ores overlying the pyrites. The capacity of the plant will approach 3,000 tons daily. F. W. SMITHER.

New Anaconda leaching and acid plants. E. P. MATHEWSON. *Eng. Mining J.* 99, 723-7(1915).—A description, with illustrations, of the 2000-ton-a-day leaching plant and its adjunct, the acid plant. The roasting furnaces are of a modified McDougall type. The values will be pptd. from the soln. by scrap Fe. The H_2SO_4 is produced by the chamber process in a 100-ton plant. F. W. SMITHER.

Boron steel. GERHARDT HANNESSEN. Göttingen. *Z. anorg. Chem.* 89, 257-79 (1914).—A detn. of the T-X diagram in the system B-Fe from 0 to 8.5% B by means of thermal analysis and microscopical exam. Many photomicrographs are given. Attempts to prepare the mixts. by the aluminothermic reaction failed, so mixts. were made using Goldschmidt ferroboration fusions in an atm. of H. An attempt to analyze the products by oxidation in a current of O containing H_2O failed; the method used was the Na_2CO_3 fusion method of Wedekind. The liquidus for the system falls from 1522°, the m. p. of Fe, to the eutectic at 1170° and 4% B; from 0 to 1.38% B the primary solid phase is mixed crystals of δ -Fe, from 1.38 to 4% B, of λ -Fe. The solidus falls to 1415° and about 0.28% B; the satd. δ -mixed crystals of this compn. react with the melt with formation of λ -mixed crystals slightly poorer in B; the δ - λ inversion in the iron was found at 1415°. From the eutectic at 4% B the fusion curve rises to a max. at the compn. of the compd. Fe_3B_2 and 1351°, then falls to 1295° at 8.5% B, which is as far as the system was followed; over the whole of the above range Fe_3B_2 is the primary crystn. Both the λ - β Fe inversion (found at 895°) and the β - α inversion (at 800°) are lowered by addition of B; the various thermal effects found in this region are discussed and compared with the corresponding inversions and unmixings in the Fe-C diagram, but the discussion cannot be briefly abstracted. The B steels are strongly magnetic. Chilled reguli containing from 0.125 to 4% B have a hardness of 5-6; slowly

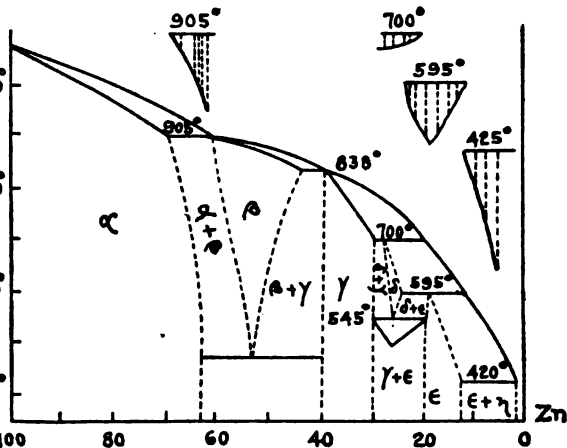
cooled reguli containing from 0.25 to 1% B a hardness of 6-7, the increase in hardness being due to B pearlite; the compd. Fe_3B_2 has a hardness greater than 9. G. W. M.

The influence of coalescence on the properties of steel and alloys. A. PORTEVIN. *J. Iron Steel Inst.* 90, 204-12 (1914); *J. Chem. Soc.* 108, II, 57.—Bronze contg. 16% of Sn, and consisting of the α - and δ -constituents, was heated in a salt bath at 525° for 1 hr., and cooled from 525° to 475° during 5 hrs. After re-heating rapidly to 525° the slow cooling was repeated. The eutectoid structure disappeared, the masses of δ coalescing, and the hardness (Brinell) diminished. The effect on a steel contg. 25% of Sn was less marked. Annealing a eutectoid steel at 700° for 30 hrs. caused coalescence of the pearlite and a great diminution of hardness. A steel contg. 0.50% of C, annealed at 800° for 10 hrs. and very slowly cooled to 700°, showed segregation of the ferrite into parallel bands without coalescence of the pearlite, while annealing for 30 hrs. at 700° brought about coalescence. E. J. C.

The hardening of metals. ROBERT HADFIELD. *Iron Coal Trades Rev.* 89, 670 (1914).—Presidential address read before the Faraday Society. H. L. OLIN.

Hardness of copper-zinc alloys. D. MENEGHINI. Padova. *Ann. chim. applicata* 3, 95-101 (1915).—The values for hardness were calcd. from the formula $\Delta = P/S$, in which P is pressure used and S is surface of the impression made, which equals $\pi D[(D/2)\sqrt{(D^2/4) - (d^2/4)}]$, D and d being, resp., the diams. of the sphere used and of the impression made by it. The values of Δ were 19.4 for pure Cu, 15.9 for pure Zn, and a max. of 72.5 for the alloy contg. 33.65 parts Cu (P was taken at 10.87 kg). The curves of hardness did not give sufficient evidence of the existence of compds. of definite constitution, although the max. of hardness coincides with the comp. Cu_2Zn , but confirmed the idea that the alloys in question are technically useful only to a max. of 40% Zn. S. LEVY.

The binary alloy copper-zinc and the ternary alloy copper-zinc-lead. N. PARRAVANO, with C. MAZZETTI AND R. MORETTI. Univ. Rome and Padova. *Gazz. chim. ital.* 44, II, 475-502 (1914).—Alloys of Cu-Pb and of Zn-Pb are characterized by the presence of a liquid break from 36 to 85% Pb in Cu-Pb and from 0.5 to 96.5% Pb in Zn-Pb. The temps. of invariant equil. with 2 liquids are 962° and 418°, resp.; the eutectic of Cu-Pb coincides practically with that of Pb and of Zn-Pb with 1% Zn. The alloy Cu-Zn is characterized by a notable complexity. The literature on this alloy is reviewed and discussed. 43 alloys were studied carefully and the temp. and duration of sepn. and transformation of the α , β , γ , δ , ϵ and η forms were detd. The data are summarized in the diagram. The m. p. diagram for Zn-Cu differs from those of Shepard and of Carpenter and Edwards only as regards the equil. horizontals at 905°, 838°, 700°, 595°, 545°, and 425°. The duration of these reactions at the temp. indicated was detd. and the character of the horizontals was established in this way. In Guertler's diagram, the allotropic Cu



360° is included as a transformation of η , but Benedicks and Arpi (cf. *C. A.* 9, 260) have shown that this transformation of Zn does not exist. The alloys of Cu-Zn-Pb have a special importance as brasses because of the ease with which they are worked mechanically. The Pb (Guillet, *Rev. métal.* 2, 100; 3, 243) has the effect of diminishing the number and size of the crystals. These alloys are interesting from the theoretical point of view because of the miscibility breaks. Seven series in which the % Pb was 2, 4, 10, 15, 20, 30, and 50, resp., were examd. In the 2% Pb series the Pb remains uniformly distributed throughout the whole mass of the metal. In the 4% Pb series, Pb remains fairly evenly distributed in the alloys rich in Cu, but as the proportion of Cu increases beyond 40% liquation begins and becomes more accentuated as the % of Pb is increased in other series. It may be said that Pb is practically not dissolved in either α or γ (a brass with 60% Cu at ordinary temp. shows α and γ) and the Pb in Pb brasses is simply mixed with the characteristic crystals. This conclusion, drawn from the duration of the arrests, is further confirmed by the results of Carpenter on the influence of the addition of Pb on the critical point at 470° (*Rev. métal.* 10, 457(1913)). The results are confirmed by photomicrographs of 3 alloys with 2% Pb. E. J. WITZEMANN.

The alloys of zinc and manganese. N. PARRAVANO, with U. PERRET. Univ. Paira and Rome. *Gazz. chim. ital.* 45, I, 1-6(1914).—The alloys of Zn with Mn are not known like those of Mn with Cd and Hg. The behavior of Zn with Fe, Ni and Co is known and the compds. FeZn_7 , FeZn_3 , CoZn_4 and NiZn_3 are formed. It was found in the alloys studied (0 to 30% Mn, because of the volatility of Zn) that 2 compds. MnZn_7 and MnZn_3 were formed and the fusion diagram had the same characteristics as that of Zn-Fe. This similarity in the compds. formed is not rare for elements of the same group but different compds. are more frequently found. The expts. of Tammann on Zn-Fe were done at atm. pressure and so are not strictly comparable. An alloy rich in Mn was first prepared and this added in calc. amts. to the proper amts. of Zn to make a total of 100 g. Twenty-three alloys were studied and the m. p. diagram was constructed. The initial temp. of solidification rose in a gentle convex curve from 419° (m. p. of Zn) to 810°, the solidification temp. of the 29.70% Mn alloy. The 1st temp. of arrest was 417-20°; the 2nd 580-90°; 3rd 725-730°; temp. of transformation 260°. The existence of the 2 compds. given above was deduced from the thermal data. The photomicrographs showed crystals of MnZn_7 and MnZn_3 .

E. J. WITZEMANN.

The possibilities in steel construction by the use of high alloy steels. GEO. L. NORRIS. *Iron Coal Trades Rev.* 89, 801(1914).—The addition of V, up to 0.15%-0.20%, to simple C steels is the simplest means of producing steels of high elastic limit without having recourse to excessive heat treatment.

H. L. OLIN.

Heat treatment of steel wire. JOHN F. TINSLEY. *Iron Coal Trades Rev.* 88, 948-50(1914).—A discussion of the effects of various methods of annealing, patenting and tempering on the tensile strength and ductility of wire.

H. L. OLIN.

Internal corrosion of colliery boilers. EDWARD INGHAM. *Colliery Guardian* 108, 1068-9(1914).—A discussion of boiler troubles such as pitting, smooth wasting, furrowing, etc., and of methods for detecting and preventing them.

H. L. OLIN.

The retardation of the oxidation of iron by bases, chromium chloride and chromates. P. ROHLAND. *Elektrochem. Z.* 21, 203-6(1914); cf. *C. A.* 8, 2070.—It is pointed out that wrought Fe, steel, etc., used in reinforced concrete structures is protected by the basic action of the lime in the cement. $\text{K}_2\text{Cr}_2\text{O}_7$ in dil. soln., borax and KOH are also protective.

W. E. RUDER.

Welding. J. F. LINCOLN. *Proc. Am. Inst. Elec. Eng.* 34, 433-8(1915).—Elec. arc welding can be applied to all metals, but the process has not received the attention it deserves. Approximate estimates of costs, partially comparative, are given.

V. H. GOTTSCHALK.

Efficiency of the oxy-acetylene welded joint. A. L. SMITH. *Am. Mach.* 42, 591-3(1915).—A method of testing the welds is described and the results of a series of comparative tests are given.

I. C. MATTHEWS.

HOUGHTON, E. F. AND Co.: *Steel and its Treatment*. Second edition by the Metallurgical Staff. Philadelphia: E. F. Houghton & Co. 104 pp. \$1.00.

SWINGLE, C. F.: *Oxy-acetylene Welding and Cutting*. Chicago: Drake. 190 pp. \$1.00.

U. S., 1,135,025, Apr. 13. G. M. KLUG. Cupola for melting iron in foundries.

U. S., 1,135,080, Apr. 13. A. E. VANDERCOOK. Apparatus for filtering solutions from ore pulps and slimes.

U. S., 1,135,381, Apr. 13. E. F. KENNEY. Adjustable top for ingot molds with a thick lining of non-conductive material, vertically adjustable for different heights of ingots to be cast.

U. S., 1,135,488, Apr. 13. R. BAGGALEY. Preventing the escape of noxious fumes in smelting sulfide ores of gold, copper or silver by leading the fumes and dust in small streams beneath the surface of milk of lime and allowing the gases to bubble up through it.

U. S., 1,135,489, Apr. 13. R. BAGGALEY. Apparatus for punching the tuyères of converters or smelting furnaces, *e. g.*, those used in treating Cu mat.

U. S., 1,135,754, Apr. 13. C. W. BELL. Ore-separator.

U. S., 1,135,997, Apr. 20. J. V. N. DORR. Apparatus for separating fine particles of ore from water. Cf. C. A. 9, 782.

U. S., 1,136,110, Apr. 20. F. EBERHART. Removing grease from sheet metal plates by exposing the plates to a gas-air flame and immediately rubbing them, to remove adhering matter, with rolls covered with carpet or other absorbent material.

U. S., 1,136,270, Apr. 20. C. M. REYNARD. Apparatus for cleaning tin plates.

U. S., 1,136,293, Apr. 20. H. M. SUTTON, W. L. STEELE and E. G. STEELE. Apparatus and method for classifying ore, etc., upon perforated inclined screens.

U. S., 1,136,304, Apr. 20. A. ZAVELBERG. Furnace for obtaining zinc from its ores. Two series of vertical shaft reduction chambers are used, one at a higher level than the other. About 35% of the ZnO is reduced in the upper series and the reduction is finished in the lower series. More complete reduction is effected than with a single series of reduction chambers.

U. S., 1,136,485, Apr. 20. C. E. RORK. Apparatus for separating constituents of ores by flotation.

U. S., 1,136,519, Apr. 20. M. ENGELS. Muffle for the distillation of zinc, formed of ordinary clay 33, ZrO₂ 1-10 and fire clay 57-66%. The ZrO₂ increases the durability of the muffle.

U. S., 1,136,622, Apr. 20. B. S. SMITH. Apparatus for wet dressing sulfide ores.

U. S., 1,136,669, Apr. 20. H. GOLDSCHMIDT and O. WEIL. Aluminothermic manufacture of ferro-chromium. C-free ferro-Cr containing an unusually large

% of Cr is made by adding Cr_2O_3 to the ordinary aluminothermic mixt. of chrome Fe ores and Al and heating to redness before subjection to the aluminothermic reaction.

U. S., 1,136,670, Apr. 20. H. GOLDSCHMIDT and O. WEIL. Ferro-titanium alloy containing Ti 24 and Al 3%, for use in forming alloy steels, etc. The use of Al lowers the m. p. and increases the alloying property of the metals.

U. S., 1,136,834, Apr. 20. W. G. PERKINS. Copper-smelting plant including a non-reversible, gas-fired reverberatory furnace, a checker-work regenerator and an enlarged dust chamber between the furnace and the regenerator to remove dust from the gases before they reach the regenerator.

U. S., 1,136,861, Apr. 20. W. W. BRIERLY and T. M. SCANLON. Furnace for heating metal in crucibles.

U. S., 1,136,863, Apr. 20. C. BUTTERS. Filter for ore-slimes, etc., formed of a shallow pan with a discharge lip at one end, a filtering sheet of canvas stretched across the pan near its bottom and supported by a corrugated block beneath it. A perforated pipe for supplying liquid or air is placed beneath the filtering sheet at the end opposite to the discharge lip. Cf. C. A. 8, 2783.

U. S., 1,136,872, Apr. 20. E. M. HAMILTON. Treating ore slimes. Lime is added to the slimes to render them alk. and settle them, then Na_2CO_3 is added to ppt. the lime and form NaOH in the slimes. The soln. is filtered off and the precious metals are pptd. by the action of Al. The pptn. is assisted by the NaOH formed in the process.

U. S., 1,136,909, Apr. 20. E. D. GLEASON. Removing gases from copper by occlusion of BF_3 . CaF_2 and vitrified boric acid are fused together and Cu is added at 1370° or higher and the mass is cooled while the BF_3 produced is occluded in the Cu.

Brit., 28,410, Dec. 9, 1913. Z. D'AMICO. In forming a protective coating on aluminium, the surface is treated with a soln. of caustic alkali until a thin layer of aluminate is formed, whereupon the surface, without being washed as described in 22,684, 1910 (C. A. 6, 1427), is treated with a soln. containing CuCl_2 or CuSO_4 , chlorides of NH_4 , Fe, Zn, and Sn, K ferrotartrate, and preferably also powdered CaCO_3 and caustic alkali. The coating thereby produced is washed with lime H_2O and warm H_2O and then heated to a temp. of at least 200° . A layer of C may be formed by immersion in a mixt. of oils and balsams and again heating.

Brit., 28,440, Dec. 9, 1913. R. B. CARNAHAN. Ingot iron contains at least 99.8% of Fe, with or without alloying metals such as Cr, Ni, Cu, or V, not more than 0.14% C, Mn, P, Si, and S in the aggregate, and not more than 0.05% O. It is obtained by prolonging the "blow" in a basic Bessemer converter, and subsequently deoxidizing and degasifying in the manner described in 27,201, 1909, and 5,015, 1911 (C. A. 6, 2228). A phosphorized Fe may contain from 0.05 to 0.5% P.

Brit., 28,450, Dec. 9, 1913. R. B. THOMAS, H. S. THOMAS and W. R. DAVIES. Tin,terne, and other metal-coated plates are manufd. by passing the plates separately through a machine comprizing a pickling-bath, a swilling-bath or other swilling-device, a Sn or like pot, a grease-pot, and branning or dusting app., the spaces between the various parts of the machine being occupied by guides, rollers, or other transferring-mechanism which renders unnecessary the employment of hand-labor between the introduction of the plates into the machine and their removal therefrom. Cf. C. A. 8, 3656.

Brit., 28,571, Dec. 11, 1913. R. B. CARNAHAN. In working pure iron by rolling or forging, the operations are arrested while the temp. passes through the zone of non-malleability, which is stated to be roughly between 1000 and 800° .

Brit., 28,593. Dec. 11, 1913. R. B. CARNAHAN. The process of 28,571 (*supra*), for working iron, is extended to Fe and Fe alloys which, while not pure, are substantially free from Mn, C, and O. Cf. C. A. 8, 1561.

Brit., 28,604. Dec. 11, 1913. E. J. HORWOOD. Treating crude ores, slimes, tailings, concentrates, or mixed sulfides to remove sol. salts, then heating to render 1 or more of the sulfides other than ZnS unfloatable, and then submitting them to a flotation or granulation process. In an example, the ore is washed with H_2O , heated to 400° , as described in 1,789, 1909, and subjected to a flotation process at a temp. of $120^\circ F$. Cf. C. A. 6, 1273, 2232.

Fr., addition 18,721, Mar. 22, 1913, to 463,615 (C. A. 8, 2669). THE MADAGASCAR MINERALS SYNDICATE, LTD. Nickel is obtained from the soln. of the sulfates of Mg and Ni, after oxidation and pptn. of Fe, Al, Cr by $CaCO_3$, by means of pulverulent MgO as $Ni(OH)_2$, which is freed from Mg by heating to a dark red to render the NiO insol., and then dissolving out the MgO . The $MgSO_4$ crystg. from the mother liquor is worked up into Na_2S for the sulfide pptn., according to the equation: $MgSO_4 + 2NaCl + 4C = MgCl_2 + Na_2S + 4CO$, or it is converted into MgO with C.

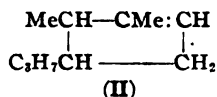
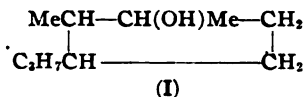
Ger., 281,094, Apr. 20, 1913. F. MEYER and H. KERSTEIN. Reduction of anhydrous metal chlorides which are volatile, or upon the reduction of which volatile intermediate products result, as $SnCl_4$ and $TiCl_4$, by heating them, in admixt. with a flowing supply of H or of an equivalent gas mixt., preferably under pressure.

10. ORGANIC CHEMISTRY.

C. A. ROUILLER.

Terpenes and ethereal oils. O. WALLACH. Univ. Göttingen. CXVII. Isomerism in the thujamenthone series. *Ann.* 408, 163-82 (1915); cf. C. A. 8, 1572.—I. α -Thujamenthone. α -Thujamenthone (A) is obtained by the reduction of isothujone with Na and EtOH and subsequent oxidation with CrO_3 ; purified through the oxime, it b. $209-9.5^\circ$, $d_{15} 0.8915$, $n_D 1.4474$. The oxime (B), large prisms, m. 97° . Semicarbazone, m. 185° . α -Thujamenthol (C), b. $212-4^\circ$, $d_{15} 0.8990$, $n_D 1.4611$. 15 g. (C), warmed with 30 g. $ZnCl_2$ 25 min. at 190° , gave a thujamenthene, b. $163-5^\circ$, $d_{15} 0.8085$, $n_D 1.4503$, also obtained from (C) and dil. H_2SO_4 at 150° . Nitrosochloride, blue, volatile with steam. (With WALTHER LOHSE.) (B), reduced with Na in abs. alc., gave α -thujamenthylamine (*Ann.* 323, 354, (1902)), b. $196-7^\circ$. Hydrochloride, m. 187° . Acetate, m. $106-7^\circ$. Urea, m. 205° . Phenylurea, m. $111-2^\circ$. Trimethylammonium iodide, m. $199-200^\circ$. 12 g. of the HCl salt, in 24 cc. H_2O , treated drop-wise with 6 g. $NaNO_2$ in 20 cc. H_2O , gave (C) and hydrocarbons. II. β -Thujamenthone. By the reduction of isothujone with $PdCl_2$ and H in MeOH (C. A. 5, 3276) β -thujamenthone (D) is obtained, b. $215-6.5^\circ$, $d_{15} 0.8990$, $n_D 1.4511$. Oxime (E), m. $130-1^\circ$. Warmed with 3 cc. AcOH and 6 cc. H_2SO_4 , an iso-oxime is formed, m. 102° . Reduced with Na and $C_6H_{11}OH$ a secondary base is obtained. Oxidized with 1% $KMnO_4$ a hydroxy iso-xime results, m. $148-9^\circ$. (E) was also prepd. by direct reduction of the oxime. Towards the close of the reaction the reduction is hastened by addition of a little dil. HCl. As a by-product an organic base (isothujylamine?) is obtained, b. 207° . Benzole, m. $147-8^\circ$. Urea, m. 160° . Phenylurea, m. $167-8^\circ$. Sulfophenylurea, m. $151-2^\circ$. β -Thujamenthol, b. $216.5-7.5^\circ$, $d_{15} 0.8995$, $n_D 1.4583$. Heated with $ZnCl_2$ 10 min. at 190° it yields a thujamenthene, b. $161-4^\circ$, $d_{15} 0.8100$, $n_D 1.4514$. β -Thujamenthylamine, b. 206.5° , $d_{15} 0.8550$, $n_D 1.4571$. Hydrochloride, m. above 230° , difficultly sol. in H_2O . Acetate, m. $115-6^\circ$. Benzole, m. 112° . Urea, m. 214° . Phenylurea, m. 165° . Sulfophenylurea, m. 183° . Trimethylammonium iodide, m. 230° .

With HNO_2 the amine gives *tertiary thujamenthol* (I), b. 204° , m. 93° . The HO group is loosely bound and is easily split off by warming 1 part alc. and 5 parts dil. H_2SO_4 1 hr. at 110° in a sealed tube, giving a *thujamenthene* (II), b. $164-6^\circ$, d_{21} 0.8100, n_D



1.4466. (II) differs from the 2 menthenes described above by forming a very difficultly sol. *nitroschloride*, m. 108° ; this easily splits off HCl by warming its soln., giving *isothujone oxime*, m. 119° , which upon reduction with Pd and H gave (E). This establishes the constitution of (I) and (II). (D), oxidized with KMnO_4 , gives the same keto-acid, $\text{C}_{10}\text{H}_{18}\text{O}_3$, and dibasic acid, $\text{C}_9\text{H}_{16}\text{O}_4$, as does (A). CXVIII. Transformation products of methylheptanone and related compounds. *Ibid* 183-202.— $\text{Me}_2\text{CHCH}_2\text{CH}:\text{CHAc}$ is reduced by Na and EtOH to *methylheptanol*, $\text{Me}_2\text{CH}(\text{CH}_2)_3\text{CH}(\text{OH})\text{Me}$, b. 173.5° , d_{20} 0.8155, n_D 1.4198. The satd. ketones from α - and γ -methylheptenones are identical. Reduced with Na and moist Et_2O this gives the above alc. and the *pinacol*, $\text{C}_{12}\text{H}_{24}\text{O}_2$, b. about 300° , b_{14} 170° , m. $43-4^\circ$. Tetrahydro-linalool (Barbier, C. A. 8, 3009), prepd. by the action of EtMgI upon $\text{Me}_2\text{CH}(\text{CH}_2)_3\text{Ac}$, b. $195.5-7^\circ$, d_{20} 0.8280, n_D 1.4335. Warmed to 170° with 3 parts ZnCl_2 0.5 hr. it gave $\text{Me}_2\text{CH}(\text{CH}_2)_3\text{CMe}:\text{CHMe}$, b. $162-3^\circ$, d_{20} 0.7490, d_{21} 0.7475, n_D 1.4273. *Nitrosate*, cryst. *Nitrolpiperidide*. The constitution was established by oxidation to $\text{Me}_2\text{CH}(\text{CH}_2)_3\text{Ac}$. The hydrocarbon was also prepd. from $\text{Me}_2\text{CH}(\text{CH}_2)_3\text{Ac}$, $\text{MeCHBrCO}_2\text{Et}$ and Zn, by decomp. the acid, $\text{Me}_2\text{CH}(\text{CH}_2)_3\text{C}(\text{OH})\text{MeCHMeCO}_2\text{H}$, splitting off H_2O and CO_2 . Attempts to prep. the unsatd. ketone, $\text{Me}_2\text{CH}(\text{CH}_2)_3\text{CH}:\text{CMeAc}$, from the nitrosate, failed. $\text{Me}_2\text{CH}(\text{CH}_2)_3\text{Ac}$ and HOBr gave $\text{Me}_2\text{CH}(\text{CH}_2)_3\text{CO}_2\text{H}$. *Monobromomethylheptanone*, from 1 mol. $\text{Me}_2\text{CH}(\text{CH}_2)_3\text{Ac}$ and 1 mol. Br in dry Et_2O , b_{14} $94-7^\circ$. Treated with 1 mol. Na in MeOH or shaken 5-6 hrs. with 1.5 mols. of 2% aq. KOH, this gives *heptonylcarbinol*, $\text{Me}_2\text{CH}(\text{CH}_2)_3\text{COCH}_2\text{OH}$, b_{12} 90° , d_{20} 0.9160, n_D 1.43196. *Semicarbazone*, m. 170° . *Oxime*, m. 89° . *Sodium bisulfite compound*. *Ozone*, yellow-brown leaflets, m. 117° . *Dibromomethylheptanone*, $\text{Me}_2\text{CH}(\text{CH}_2)_3\text{COCHBr}_2$, b_{12} $130-2^\circ$, b_{18} $139-41^\circ$. Shaken with an excess of aq. KOH it gives an unsatd. *octic acid*, $\text{Me}_2\text{CH}(\text{CH}_2)_3\text{CH}:\text{CHCO}_2\text{H}$, b_{12} $122-3^\circ$, d_{20} 0.938, n_D 1.4511. *Silver salt*. *Amide*, m. 153° . *Isopropyl butylketone*, $\text{Me}_2\text{CHCO}(\text{CH}_2)_3\text{Me}$, obtained by reducing $\text{Me}_2\text{CHCOCH}_2\text{CH}:\text{CHMe}$ (Ann. 319, 112 (1901)) with Pd and H, b. $158-9^\circ$, d_{20} 0.816, n_D 1.4113. *Semicarbazone*, m. $110-1^\circ$. *Oxime*, b_{22} $135-7^\circ$. Upon reduction this gives the base, $\text{C}_8\text{H}_{17}\text{NH}_2$, b. $158-9^\circ$; *hydrochloride*, m. $74-5^\circ$; *urea*, m. $136-7^\circ$. *Isopropylbutylcarbinol*, by reduction of the ketone in moist Et_2O with Na, b. $167-8^\circ$, d_{21} 0.820, n_D 1.4249. *Pinacol*, b_{14} $170-5^\circ$, m. $46-7^\circ$. *Methylisopropylbutylenecarbinol*, $\text{Me}_2\text{CHCMe}(\text{OH})\text{CH}_2\text{CH}:\text{CHMe}$, b. $174-7^\circ$, d_{17} 0.849, n_D 1.4486. *Hydrocarbon*, C_9H_{18} , a by-product in the Grignard reaction, b. $146-9^\circ$. Treated with H_2SO_4 an isomeric hydrocarbon is obtained, which gives a *nitrosate*, m. $122-5^\circ$. *Ethylisopropylbutylenecarbinol*, b. $188-91^\circ$, d_{17} 0.850, n_D 1.4521. *Hydrocarbon*, $\text{C}_{10}\text{H}_{18}$, b. $158-61^\circ$. *Ethylisopropylbutylcarbinol*, b. $191-5^\circ$, d_{20} 0.8455, n_D 1.4378. *Hydrocarbon*, $\text{C}_{10}\text{H}_{20}$, b. 155.7° , d_{20} 0.7570, n_D 1.4302. CXIX. Transformation of trimethylethylene into trimethylcyclopentenone. With JOHANNES RECHENBERG and FRITZ RIESNER. *Ibid* 202-211.—*Methyl amylenenitrolacetoacetate*, $\text{MeC}(:\text{NOH})\text{CMe}_2\text{CHAcCO}_2\text{Me}$, prepd. from $\text{Me}_2\text{C}(\text{ONO}_2)\text{C}(:\text{NOH})\text{Me}$ and $\text{AcCH}_2\text{CO}_2\text{Et}$ in EtONa , m. $145-6^\circ$. 10 g. Me or Et ester, boiled 4 hrs. with 100 cc. of 50% KOH, gives *trimethylcyclopentenone*, $\text{C}_8\text{H}_{12}\text{O}$. *Semicarbazone*, leaflets, m. $199-200^\circ$. Reduced with Pd and H, it gives *trimethylcyclopentanone*, b. $164-7^\circ$, d_{18} 0.8829, n_D 1.4336. *Semicarbazone*, m. 209° . *Oxime*, m. 105° . This reaction is probably as follows: The aceto-

acetic ester compd. undergoes the ketone decompn., and the resulting oxime is hydrolyzed to the corresponding diketone which then suffers inner condensation. In order to establish the constitution of the resulting product homologs were prepd. and partially studied. *Ethyl amyleneisotrolmethyloacetate*, m. 153°. *Ethyl derivative*, m. 163°. *Propyl derivative*, m. 166°. If the above Me or Et ester is treated with EtONa , a yellowish brown compound, $\text{C}_{10}\text{H}_{15}\text{O}_5\text{N}$, is obtained, sol. in alkalis with a red color.

C. J. WEST.

Spectrochemical investigations. K. v. AUWERS, A. BOENNECKE, F. KROLL-PFEIFFER AND G. PETERS. Univ. Greifswald and Marburg. *Ann.* 408, 212-84 (1915). —A consideration of the question as to how far spectrochemistry would help to det. the equil. relations between keto and enol forms led to the optical study of series of O-containing C_6H_5 derivs. I. Spectrochemistry of benzene derivatives. An *o*- or *m*-Me group does not change the exaltation of the parent substance but this is regularly increased by a *p*-Me group, varying from 30 to 70%. This difference is so marked that the *p*-deriv. may be distinguished from the *o*- or *m*-derivs. by this means. The earlier established rule that aldehydes have a higher exaltation than the corresponding ketones and acid esters is confirmed by an exam. of homologs. The action of the MeO group is much stronger than that of Me. Here all 3 positions have a higher exaltation than the parent substance, but the *p*-deriv. may be again distinguished because its value is twice that of the original. A further proof of the slight effect of an *o*- or *m*-Me group is seen in the fact that such a group, introduced into an *o*-MeO aldehyde, does not change the $\text{E}\Sigma$ -value. The ethers of aromatic hydroxy aldehydes, ketones and acid esters have a considerably lower exaltation than the parent compds. The Ac compds. have a smaller exaltation than the corresponding Me ethers. The presence of an *o*-HO group causes a marked increase in the exaltation of the parent substance. The above points are illustrated by several tables of compds. The following data are given: *o*- $\text{MeC}_6\text{H}_4\text{CHO}$, b_{111} 195°, d_4^{20} 1.038, n_D 1.54233, n_D 1.54852, n_D 1.56502, n_D 1.57978 at 19°, $\text{E}\Sigma_\alpha$ 0.93, $\text{E}\Sigma_D$ 1.01. *m*- $\text{MeC}_6\text{H}_4\text{CHO}$, b_{115} 195°, d_4^{20} 1.020, n_D 1.53444, n_D 1.54068, n_D 1.55676, n_D 1.57168 at 21.4°, $\text{E}\Sigma_\alpha$ 1.10, $\text{E}\Sigma_D$ 1.18; *p*- $\text{MeC}_6\text{H}_4\text{CHO}$, b_{118} 198-200°, d_4^{20} 1.016, n_D 1.54015, n_D 1.54693, n_D 1.56413, n_D 1.58000 at 16.6, $\text{E}\Sigma_\alpha$ 1.37, $\text{E}\Sigma_D$ 1.47. *o*- $\text{HOC}_6\text{H}_4\text{CHO}$, b_{118} 86, b_{111} 91°, d_4^{20} 1.167, n_D 1.56526, n_D 1.57358, n_D 1.59674, n_D 1.62097 at 19.7°, $\text{E}\Sigma_\alpha$ 1.52, $\text{E}\Sigma_D$ 1.66. *o*- $\text{MeOC}_6\text{H}_4\text{CHO}$, b_{118} 124-5°, d_4^{20} 1.133, n_D 1.55245, n_D 1.55966, n_D 1.57947, n_D 1.59912 at 20.2°, $\text{E}\Sigma_\alpha$ 1.10, $\text{E}\Sigma_D$ 1.21. *o*-Acetoxybenzaldehyde, $\text{AcOC}_6\text{H}_4\text{CHO}$, from 23 g. $\text{OHCC}_6\text{H}_4\text{ONa}$ and 15 g. AcCl in dry Et_2O , b_{118} 142°, $d_4^{44.5}$ 1.1580, n_D 1.51715, n_D 1.52254, n_D 1.53646, n_D 1.54940 at 44.5°, $\text{E}\Sigma_\alpha$ 0.83, $\text{E}\Sigma_D$ 0.87. *m*- $\text{MeOC}_6\text{H}_4\text{CHO}$, d_4^{20} 1.118, n_D 1.55006, n_D 1.55656, n_D 1.57486, n_D 1.59228 at 13.9°, $\text{E}\Sigma_\alpha$ 1.18, $\text{E}\Sigma_D$ 1.27. *p*- $\text{MeOC}_6\text{H}_4\text{CHO}$, b_{118} 247°, d_4^{20} 1.123, n_D 1.56784, n_D 1.57641, n_D 1.59764 at 12.7°, $\text{E}\Sigma_\alpha$ 1.81, $\text{E}\Sigma_D$ 1.96. *1,4*- $\text{HOMeC}_6\text{H}_3\text{CHO}$, $d_4^{59.2}$ 1.0913, n_D 1.53921, n_D 1.54655, n_D 1.56840 at 59.2°. *1,4*- $\text{MeOMeC}_6\text{H}_3\text{CHO}$, b_{118} 130.2°, d_4^{20} 1.098, n_D 1.54672, n_D 1.55375, n_D 1.57328 at 19.2°, $\text{E}\Sigma_\alpha$ 1.18, $\text{E}\Sigma_D$ 1.30. *o*- $\text{MeC}_6\text{H}_4\text{Ac}$, b_{117} 92-3°, d_4^{20} 1.014, n_D 1.52963, n_D 1.53522, n_D 1.54885, n_D 1.56134 at 12.75, $\text{E}\Sigma_\alpha$ 0.51, $\text{E}\Sigma_D$ 0.57. Semicarbazone, m. 203° (Senderens, C. A. 5, 1591, gives 192°). *m*-Methylacetophenone, from 15 g. $\text{MeC}_6\text{H}_4\text{CHO}$, 3.8 g. Mg and 23 g. MeI , in a yield of 15.5 g., b_{118} 108.9-9.4°, d_4^{20} 0.993, n_D 1.52262, n_D 1.52635, n_D 1.53740, n_D 1.54710 at 15.35°, $\text{E}\Sigma_\alpha$ 0.19, $\text{E}\Sigma_D$ 0.16. Oxidized with Bechmann's mixt., it gives *m*- $\text{MeC}_6\text{H}_4\text{Ac}$, b_{118} 109°, d_4^{20} 1.007, n_D 1.52697, n_D 1.53270, n_D 1.54654, n_D 1.55946 at 15.3°, $\text{E}\Sigma_\alpha$ 0.66, $\text{E}\Sigma_D$ 0.73. Semicarbazone, m. 197-8° (S. gives 188°). *p*- $\text{MeC}_6\text{H}_4\text{COEt}$, b_{118} 112-4°, d_4^{20} 0.991, n_D 1.52184, n_D 1.52714, n_D 1.54072, n_D 1.55289, $\text{E}\Sigma_\alpha$ 0.77, $\text{E}\Sigma_D$ 0.82. *1,4*- $\text{Me}_2\text{C}_6\text{H}_3\text{Ac}$, b_{118} 107°, d_4^{20} 0.995, n_D 1.52497, n_D 1.53005, n_D 1.54349, n_D 1.55550 at 18.55°, $\text{E}\Sigma_\alpha$ 0.72, $\text{E}\Sigma_D$ 0.77. Semicarbazone, m. 168-9°. *p*- $\text{MeC}_6\text{H}_4\text{COCHMe}_2$, b_{118} 117-8°, d_4^{20} 0.969, n_D 1.51366, n_D 1.51873, n_D 1.53167, n_D 1.54352

at 21.2° , EZ_α 0.80, EZ_D 0.86. *o*-HOC₆H₄Ac, b_{14} 100° , d_4^{20} 1.131, n_α 1.55061, n_D 1.55797, n_β 1.57821, n_γ 1.59931 at 21.3° , EZ_α 1.16, EZ_D 1.26. *o*-MeOC₆H₄Ac, b_{11} 126.5° , d_4^{20} 1.088, n_α 1.53214, n_D 1.53787, n_β 1.55339, n_γ 1.56792 at 23.6° , EZ_α 0.89, EZ_D 0.97. *m*-MeOC₆H₄Ac, b_{12} $125-6^\circ$, d_4^{20} 1.095, n_α 1.53693, n_D 1.54313, n_β 1.55829, n_γ 1.57247 at 15.35° , EZ_α 0.73, EZ_D 0.82. *p*-MeOC₆H₄Ac, m . 38° , $d_4^{21.3}$ 1.0816, n_α 1.53998, n_D 1.54684, n_β 1.56443, n_γ 1.58094 at 41.3° , EZ_α 1.33, EZ_D 1.45. 1,4-HOMeC₆H₄Ac, m . 50° , d_4^{53} 1.0797, n_α 1.53426, n_D 1.54095, n_β 1.56135 at 53° , EZ_α 1.21, EZ_D 1.32. 1,4-MeOMeC₆H₄Ac, b_{14} $136-7^\circ$, d_4^{20} 1.064, n_α 1.53228, n_D 1.53769, n_β 1.55336, n_γ 1.56802 at 13.8° , EZ_α 0.89, EZ_D 0.94. *p*-MeOC₆H₄COEt, m . $25-6^\circ$, b_{11} $143-4^\circ$, d_4^{20} 1.076, n_α 1.54213, n_D 1.54837, n_β 1.56477, n_γ 1.57999, EZ_α 1.05, EZ_D 1.14. 1,4-HOMeC₆H₄COEt, b_{10-8} $120-3^\circ$, b_{11} $123-4^\circ$, d_4^{20} 1.077, n_α 1.54211, n_D 1.54852, n_β 1.56760, n_γ 1.58693 at 13.8° , EZ_α 1.07, EZ_D 1.11. 1,4-MeOMeC₆H₄COEt, b_{11-17} $144.8-46.4^\circ$, d_4^{20} 1.047, n_α 1.52638, n_D 1.53179, n_β 1.54650, n_γ 1.56045 at 18.9° , EZ_α 0.81, EZ_D 0.86. *p*-Isobutyroanisole, MeOC₆H₄COCHMe₂, b_{14} $149-50^\circ$, d_4^{20} 1.047, n_α 1.53328, n_D 1.53925, n_β 1.55489, n_γ 1.56926 at 16.6° , EZ_α 1.10, EZ_D 1.19. *o*-Isobutyro-*p*-cresol, b_{11} $125-5.3^\circ$, b_{11-8} $250.5-251.5^\circ$, d_4^{20} 1.044, n_α 1.52912, n_D 1.53550, n_β 1.55364, n_γ 1.57256, at 21.3° , EZ_α 1.18, EZ_D 1.29. Methyl ether, b_{10} $136-7.5^\circ$, b_{11} 155° , d_4^{20} 1.016, n_α 1.51644, n_D 1.52110, n_β 1.53460, n_γ 1.54694 at 13.7° , EZ_α 0.77, EZ_D 0.82. *o*-MeC₆H₄CO₂Et, b_{11} $102-102.5^\circ$, d_4^{20} 1.034, n_α 1.50229, n_D 1.50699, n_β 1.51849, n_γ 1.52884 at 21.6° , EZ_α 0.49, EZ_D 0.53. *m*-MeC₆H₄CO₂Et, b_{11} 133° , d_4^{20} 1.028, n_α 1.50042, n_D 1.50502, n_β 1.51670, n_γ 1.52718 at 21.6° , EZ_α 0.58, EZ_D 0.62. *o*-HOC₆H₄CO₂Me, b_{11} 101° , d_4^{20} 1.184, n_α 1.53149, n_D 1.53773, n_β 1.55371, n_γ 1.56921 at 18.1° , EZ_α 0.83, EZ_D 0.91. *o*-MeOC₆H₄CO₂Me, b_{11} $127-7.5^\circ$, d_4^{20} 1.156, n_α 1.52893, n_D 1.53422, n_β 1.54789, n_γ 1.56029 at 19.5° , EZ_α 0.67, EZ_D 0.72. *o*-HOC₆H₄CO₂Et, b_{11} $107.5-8.5^\circ$, d_4^{20} 1.131, n_α 1.51977, n_D 1.52511, n_β 1.54036, n_γ 1.55466 at 14.4° , EZ_α 0.84, EZ_D 0.90. *o*-MeOC₆H₄CO₂Et, b_{11} $135-6^\circ$, d_4^{20} 1.111, n_α 1.51913, n_D 1.52379, n_β 1.53694, n_γ 1.54856 at 14.55° , EZ_α 0.69, EZ_D 0.73. *m*-MeOC₆H₄CO₂Et, b_{11-8} $158-60^\circ$, d_4^{20} 1.099, n_α 1.51195, n_D 1.51697, n_β 1.52955, n_γ 1.54111 at 16.4° , EZ_α 0.68, EZ_D 0.73. *p*-MeOC₆H₄CO₂Et, b_{11} $136-7^\circ$, d_4^{20} 1.104, n_α 1.52183, n_D 1.52739, n_β 1.54143, n_γ 1.55436 at 14.3° , EZ_α 0.97, EZ_D 1.04.

II. Spectrochemistry of heterocyclic compounds. Cyclopentadiene, furane and thiophene are spectrochem. the same. The depression of the parent substance—the proof is yet lacking for cyclopentadiene—is either decreased or changed into exaltation, depending upon the nature of the substituent; the action of the same substituent in the various parent substances is different in degree. Coumarone and thionaphthene derivs. have nearly the same sp. exaltation. β -Me or MeO groups have no influence, though they act as disturbing substituents in a conjugation. The spectrochem. behavior of the esters of coumarilic acid is not essentially changed by the introduction of a *m*-Me or MeO group. On the other hand the exaltation of the chromenes is depressed if a Me group is introduced into the conjugation between the double bond of the O-containing ring and a double bond of the C₆H₅ ring. Furfurane, d_4^{20} 0.9366, n_α 1.41837, n_D 1.42157, n_β 1.42967, n_γ 1.43668 at 20° , EZ_α —0.97, EZ_D —1.10. α,α -Dimethylfurfurane, b . $93-4^\circ$, d_4^{20} 0.888, n_α 1.43173, n_D 1.43508, n_β 1.44313, n_γ 1.45008 at 21.6° , EZ_α —0.19, EZ_D 0.19. Coumarone, prepd. from pure coumarilic acid (the preps. from coal tar contain hydrocarbons which lower the d .), b_{11} $62-3^\circ$, $d_4^{22.7}$ 1.0913, n_α 1.55787, n_D 1.56450, n_β 1.58101, n_γ 1.59609 at 22.7° , EZ_α 0.55, EZ_D 0.59. 2-Methylcoumarone, by heating the corresponding acid, b . 189° , d_4^{20} 1.055, n_α 1.54903, n_D 1.55501, n_β 1.57062, n_γ 1.58478 at 18° ; from phenacetole, b . $197-7.5^\circ$, d_4^{20} 1.057, n_α 1.54663, n_D 1.55255, n_β 1.56924, n_γ 1.58224 at 23.1° , EZ_α 0.68, EZ_D 0.72. 4-Methylcoumarone, b_{11} 83.5° , d_4^{20} 1.058, n_α 1.54958, n_D 1.55547, n_β 1.57145, n_γ 1.58573 at 22.5° , EZ_α 0.70, EZ_D 0.75. 2,4-Dimethylcoumarone, b_{11} 99° , d_4^{20} 1.036, n_α 1.54260, n_D 1.54846, n_β 1.56339, n_γ 1.57683 at 22.2° , EZ_α 0.71, EZ_D 0.77. 2-Methoxycoumarone, d_4^{20} 1.144,

n_D^{20} 1.55277, n_D 1.55894, n_F 1.57489, n_F 1.58941 at 19.3° , EZ_a 0.62, EZ_D 0.68. 2-EtO deriv., d_4^{20} 1.104, n_a 1.54210, n_D 1.54773, n_F 1.56267, n_F 1.57619 at 17.9° , EZ_a 0.64, EZ_D 0.69. 4-Methyl-3-methoxycoumarone, d_4^{20} 1.112, n_a 1.54458, n_D 1.55036, n_F 1.56572, n_F 1.57971 at 24.3° , EZ_a 0.72, EZ_D 0.78. 2-EtO deriv., d_4^{20} 1.079, n_a 1.53846, n_D 1.54395, n_F 1.55856, n_F 1.57184 at 16.6° , EZ_a 0.71, EZ_D 0.76. Et coumarilate, m. $30-31^\circ$, d_4^{20} 1.174, $d_4^{32.8}$ 1.1612, n_a 1.55453, n_D 1.56194, n_F 1.58119, n_F 1.60020 at 32.2° , EZ_a 1.47, EZ_D 1.58. Et 2-methylcoumarilate, d_4^{50} 1.1145, n_a 1.53882, n_D 1.54559, n_F 1.56348, n_F 1.57936 at 64.8° , EZ_a 1.61, EZ_D 1.73. Ethyl 5-methylcoumarilate, needles, m. $42-3^\circ$, b_{10} 1.69-9.5, $d_4^{43.8}$ 1.1187, n_a 1.54821, n_D 1.55575, n_F 1.57565, n_F 1.59513 at 43.9° , EZ_a 1.81, EZ_D 1.95. Et 2,4-dimethylcoumarilate, d_4^{50} 1.0931, n_a 1.53939, n_D 1.54642, n_F 1.56425, n_F 1.58147 at 50° , EZ_a 1.67, EZ_D 1.80. Et 2-methoxycoumarilate, m. 59° , d_4^{70} 1.1595, n_a 1.54280, n_D 1.54987, n_F 1.56911 at 70° , EZ_a 1.77, EZ_D 1.89. Et 2-ethoxycoumarilate, d_4^{20} 1.162, n_a 1.55231, n_D 1.55922, n_F 1.57818, n_F 1.59662 at 14.4° , EZ_a 1.52, EZ_D 1.64. Et 4-methyl-2-methoxycoumarilate, d_4^{20} 1.174, n_a 1.55570, n_D 1.56279, n_F 1.58240, n_F 1.60172 at 23.8° , EZ_a 1.61, EZ_D 1.73. Et 4-methyl-2-ethoxycoumarilate, m. $47-8^\circ$, $d_4^{24.6}$ 1.1044, n_a 1.53367, n_D 1.54037, n_F 1.55855, n_F 1.57637 at 52.6° , EZ_a 1.89, EZ_D 2.02. Thionaphthene, $d_4^{36.2}$ 1.1484, n_a 1.62509, n_D 1.63324, n_F 1.65439, n_F 1.67368(?) at 36.2° , EZ_a 0.60, EZ_D 0.68. 2-Methoxythionaphthene, b_{10} 148, d_4^{20} 1.202, n_a 1.61990, n_F 1.62767, n_F 1.64810 at 13.6° , EZ_a 0.58, EZ_D 0.64. 2-Ethoxythionaphthene, b_{10} 154, d_4^{20} 1.157, n_a 1.59779, n_D 1.60495, n_F 1.62362, n_F 1.64098 at 17.9° , EZ_a 0.62, EZ_D 0.70. 4-Methylthionaphthene, by reducing 4-methyl-2-hydroxythionaphthene with Zn and AcOH, b_{10} 111-5, m. $19-22^\circ$, $d_4^{21.8}$ 1.1107, n_a 1.60730, n_D 1.61476, n_F 1.63374, n_F 1.65141 at 21.65° , EZ_a 0.67, EZ_D 0.74.

C. J. WEST.

Dinitronaphthylpyridinium chloride and its transformation products. TH. ZINCKE AND FR. KROLLPFEIFFER. Marburg. *Ann.* 408, 285-314 (1915); cf. C. A. 7, 1711, 2207.—1,3-Dinitronaphthyl-4-pyridinium chloride (a), prepd. by heating 1 part finely pulverized $(O_2N)_2C_{10}H_6Cl$, 1 part C_5H_5N and 8 parts EtOH 20 min., filtering hot from the red by-products, and recrystg. from MeOH containing a little concd. HCl, compact, slightly yellow crystals with 1 mol. MeOH, or needles with 1 mol. AcOH, m. 140° (decompn.), sol. in alc. with a yellowish color (probably due to a slight dissociation or hydrolytic decompn.). The decompn. is complete if the dil. HCl soln. is repeatedly concd. to dryness, or if (a) is dissolved in Ac_2O . Chloroplatinate, yellowish white, sinters 220° , m. 260° (decompn.). In the presence of NaOAc or $NaNO_3$ (a) is hydrolyzed into C_5H_5N and $(O_2N)_2C_{10}H_6OH$; the latter reacts with unchanged (a) to give dinitronaphthylpyridinium dinitronaphtholate, obtained in a yield of 20% in alc. soln., deep red leaflets or needles, m. 210° (decompn.). It is decompd. in hot AcOH. 1 part (a) in 100 parts H_2O , satd. with H_2S , gives dinitronaphthyl mercaptan, yellow powder, m. $117-8^\circ$ (decompn.), sol. in NH_3 with a brown color; NaOH gives a brown-red salt, fine clusters. A small amt. of the disulfide is also formed, brown-red powder, sinters 115° , m. 145° (decompn.), insol. in alkalis. In alc. soln. the principal product is dinitronaphthyl sulfide, yellow needles, m. $273-4^\circ$ (decompn.); yield, 90%. Alkalies give a deep blue-violet ppt., which is unstable. If 1 g. (a) in 20 cc. H_2O is treated with 20 cc. of N NaOH and the blue-violet ppt. at once treated with 25 cc. of N HCl, there results a red compound (b), $(O_2N)_2C_{10}H_6NHCH:CHCH:CHCHO$; this is more easily obtained by treating 10 g. (a) in 200 cc. alc. with 50 cc. of 5% EtONa and then decomp. with alc. HCl (yield, 75-80%); small ruby-red prisms with metallic luster from $CHCl_3$, m. 190° (explosive decompn.). Alc. KOH gives a blue-violet soln. HCl in AcOH (exclusion of H_2O) regenerates (a). 2N HCl gives a trace of (a) but principally $(O_2N)_2C_{10}H_6NH_2$ and the aldehyde $C_6H_4O_2$ (*Ann.* 333, 306 (1904)). Long treatment with acetone in the cold, more quickly upon warming, changes (b) into a yellow modification (c), purified by pptn. from $C_2H_5Cl_4$ with EtOH, m. 190° (decompn.). This form is

not as reactive as (b). Alc. KOH gives a blue-violet color, from which soln. HCl ppts. yellow or brown products. HCl-AcOH gives principally $(O_2N)_2C_{10}H_8Cl$. Alcs. change (b) in various ways; probably the end product is the same as from acetone. MeOH gives an *olive-green compound*, m. $170-80^\circ$, changed into (c) by acetone. C_6H_5OH gives a *yellowish brown modification*, m. 170° (decompn.), changed into (c) by acetone. (b) *acetate*, $C_{10}H_8(NO_2)_2N:CHCH:CHCH:CHOAc$, by b. (b) in 4 parts Ac_2O until soln. resulted, yellow, m. $166-7^\circ$ (decompn.); yield 35-40%; alc. KOH sapon. it to (b). Suspended in MeOH, HCl decomps. it into $(O_2N)_2C_{10}H_8NH_2$. *Benzoate*, prepd. by shaking 1 g. (a) in 60 cc. EtOH with 5 cc. of 5% EtONa soln. and 1 cc. BzCl 10 min., yellow powder, m. $170-80^\circ$ (decompn.). *Carbethoxy derivative*, prepd. as above, using $ClCO_2Et$ in place of BzCl, small citron-yellow prisms, m. 180° (decompn.). *Phenylhydrazine compound*, $C_{10}H_8(NO_2)_2NHCH:CHCH:CHCH:NNHPh$ (d), prepd. from an alk. soln. of (a) and $PhNHNH_2$ in alc., black cryst. powder, m. 140° (decompn.), very insol. Alc. HCl decomps. it into $(O_2N)_2C_{10}H_8NH_2$ and $PhNHC_6H_5NCl$. *Oxime*, brownish red scales with green luster, sinter 164° , m. $166-7^\circ$ (decompn.). This is decompd. by HCl-MeOH. *Amine*, $C_{10}H_8(NO_2)_2N:CHCH:CHCH:CHNH_2$ (f), prepd. by treating 5 g. pure (a) in 250 cc. MeOH with 10 cc. of 25% NH_3 , dild. with the same vol. MeOH, brownish violet powder with bronze luster, m. $143-5^\circ$ (decompn.). Alkali liberates NH_3 , upon warming also C_6H_5N . $PhNHNH_2$ gives (d). *Hydrochloride*, golden orange leaflets, decompd. by H_2O , but sol. in dil. HCl. *Chloroplatinate*, red. *Nitrate*, red powder, somewhat more stable than the chloride. AcOH decomps. it into NH_3 , $(O_2N)_2C_{10}H_8OH$ and the dinitronaphthylate. Ac_2O and BzOH give the corresponding derivs. of $(O_2N)_2C_{10}H_8OH$. *Dinitronaphthol benzoate*, yellow needles, m. 174° . HCl decomps. (f) into C_6H_5N , NH_3 , $(O_2N)_2C_{10}H_8NH_2$ and regenerates a small amt. of (a). If an AcOH soln. of (f) is allowed to stand 1 hr., or if a soln. in C_6H_6 is boiled 3 hrs. the *secondary amine*, $[C_{10}H_8(NO_2)_2N:CHCH:CHCH:CH]_2NH$, is formed, fine black powder, which forms dark brown scales when boiled with H_2O , m. $195-200^\circ$ (decompn.). Conc'd. HCl or H_2SO_4 gives a deep blue soln. *Methylamine derivative*, black-green aggregates, m. $123-5^\circ$ (decompn.). It behaves like the amine. *Hydrochloride*, light red needles. *Dimethylamine derivative*, black scales with green luster, m. $178-180^\circ$ (decompn.). *Hydrochloride*, dark red scales with metallic luster. C. J. W.

Dinitronaphthylisoquinolinium chloride and its transformation products. TH. ZINCKE AND FR. KROLLPFEIFFER. Marburg. *Ann.* 408, 314-39(1915); cf. preceding abstr.—1,3-Dinitronaphthyl-4-isoquinolinium chloride (A), prepd. by boiling a mixt. of 10 g. finely pulverized $(O_2N)_2C_{10}H_8Cl$ in 100 cc. EtOH and 5 g. isoquinoline 1 hr., filtering hot, washing the product with cold MeOH, and pptg. with Et_2O , seps. from MeOH- Et_2O containing a little conc'd. HCl in small compact prisms, sinters 100° , m. $160-5^\circ$ (decompn.). The solns. are somewhat yellow because of dissociation. *Nitrate*, small needles, m. 170° (decompn.). In the presence of AcONa or $NaNO_3$ (A) is decompd. into $(O_2N)_2C_{10}H_8OH$, isoquinoline and HCl. *Dinitronaphthylisoquinolinium dinitronaphtholate* (B), small brick-red needles, m. 205° (decompn.). In H_2O , H_2S gives $(O_2N)_2C_{10}H_8SH$ and $[(O_2N)_2C_{10}H_8S]_2$; in alc. $[(O_2N)_2C_{10}H_8]_2S$. *Pseudo or carbinol base* (C), $(O_2N)_2C_{10}H_8N:CH:CH.C_6H_4.CHOH$, prepd. by treating 5 g. (A) in 250

cc. H_2O with 30 cc. of 2 N Na_2SO_3 , dark brown amorphous powder, sinters 165° , m. 200° (decompn.). Dil. acids dissolve it, forming (A). Heated with H_2O for some time it is decompd., giving (B). Heated with Ac_2O $C_9H_7N.O.C_{10}H_8(NO_2)_2$ (D) is formed. *Methyl ether* (E), by boiling (C) with MeOH, dark red needles, m. 160° (decompn.). Boiled with Ac_2O (D) is formed. *Ethyl ether*, small, brownish violet leaflets with slight metallic luster, m. 150° (decompn.). *Isobutyl ether*, nearly black, m. 118° (decompn.). *Anhydro base hydrochloride*, $C_{38}H_{25}O_9N_4Cl$, obtained as a light red powder, insol. in dil.

HCl, when (C) is extd. with HCl, m. 110° (decompn.). Conc'd. HCl gives (A). MeOH-NH₃ gives (E). Alc. in a sealed tube forms (B). Ac₂O gives (C) and C₉H₇N.O.C₁₀H₄(NO₂)₂. (A) reacts with PhNH₂ and *p*-MeC₆H₄NH₂ to give the corresponding derivs. of (O₂N)₂C₁₀H₄OH. The carbinol base and its ethers react to give the isoquinoline derivs. In the case of MeNH₂ or EtNH₂ both (A) and (C) react in the same way, (O₂N)₂C₁₀H₄NH₂ pptg. and the soln., after acidifying with HCl, containing the alkylisoquinolinium chloride. *Dimethylpseudoammonium base*, prep'd. by adding 4 cc. of 33% Me₂NH to 1 g. (A) in 20 cc. MeOH, deep bluish dark scales, m. 155° (decompn.). Dil. acids change it to (A). Alcs. give the ethers. If (A) is boiled with Me₂NH, (O₂N)₂C₁₀H₄NH₂ is formed. The decompn. of the pseudo base is probably simply a hydrolytic process. 10 g. (A) in 200 cc. warm alc., treated with a mixt. of 10 g. PhNHNH₂ in 10 cc. alc., gives the *phenylhydrazine compound*, (O₂N)₂C₁₀H₄NHCH:CHC₆H₄CH:NHNHPh, brown-red scales with a golden luster, m. 145° . Alc. HCl decomps. it into (O₂N)₂C₁₀H₄NH₂ and C₉H₇N(NHPh)Cl. By the action of Na₂CO₃ upon C₉H₇N(NHPh)Cl, there is formed a *reddish brown compound* (F), probably C₉H₇N:NPh. *Anilinoisoquinolinium pseudocyanide*, PhNHN.CH:CH.C₆H₄CHCN, ob-

tained by adding an excess of KCN to C₉H₇N(NHPh)Cl in 50 parts H₂O, nearly colorless needles, m. 110° . AcOH splits off HCN, giving the acetate. In MeOH KCN splits off PhNH₂, giving *isoquinaldinic nitrile*, also obtained by the action of KCN upon (F), felt-like needles, m. 93° . Conc'd. H₂SO₄ gives the amide (Reissert, *Ber.* 38, 3428 (1905)).

C. J. WEST.

Bromination of aromatic amines. WALTER FUCHS. Univ. Vienna. *Monatsh.* 36, 113-41 (1915).—The bromination of aromatic amines is best carried out in AcOH. The number of Br atoms entering the comp'd. depends upon the conditions of expt. The directing influence of the NH₂ group is stronger than that of any other group. 5 g. *p*-MeC₆H₄NH₂ in 20 cc. glacial AcOH, treated with 46 cc. of a Br soln. (50 g. Br in 200 cc. glacial AcOH), gave 17 g. of the HBr salt and 13 g. 4,2,6-MeBr₂C₆H₂NH₂, m. 79° . 5 g. *p*-H₂NC₆H₄NHAc in 20 cc. AcOH is treated with 5 g. AcONH₄ and 43 cc. Br soln., giving 10 g. *dibromoacetylphenylenediamine*, needles, m. 239° (decompn.). Upon sapon. this gave 3,5-Br₂C₆H₂(NH₂)₂, m. 138° ; diazotized and treated with CuBr, 3,4,5-Br₃C₆H₂NH₂, m. $118-9^{\circ}$, is formed, while if it is diazotized according to Witt (K metabisulfite and conc'd. HNO₃) and poured into alc. CuSO₄, it gives 3,5-Br₂C₆H₂NHAc, m. 231° . Treated with 1 mol. Br in AcOH it gives 3,4,5-Br₃C₆H₂NHAc, m. $255-6^{\circ}$. 5 g. *p*-H₂NC₆H₄Ac in 220 cc. AcOH, treated with 48 cc. Br soln., gave 11 g. *methyl 4-amino-3,5-dibromophenyl ketone*, prisms, m. 180° . *Hydrazone*, golden yellow needles, m. not sharply 146° , cannot be recrystd. Diazotized with conc'd. HNO₃ as above, it yields 3,5-*dibromoacetylphenone*, needles, m. 66° , which is oxidized to 3,5-Br₂C₆H₂CO₂H, m. 209° . *p*-H₂NC₆H₄SO₃H reacts very slowly with Br in the cold, while if the soln. is warmed, *s*-Br₂C₆H₂NH₂ is the principal product. H₂NC₆H₄SO₂NH₂ and Br give 3,5-*dibromosulfanilic amide*, small leaflets, m. 237° . Heated 1 hr. with 75% H₂SO₄ it yields 2,6-Br₂C₆H₂NH₂, m. 83° . 5 g. *p*-H₂NC₆H₄OEt in 15 cc. AcOH, treated with 47 cc. Br soln., and distd. with steam, gave 4 g. 4-*amino-3,5-dibromophenyl ethyl ether*, glistening needles, m. 79° . The constitution was established by diazotizing and reducing, 3,5-Br₂C₆H₂OEt, b. $266-7^{\circ}$, being formed. 33 g. *o*-MeC₆H₄NH₂ in 60 cc. AcOH, treated with 180 cc. Br soln., gave 80 g. 2,4,6-MeBr₂C₆H₂NH₂, m. 45° . 2 g. *o*-H₂NC₆H₄CHO, treated with 22 cc. Br soln., gives 4.5 g. 2-*amino-3,5-dibromobenzaldehyde*, m. 110° , probably identical with the product of Bamberger and Demuth (*Ber.*, 34, 1338 (1901)) and of Muller (*C. A.* 4, 205). The constitution was established by diazotizing and reducing, thus forming 3,5-Br₂C₆H₂CHO, m. 90° , and oxidation of this to 3,5-Br₂C₆H₂CO₂H. 2 g. *o*-H₂NC₆H₄Ac and 19 cc. Br soln. gave 4 g. *methyl 2-amino-3,5-*

di-bromophenyl ketone, golden yellow rods, m. 130° . This yields $3,5\text{-Br}_2\text{C}_6\text{H}_3\text{CHO}$ upon diazotizing and reducing. $o\text{-H}_2\text{NC}_6\text{H}_4\text{OMe}$ gives 14.5 g. of the *2-amino-3,5-di-bromophenyl methyl ether hydrobromide*. The free base is an oil. *Hydrochloride*, needles. *Acetate*, prisms, m. 145° . This gives $3,5\text{-Br}_2\text{C}_6\text{H}_3\text{OMe}$ when diazotized and reduced. Diazotized according to Witt, a compound, needles, m. 86° , is obtained. It contains N. 5 g. PhNH_2 in 10 cc. AcOH , treated with 100 cc. Br soln., gave 17.5 g. $\text{Br}_2\text{C}_6\text{H}_3\text{NH}_2$. $m\text{-MeC}_6\text{H}_4\text{NH}_2$ gave a quant. yield of $3,2,4,6\text{-MeBr}_2\text{C}_6\text{H}_2\text{NH}_2$. 3.3 g. $m\text{-O}_2\text{NC}_6\text{H}_4\text{NH}_2$ gave 8 g. $3,2,4,6\text{-O}_2\text{NBr}_2\text{C}_6\text{H}_2\text{NH}_2$. 5 g. $m\text{-H}_2\text{NC}_6\text{H}_4\text{CHO}$ gave 10 g. $3,2,4,6\text{-H}_2\text{NBr}_2\text{C}_6\text{H}_3\text{CHO}$, m. 147° , which, when diazotized and reduced, gave $\text{Br}_2\text{C}_6\text{H}_3\text{CHO}$. *Oxime*, $\text{C}_7\text{H}_4\text{ONBr}_2$, needles, m. 175° . 1.5 g. $m\text{-H}_2\text{NC}_6\text{H}_4\text{Ac}$ in 40 cc. AcOH , treated with 22 cc. Br soln., gave 4 g. *methyl 3-amino-2,4,6-tribromophenyl ketone*, long prisms, m. 121° . *Hydrazone*, needles, m. 120° . Diazotized and reduced, it yields *2,4,6-tribromoacetophenone*, glistening scales, m. 93.5° . Oxidized with alk. KMnO_4 , this yields *tribromophenylglyoxylic acid*, $\text{Br}_3\text{C}_6\text{H}_2\text{COCO}_2\text{H}$, fine needles, m. 174° . When this is boiled with H_2SO_4 it yields $\text{Br}_3\text{C}_6\text{H}_2\text{CO}_2\text{H}$, m. 186° . If 5 g. PhNH_2 in 25 cc. AcOH are treated with 34 cc. Br soln. drop-wise, and the product pptd. with aq. AcONa , 9 g. $p\text{-BrC}_6\text{H}_4\text{NH}_2$ are formed. 5 g. $m\text{-O}_2\text{NC}_6\text{H}_4\text{NH}_2$ in 75 cc. AcOH , treated with 23 cc. Br soln., gave 9 g. $3,4\text{-O}_2\text{NBrC}_6\text{H}_3\text{NH}_2$, m. $125\text{--}6^{\circ}$. In the same way $o\text{-O}_2\text{NC}_6\text{H}_4\text{NH}_2$ gives $2,4\text{-O}_2\text{NBrC}_6\text{H}_3\text{NH}_2$, m. $111\text{--}2^{\circ}$. 5 g. $o\text{-H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$ gave 9 g. $5,2\text{-Br}(\text{H}_2\text{N})\text{C}_6\text{H}_3\text{CO}_2\text{H}$ as the HBr salt, from which the free base is obtained by crystg. from AcONa soln.

C. J. WEST.

Condensation of terephthalaldehyde with methyl 2,3-hydroxynaphthoate. KARL LUGNER. Univ. Vienna. *Monatsh.* 36, 143-67(1915).—In the condensation between $\text{C}_6\text{H}_4(\text{CHO})_2$ and $\text{C}_{10}\text{H}_6(\text{OH})\text{CO}_2\text{Me}$ only 1 CHO group was reactive, though the 2nd CHO group reacted with MeOH , PhNH_2 , etc. *Methyl 1-[chloro-p-aldehydobenzyl]-2-hydroxy-3-naphthoate (A)*, obtained by condensing bimol. amts. of $\text{C}_6\text{H}_4(\text{CHO})_2$ and $\text{C}_{10}\text{H}_6(\text{OH})\text{CO}_2\text{Me}$ in abs. Et_2O with HCl , and allowing to stand several days, yellow needles, m. 180.5° . The yield is small. *Concd. H}_2\text{SO}_4* gives an intense brick-red color, changing to emerald-green upon adding *concd. HNO}_3*. *AcOH* containing 10% H_2SO_4 gives a red color. SnCl_4 gives a red color with an orange fluorescence, changing to light yellow upon warming. FeCl_3 gives a green color which increases in intensity upon standing. *Bromo derivative (B)*, by condensing with HBr , yellow, m. $169\text{--}70^{\circ}$. *Concd. H}_2\text{SO}_4* gives a blue-violet color, changing to green with HNO_3 . SnCl_4 gives a rose color, while the substance becomes a dark brown. *Hydroxy derivative (C)*, best prepd. by treating the Br compd. in acetone with the *calcd. amt.* of H_2O , yellow compact prisms, m. 166° . FeCl_3 gives a deep indigo-blue color, changing to dark green upon warming. The Br compd. decomps. about 10 times as fast as the Cl deriv. *Methyl 1-[methoxy-p-dimethoxymethylbenzyl]-2-hydroxy-3-naphthoate*, prepd. by boiling 3 g. (A) and 100 cc. MeOH 4 hrs., long thin, yellow plates or needles, m. 150° . FeCl_3 gives a green color. *Methyl 1-[methoxy-p-aldehydobenzyl]-2-hydroxy-3-naphthoate*, obtained by boiling (A) and PhOH in C_6H_6 with Na , fine needles from acetone, m. 171° . *Concd. H}_2\text{SO}_4* gives an orange-red color, becoming brick-red upon adding HNO_3 . FeCl_3 gives a yellowish green color. *p-Cresoxy derivative*, small light yellow needles, m. 203° . *p-Cymoxy derivative*, yellow rhombic leaflets, or long needles, m. 186° . FeCl_3 gives a green color. NH_3 reacts with (A) but no definite compd. could be isolated. If 2 mols. PhNH_2 and 1 mol. (A) are boiled 1.5 hrs. in C_6H_6 , *methyl 1-[anilino-p-phenylasomethinbenzyl]-2-hydroxy-3-naphthoate* results, short, thin rods, m. 171° . The same product is obtained with 3 mols. PhNH_2 . *Concd. H}_2\text{SO}_4* gives a yellow color, changing to olive-green and then brown upon adding HNO_3 . SnCl_4 gives a yellow-brown color. *1-[Anilino-p-aldehydophenylhydrazonobenzyl] derivative*, prepd. by b. 2.4 g. anil and 0.7 g. PhNHNH_2 in C_6H_6 , m. 202° (decompn.). It is unstable in the air or light.

Warm concd. H_2SO_4 gives a brick-red color, which is changed by HNO_3 into olive-brown and then emerald-green. HClO_4 gives a citron-yellow soln., while the substance is colored olive-green. 1-[Hydroxy-*p*-aldehydophenylhydrazonobenzyl] derivative, from mol. amts. of (C) and PhNHNH_2 , by boiling 10 min. in C_6H_6 , m. 215° . Concd. H_2SO_4 gives a dark violet color, changed to light olive-green by adding HNO_3 . HClO_4 gives a pale green color but colors the compd. violet-black. Methyl 1-[piperidino-*p*-aldehydobenzyl]-2-hydroxy-3-naphthoate, prep'd. by treating 1 mol. (A) with 2 mols. $\text{C}_8\text{H}_{11}\text{N}$ in little CHCl_3 , boiling 0.5 hr. and adding 10 vols. Et_2O and filtering after 0.5 hr., 6-sided leaflets, m. 171° . H_2SO_4 gives a golden yellow soln., which HNO_3 changes to olive-brown. FeCl_3 gives a reddish yellow color, changing very rapidly through lilac and violet to dark blue. 1-[Azobenzeneamino-*p*-azobenzene-*p*-asomethinbenzyl] derivative, $\text{PhN}:\text{NC}_6\text{H}_4\text{N}:\text{CHC}_6\text{H}_4\text{CH}(\text{NHC}_6\text{H}_4\text{N}:\text{NPh})\text{C}_{10}\text{H}_6(\text{OH})\text{CO}_2\text{Me}$, from 1 mol. (A) and 3 mols. $\text{PhN}:\text{NC}_6\text{H}_4\text{NH}_2$, long orange needles, m. 219° . Hydrochloride, violet-red. Concd. H_2SO_4 gives a brick-red, HClO_4 a deep reddish yellow, SnCl_4 a deep orange-red, FeCl_3 a red-yellow color. 1-[Hydroxy-*p*-aldehydthiosemicarbazonebenzyl] derivative, $\text{H}_2\text{NCSNHN}:\text{CHC}_6\text{H}_4\text{CH}(\text{OH})\text{C}_{10}\text{H}_6(\text{OH})\text{CO}_2\text{Me}$, long, thin, microscopic, yellow needles, m. 210° . Concd. H_2SO_4 gives a brick-red soln. which HNO_3 changes through blue and violet into green, finally becoming brown. HClO_4 gives a brick-red color, which upon warming becomes olive-green and then reddish brown. FeCl_3 gives a green color gradually becoming darker. Silver salt, white amorphous flakes which soon form a dark brown powder. It is rather stable in the light and gradually carbonizes above 150° . C. J. WEST.

Chlorination of cyclic ketones with antimony pentachloride. ALFRED ECKERT AND KARL STEINER. Univ. Prag. *Monatsh.* 36, 175-89 (1915).—In the reaction of SbCl_5 upon cyclic ketones, perchloro derivs. are first obtained, which then are more or less decomp'd. into halogen acids and hydrocarbons. Ordinarily 1 part substance was heated 6-8 hrs. with 15-20 parts SbCl_5 and a trace of I. After cooling the Sb and SbCl_5 were removed by washing with HCl and with H_2O . 10 g. $\text{C}_6\text{H}_4(\text{CO})_2\text{C}_6\text{H}_4$, treated as above, gave 3 g. $\text{Cl}_4\text{C}_6(\text{CO}_2\text{H})_2$, sep'd. by extn. with HCl , 5 g. $\text{Cl}_4\text{C}_6(\text{CO}_2\text{H})\text{COC}_6\text{Cl}_5$, extd. with dil. Na_2CO_3 , 5 g. C_6Cl_6 , extd. with Et_2O or C_6H_6 , and about 6 g. $\text{Cl}_4\text{C}_6(\text{CO})_2\text{C}_6\text{HCl}_3$, which remains after the residue is extd. with glacial AcOH . Heptachloro-anthraquinone, $\text{Cl}_4\text{C}_6(\text{CO})_2\text{C}_6\text{HCl}_3$, yellowish green needles from PhCl , m. 380° , difficultly sol. in concd. H_2SO_4 . Zn and NaOH or $\text{Na}_2\text{S}_2\text{O}_4$ gives a red dye-bath. Treated with SbCl_5 for 8 hrs., about 0.5 is recovered unchanged while the remainder is found as C_6Cl_6 , $\text{Cl}_4\text{C}_6(\text{CO}_2\text{H})_2$ and $\text{Cl}_4\text{C}_6(\text{CO}_2\text{H})\text{COC}_6\text{Cl}_5$. Perchlorobenzoylbenzoic acid, $\text{Cl}_4\text{C}_6(\text{CO}_2\text{H})\text{COC}_6\text{Cl}_5$, diamond-like 6-sided tables, m. 266° (decompn.). Chloride, m. 180° , does not react with cold H_2O or alc. Methyl ester, by boiling the chloride with a large excess of MeOH several hrs., m. 213° . 1 g. acid heated 0.5 hr. with 10 cc. concd. H_2SO_4 at $200-250^\circ$, gave $\text{Cl}_4\text{C}_6(\text{CO}_2\text{H})_2$ and C_6HCl_3 . Heated with SbCl_5 the acid gives $\text{Cl}_4\text{C}_6(\text{CO}_2\text{H})_2$ and C_6Cl_6 . $(\text{C}_6\text{H}_5)_2\text{CO}$ and SbCl_5 give $(\text{C}_6\text{Cl}_5)_2$, m. 340° , and pentachloro-*o*-phenyltetrachlorobenzoic acid, $\text{Cl}_5\text{C}_6(\text{CO}_2\text{H})\text{CCl}_5$, extd. as the Na salt with Na_2CO_3 and purified by pptn. of the acid from AcOH by H_2O , and finally subliming *in vacuo*, leaflets, m. 264° . From MeOH it crystals with 1 mol. MeOH . The same acid is obtained by treating 1 part $(\text{C}_6\text{H}_4\text{CO})_2$ with 15 parts SbCl_5 , heating 3 hrs., then adding 10 parts SbCl_5 and heating 5 hrs. Xanthone gave a small amt. of $\text{C}_6\text{Cl}_6\text{CO}_2\text{H}$, m. 199° , and C_6Cl_6 , besides octochloroxanthone, yellowish needles, m. 324° , sublimes undecomp'd. *in vacuo*. Acridone gave as the only cryst. reaction product octochloroacridone, long slightly yellow needles, m. 340° . PhCl gives a red-violet soln., with a brownish red fluorescence. Warm H_2SO_4 gives a green soln. with a yellowish green fluorescence. If the compd. is heated longer with SbCl_5 , there results a small amt of C_6Cl_6 and $\text{Cl}_4\text{C}_6\text{CO}_2\text{H}$. Methylacridone gave the same reaction products as acridone. Only small amts. of the acid were obtained. C. J. WEST.

Action of organo-magnesium compounds upon methyl *o*- and *p*-cresotinate. H. BERLITZER. Univ. Vienna. *Monatsh.* 36, 191-209(1915).—A soln. of 3 mols. of EtBr and Mg, after warming 1 hr., is treated with 1 mol. 2,3-(HO)MeC₆H₃CO₂Me in Et₂O, the mixt. warmed 4-5 hrs. and decompd. with dil. AcOH with cooling, giving 72% of 3-methyl-2-hydroxy-1-diethylmethanolbenzene, (HO)MeC₆H₃C(Et)₂OH, flat leaflets from dil. alc. Boiled with Ac₂O and 1.5 times its wt. of AcONa for 10 hrs., a 75% yield of 3-methyl-2-acetoxy-1-[1-ethyl-1-propene]benzene, (AcO)MeC₆H₃CET:CHMe, is formed, *b*₁₁ 124-7°. Sapond. by boiling 3 hrs. with 25% alc. KOH it gives the 2-hydroxy derivative, *b*₁₃ 108-12°. This adds Br without evolution of HBr but upon concg. the CS₂ soln. HBr is given off and no cryst. compd. was isolated. 3-Methyl-2-hydroxy-1-dipropylmethanolbenzene, long wide prisms, *m.* 157°. Yield, 80%. 3-Methyl-2-acetoxy-1-[1-propyl-1-butene]benzene, *b*₁₁ 138-42°. Sapond. this gives the 2-hydroxy derivative, (HO)MeC₆H₃CPr:CHET, *b*₁₁ 124-7°. 3-Methyl-2-hydroxy-1-dibenzylmethanolbenzene, purified by distn. of the (PhCH₂)₂ with steam and crystn. of the residue from C₆H₁₁OH, thin prisms, *m.* 121-2°. In attempting to prep. an unsatd. deriv., the compd. was boiled 6 hrs. with Ac₂O and AcONa, treated with AcCl in C₆H₅N, with Ac₂O and H₂SO₄ and boiled 5 hrs. with 40% H₂SO₄, but no definite compd. could be isolated. 3-Methyl-2-hydroxy-1-[diphenylmethanol]benzene, compact monoclinic prisms, *m.* 120-1°. Conc'd. H₂SO₄ gives a dark red soln. The same compd. was obtained by using 5 mols. PhMgBr. 3-Methyl-2-hydroxy-1-[di- α -naphthylmethanol]benzene, *m.* 214°. The yield is 10%, much C₁₀H₈ being isolated. The soln. is unstable in the air. 5-Methyl-2-hydroxy-1-diethylmethanolbenzene, from 4 mols. EtMgBr and 1 mol. 5,2-Me(OH)C₆H₃CO₂Et, flat leaflets from dil. alc., *m.* 81-2°. 5-Methyl-2-acetoxy-1-[1-ethyl-1-propene]benzene, *b*₁₂ 138-9°. 2-Hydroxy derivative, *b*₁₀ 116-9°. 5-Methyl-2-hydroxy-1-dipropylmethanolbenzene, wide needles, *m.* 84-5°. Yield, 80%. 5-Methyl-2-acetoxy-1-[1-propyl-1-butene]benzene, *b*₁₂ 150-2°. 2-Hydroxy derivative, *b*₁₁ 136-8°. 5-Methyl-2-hydroxy-1-dibenzylmethanolbenzene, compact crystals, *m.* 111-2°. 5-Methyl-2-hydroxy-1-diphenylmethanolbenzene, hexagonal crystals, *m.* 166-7°; conc'd. H₂SO₄ gives an orange color. Heated above its *m. p.* it decomp., giving 7-methyl-*o*-phenylxanthene, microscopic needles, *m.* 145°. 5-Methyl-2-hydroxy-1-di- α -naphthylmethanolbenzene, microscopic crystals, *m.* 184°.

C. J. WEST.

Asymmetric synthesis of mandelic acid and production of ethyl benzylidenetartarate and benzylidenetartaric acid. EMIL ERLÉNMEYER. Dahlen. *Biochem. Z.* 68, 351-67(1915); cf. *C. A.* 8, 3431.—Even though it has not been possible to isolate a pure asym. optically active BzH from the reaction product of BzH and (HOCHCO₂H)₂ (which is practically impossible because of the ease with which it is racemized), yet the fact that optically active PhCH(OH)CO₂H may be obtained in a yield of 0.05% indicates its existence. Neither of the 2 principal reaction products mentioned below, when treated with KCN, gives an optically active PhCH(OH)CO₂H. Diethyl benzylidenetartarate, PhCH

$$\begin{array}{c} \text{OCHCO}_2\text{Et} \\ \diagup \quad | \quad \diagdown \\ \text{PhCH} \quad \text{OCHCO}_2\text{Et} \end{array}$$
 , freed from BzH by first distg. *in vacuo*, and then removing the traces with steam and from BzOH by shaking with NaHCO₃, large compact crystals from petrol. ether, *m.* 48-9°, [α]_D -40°. 100 g. BzH and 150 g. C₆H₆O₆ gave 2.5 g.; using alc. HCl as the condensing agent, 5 g. ester were obtained from 50 g. C₆H₆O₆. The NaHCO₃ washings gave benzylidenetartaric acid, also obtained by sapon. of the ester, fine needles from C₆H₆, *m.* 124°, [α]_D -31°. It is very unstable, so that the *m. p.* is 80° after a few hrs. Boiled with H₂O it is decompd. into BzH and C₆H₆O₆. The difficultly sol. amorphous silver salt is more stable.

C. J. WEST.

Rate of saponification of derivatives of ethyl benzoate. HAMILTON MCCOMBIE AND HAROLD A. SCARBOROUGH. Univ. Birmingham. *J. Chem. Soc.* 107, 156-62

(1915); *Proc.* **30**, 294-5.—M. and S. have studied the velocity of sapon. at 30° of the following Et esters: BzOEt and the 3 isomeric $\text{MeC}_6\text{H}_4\text{CO}_2\text{Et}$, $\text{ClC}_6\text{H}_4\text{CO}_2\text{Et}$, $\text{BrC}_6\text{H}_4\text{CO}_2\text{Et}$, and $\text{IC}_6\text{H}_4\text{CO}_2\text{Et}$. Their methods have been previously described (cf. *C. A.* **8**, 3024). Phenolph. was the indicator used. Halogen substituents show a marked increase in the rate of sapon. in comparison with BzOEt, the influence of the halogen being greatest in the *m*-, least in the *o*-position. The influence of $\text{Cl} > \text{Br} > \text{I}$ (except when the halogens occupy the *p*-positions, when the order is reversed; cf. Meyer and Kellas, *Z. physik. Chem.* **24**, 221). When graphs are drawn, taking the at. wt. of the halogen radicals (in any 1 position) as abscissas and the corresponding sapon. velocities (*k*) as ordinates, *straight lines* are obtained in all 3 cases (*o*, *m* and *p*), the value of *k* for the Br-substituted ester being (in each case) a mean between the values of *k* for the corresponding Cl and I isomers. The introduction of the Me group causes a marked retardation in the rate of sapon. Retardation is also produced by NH_2 , MeO and HO groups, while the NO_2 group causes a decided acceleration. M. and S. find that for BzOEt and KOH at 14.4°, in H_2O , $k = 0.83$, whereas in abs. EtOH, $k = 0.00543$, but offer no explanation.

LOUIS E. WISE.

Hydroaromatic ketones. III. 1-Isopropylcyclohexan-3-one. ARTHUR W. CROSSLAY AND WALTER R. PRATT. King's College, London. *J. Chem. Soc.* **107**, 171-6 (1915).—The greater part of this work has been previously outlined (cf. *C. A.* **9**, 613). *iso*-Pr.CH.CH₃.CO.CH:C(OH).CH₃ (A) (70% yield), was prepd. by the following

method: 23 g. Na in 275 cc. abs. EtOH were heated on a steam bath with 170 g. $\text{CH}_2(\text{CO}_2\text{Et})_2$ and 112 g. of $\text{Me}_2\text{CHCH}:\text{CHAc}$ for 2 hrs., the mixt. evapd., dild. to 2 l. and treated with 900 g. of 10% aq. KOH, boiled for 0.25 hr., acidified with aq. H_2SO_4 and again boiled to expel CO_2 . (A) sepd. as an oil which crystd. The *anilide* of (A), needles, m. 175°. The following derivs. (whose mother substances have been previously described) were also prepd.: 5-chloro-1-isopropyl- Δ^4 -cyclohexene-3-one *semi-carbazone*, plates, m. 193° (decompn.); 1-isopropylcyclohexanyl 3-benzoate, b₃₅ 210°.

LOUIS E. WISE.

Synthesis of *p*-thiol- β -phenylethylamine. HAROLD KING. *J. Chem. Soc.* **107**, 222-30 (1915).—The synthesis of *p*-thiol- β -phenyl ethylamine (A), $\text{SHC}_6\text{H}_4(\text{CH}_2)_2\text{NH}_2$, hexagonal leaflets, m. 216-7° (from H_2O), may be outlined as follows: *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{Sn} + \text{HCl}$ in EtOH

$\text{H}_4(\text{CH}_2)_2\text{NHBz} \xrightarrow{\text{H}_2\text{NC}_6\text{H}_4(\text{CH}_2)_2\text{NHBz} \text{ (B), m. 133.5-4.5° (cf. Barger and Walpole, C. A. 4, 1018)}}$ $\xrightarrow{\text{diazotization} + \text{K xanthate}}$

$\text{EtSOCSN}_2\text{C}_6\text{H}_4(\text{CH}_2)_2\text{NHBz}$
(not isolated) $\xrightarrow{\text{benzo-}p\text{-xanthyl-}\beta\text{-phenylethyl amide, } p\text{-EtSOCS.C}_6\text{H}_4(\text{CH}_2)_2\text{NHBz}}$
(not purified) $\xrightarrow{\text{hydrolysis in EtOH with aq. KOH}}$

$\xrightarrow{\text{benzo-}p\text{-thiol-}\beta\text{-phenylethylamide, micro-} + \text{alk K}_3\text{Fe(CN)}_6}$

needles, very sensitive to oxidation $\xrightarrow{\text{dibenzodi-}\beta\text{-phenylethylamide}}$
p-disulfide, $[\text{SC}_6\text{H}_4(\text{CH}_2)_2\text{NHBz}]_2$, minute needles (from AcOH), m. 199-201°, hydrolysis at 150° with 20% aq. HCl

$\xrightarrow{\text{di-}\beta\text{-phenylethylamine } p\text{-disulfide dihydrochloride}}$
(C), $[\text{SC}_6\text{H}_4(\text{CH}_2)_2\text{NH}_2\text{HCl}]_2$, microscopic hexagons (from 5% aq. HCl), m. 339.5-40.5°

$\xrightarrow{\text{Sn} + \text{HCl in EtOH}}$ $\xrightarrow{\text{hydrochloride of (A), filmy leaflets (from abs. EtOH), neutralization} + \text{NaOH}}$
m. 31.5-3.0° $\xrightarrow{\text{(A). The picrate of (A), orange needles, m. 156.5-7.5° (decompn.).}}$

The hydrochloride of (B), hexagons, decomp. 283-5°; sulfate, leaflets, m. 278-9° (decompn.). Acetyl derivative of (B), rectangular leaflets, m. 209.5-10.5°. The sulfate corresponding to (C) forms silky leaflets; the corresponding picrate, *syphnate* and the free base, $[\text{SC}_6\text{H}_4(\text{CH}_2)_2\text{NH}_2]_2$ (D), are oils. (A) when heated with H_2SO_4 gives a purple color, does not respond to Millon's test, and gives a primrose-yel-

low ppt. with $(\text{AcO})_2\text{Pb}$. (A) has about $1/4$ the pressor activity while (D) approx. $1/30$ the activity of $p\text{-HOC}_6\text{H}_4(\text{CH}_2)_3\text{NH}_2$, when intravenously injected into cats.

LOUIS E. WISE.

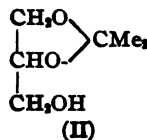
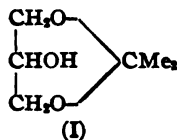
Nitroguaiacols. DAVID CARDWELL AND ROBERT ROBINSON. Univ. Manchester and Sidney. *J. Chem. Soc.* 107, 255-9(1915).— $o\text{-(MeO)}_2\text{C}_6\text{H}_4$ (A) was readily nitrated, with the formation of $1,2,4\text{-(MeO)}_3(\text{O}_2\text{N})\text{C}_6\text{H}_3$ (B), (99% yield), by gradually adding 25 g. of (A) to a cooled mixt. of 20 cc. HNO_3 (d. 1.42) and 20 cc. H_2O . When 5 g. (B) are heated on a steam bath with 15 cc. satd. HBr , 5-nitroguaiacol (C), $1,2,5\text{-(HO-(MeO)(O}_2\text{N))C}_6\text{H}_3$, pale yellow needles, m. $104\text{--}5^\circ$, is obtained; *acetate*, m. 101° . (C) is also obtained by the semi-methylation of nitrocatechol, and by the nitration of $o\text{-AcO(MeO)C}_6\text{H}_4$. When 5 g. nitroveratrole were boiled under reflux with 10 g. KOH , 50 cc. MeOH and 20 g. H_2O , for 12 hrs., 4-nitroguaiacol (D), pale yellow needles, m. $101\text{--}2^\circ$, were formed. (D) has been previously prepd. by Rupe (*Ber.* 30, 2446) and (C) has been synthesized by Cousin (*J. pharm. chim.* 9, 276), but the 2 products were erroneously believed to be identical. Mixts. of (C) and (D) m. $72\text{--}6^\circ$. When 6-nitrohomoveratrole was heated with glacial AcOH and satd. aq. HBr , 6-nitro 4-hydroxy-m-tolyl methyl ether (E), $1,3,4,6\text{-Me(MeO)(HO)(O}_2\text{N)C}_6\text{H}_3$, yellow prisms, m. $138\text{--}40^\circ$, was obtained. Its *potassium salt* formed yellow needles; *acetate*, feathery needles, m. $138\text{--}9^\circ$. A by-product in the (E) synthesis was identical with Cousin's non-volatile nitrohomocatechol (cf. *Bull. soc. chim.* 9, 53, 157).

LOUIS E. WISE.

Silicon compounds. VIII. Preparation and constitution of silico-oxalic acids, and the action of methyl and ethyl alcohols on trisilicon octachloride. GEOFFREY MARTIN. London. *J. Chem. Soc.* 107, 319-28(1915).—Neither Friedel and Ladenburg (*Ann.* 203, 250(1880)) nor Gattermann and Weinlig (*Ber.* 27, 1943(1894)) were able to prepare pure silico-oxalic acid, $(\text{SiO}_2\text{H})_x$, by the decompn. of disilicon hexahalides. An acid of 99-100% purity was obtained by hydrolysis of $\text{Si}_2(\text{OEt})_6$ with cold H_2O for 48 hrs. It is a white, amorphous, hygroscopic solid, decomp. explosively when scratched, rubbed, or suddenly heated, evolves the theoretical amt. of H when treated with 50% aq. KOH . If warmed, or prepd. by means of hot H_2O , or if unduly handled, it evolves too little H. An attempt was made to prep. $\text{Si}_2(\text{OEt})_6$ in order to effect a similar synthesis of mesosilico-oxalic acid, $\text{HO}_2\text{Si.Si(OH)}_2\text{SiO}_2\text{H}$ (A). However, the action of EtOH on Si_2Cl_4 resulted in the formation of Si(OEt)_4 , and an inseparable mixt. of very labile products which could not be isolated. Similar results were obtained with MeOH , except that the decompn. of the Si.Si.Si chain was not quite so marked, as was shown by the greater evolution of H when the products of the reaction were treated with alkali (*C. A.* 6, 2923; 8, 345). (A), prepared by exposing Si_2Cl_4 to atm. moisture, is much more explosive than $(\text{SiO}_2\text{H})_x$, as would be expected from the great instability of the Si_3 chain observed above.

M. HEIDELBERGER.

Condensation of acetone and benzaldehyde with glycerol. Preparation of glycerol α -methyl ether. JAMES C. IRVINE, JAMES L. A. MACDONALD AND CHARLES W. SOUTAR. Univ. St. Andrews. *J. Chem. Soc.* 107, 337-51(1915).—An attempt to derive information as to the mechanism of the formation of condensation products between polyhydric alcs. and acetone or BzH . Since only 1 Me group can be introduced into isopropylideneglycerol (A), formulas based on a condensation with acetone in the enol form may be discarded and only (I) and (II) need be considered. To obtain (A)



free from unchanged glycerol (*B*) it is best prepd. by the following modification of Fischer's method: 100 g. freshly distd. (*B*) were shaken until dissolved with 650 cc. dry acetone containing 1% HCl. After 24 hrs. the soln. was neutralized with PbCO_3 , or with Ag_2CO_3 , warmed with bone-black, and shaken with a large excess of CaCl_2 . The soln. was decanted from the syrupy residue, evapd., and fractionated *in vacuo*. Yield, 88.7 g., $b_{11} 86.5^\circ$, $d_4^{18} 1.0727$, $n_D 1.4383$. To 80 g. (*A*) in 280 g. MeI were gradually added 200 g. Ag_2O . After the first vigorous reaction had ceased, the mixt. was boiled 6 hrs. and then extd. with Et_2O . This yielded 61 g. *isopropylideneglycerol methyl ether*, mobile liquid, $b_{11} 57^\circ$, $b_D 75^\circ$, $d_4^{16} 0.9900$, $n_D 1.4177$, readily hydrolyzed by traces of acids. When boiled 20 min. in 75% alc. containing 0.5% HCl it gives *glycerol α -methyl ether* (*C*), $b_{11} 110^\circ$, $d_4^{17} 1.1197$, $n_D 1.4463$, sol. in H_2O . *o*- $\text{C}_6\text{H}_4(\text{CO})_2\text{O}$ and (*C*) give a mixt. of mono- and di-acid phthalates which could not be resolved, owing to the difficulty in sepg. the alkaloidal salts. Dry HCl was slowly bubbled into *l*-menthone until the vol. corresponding with a 1% soln. had been absorbed. The soln. was then dild. with an equal vol. of Et_2O and shaken 48 hrs. with (*C*). Neutralization of the product with Ag_2CO_3 could be completed only after adding a small amt. of H_2O . The resulting *l*-menthylideneglycerol methyl ether, $b_{11} 135-6^\circ$, did not cryst., and could not be resolved by partial hydrolysis. PBr_3 and (*C*) in CHCl_3 , finally boiled 45 min., allowed to stand overnight, and washed with aq. Na_2CO_3 and H_2O , gave chiefly non-volatile sirup of the formula $(\text{HO})_2\text{POCH}_2\text{CHBrCH}_2\text{OMe}$ or $\text{BrCH}_2\text{CH}[\text{OP}(\text{OH})_2]\text{CH}_2\text{OMe}$, and a small amt. of a mixt. of the bromohydrin and $\text{BrCH}_2\text{CHBrCH}_2\text{OMe}$ (*D*). After 2 treatments with PBr_3 the latter was obtained pure. PBr_3 and (*C*) yielded chiefly P-containing, non-volatile material and a little (*D*) contaminated with a small amt. of a substance containing more Br. In an attempt to produce a mixed ether with EtI and Ag_2O , oxidation also occurred and *ethyl β -methoxy- α -ethoxypropionate* was formed, mobile liquid, $b_{11} 57-8^\circ$. (*C*) was synthesized as follows: $\text{MeOCH}_2\text{CH}:\text{CH}_2$ was prepared by methylating $\text{C}_4\text{H}_9\text{OH}$ by the Ag_2O reaction and from $\text{C}_4\text{H}_9\text{I}$ and NaOMe ; on bromination it yielded *dibromo- α -methoxypropane* (*D*), which was fractionated until its n was const.; it $b_{11} 81^\circ$, $d_4^{20} 1.8329$, $n_D 1.5143$; heated at 160° with aq. alc. AgOAc for 30 hrs. it gives (*C*) after complete hydrolysis with 5% aq. $\text{Ba}(\text{OH})_2$ of the partially hydrolyzed acetate first formed. A product identical with (*D*) was prepd. from (*C*) by heating this at 180° for 2 hrs. with $(\text{CO}_2\text{H})_2$ and a trace of $(\text{NH}_4)_2\text{SO}_4$, then at 230° for 8 hrs., with occasional addition of more $(\text{CO}_2\text{H})_2$, and brominating the resulting distillate of MeOC_4H_9 . Benzylideneglycerol (Gerhardt, *C. A.* 7, 868), when methylated with Ag_2O and MeI free from acid and I, gave *benzylideneglycerol methyl ether* (*E*), $b_{11} 121^\circ$, $d_4^{15} 1.1263$, $n_D 1.5170$, is hydrolyzed even by the traces of acid in lab. air. Hydrolysis yields (*C*). The (*C*) prepd. from (*A*) gives (*E*) when condensed with BzH , and the (*C*) prepd. from (*E*) yields (*A*) when condensed with acetone. By the above methods it is therefore demonstrated that (*A*) and the corresponding benzylidene deriv. have the constitution (II).

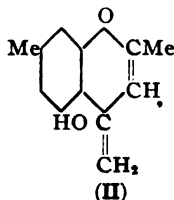
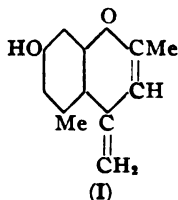
M. HEIDELBERGER.

Removal of oxygen from triethylphosphine oxide. JOHN N. COLLIE AND FRANK REYNOLDS. London. *J. Chem. Soc.* 107, 367-9.—It is well known that Et_3PO (*A*) is unchanged by ordinary reducing agents and may even be distd. over Na. It may also be distd. over Zn and Mg. 5.66 g. (*A*) and 8 g. PCl_3 reacted readily. After distg. off the POCl_3 the resulting *triethylphosphine dichloride* crystd. With H_2O it gives back (*A*); reduced by boiling in alc. with Na-Hg, it gives Et_3P . The dichloride could not be prepd. pure; on distn. it decompd., giving EtCl and other inflammable gases, C, yellow P, and a mixt. containing traces of Et_3PCl_2 and Et_2PHCl . This was again distilled, but again decompd. to a great extent. In another expt., by adding the distillate from the dichloride to dil. HNO_3 , evapg. to dryness, and converting into the Ag salt of $\text{Et}_3\text{PO}_2\text{H}$ with Ag_2O and b. H_2O , it was shown that the chief product of the decompn.

is Et_3PCl , according to the equation $\text{Et}_3\text{PCl}_2 = \text{Et}_2\text{PCl} + \text{EtCl}$. This behavior is similar to that of analogous compds. of As and Bi.

M. HEIDELBERGER.

Some benzopyranol derivatives. JOHN N. COLLIE AND GERALD N. WHITE. London. *J. Chem. Soc.* **107**, 369-76.—A paper dealing with an additional simple condensation of $-\text{CH}_2\text{CO}-$ derivs. (cf. C., C. A. **2**, 798). Condensation of orcinol and CH_3Ac , either undil. or in soln., is readily effected by means of concd. HCl, dry HCl, concd. HBr, or H_2SO_4 , giving salts of 2 bases, $\text{C}_{12}\text{H}_{12}\text{O}_2$ (I) and (II). Since each



of the starting products may be obtained from HOAc, the reaction may be summarized as follows: $7\text{H}(\text{CH}_2\text{CO})\text{OH} = \text{C}_{12}\text{H}_{12}\text{O}_2 + 2\text{CO}_2 + 8\text{H}_2\text{O}$. The orange hydrochloride of (II), 5-hydroxy-2,7-dimethyl-4-methylene- γ -benzopyranol, is best sep'd. from the lemon-yellow hydrochloride of (I), 7-hydroxy-2,5-dimethyl-4-methylene- γ -benzopyranol, by means of its lower solubility in concd. HCl. Both cryst. with 1 mol. H_2O , which is driven off at 100° ; both decomp. between 200° and 235° . Below are given data for the derivs. of (I) and (II), resp.: *Free bases*, orange, sol. in NaOH with a pale yellow color; violet, almost colorless in NaOH, gives a pale brown soln. in alc., changing to violet when hot. *Hydrobromides*: Greenish yellow and orange, sep'd. in the same way as the HCl salts. *Chloroplatinates*: Yellow, evolve Cl when boiled a few moments in soln. and give chloroplatinites, crystals. *Perchlorates*: Greenish yellow, readily sol. in cold aq. HClO_4 , the soln. decomp. when warmed; orange crystals with 1 H_2O , difficultly sol. in aq. HClO_4 ; both deflagrate when heated. HgCl_2 gives a mixt. of mercurio- and mercurichlorides of which the latter are sol. in cold $\text{C}_6\text{H}_5\text{N}$. *Mercurichlorides*: Deep orange, gives a crimson soln. in $\text{C}_6\text{H}_5\text{N}$; purple, gives a violet color in $\text{C}_6\text{H}_5\text{N}$; both are reduced to the mercuriochlorides in cold alc. *Mercuriochlorides*: Orange and purple, insol. in $\text{C}_6\text{H}_5\text{N}$. Reduction of the HCl salts with Zn in boiling HCl gave colorless, amorphous dihydro derivatives (A); feebly basic; that from (I) gave a similar tetrahydro derivative with Al-Hg, has no basic properties. Both (A), nitrated in AcOH, give needles, decomp. at 100° ; formulas: $\text{C}_{12}\text{H}_{12}\text{O}_4\text{N}$ and $\text{C}_{12}\text{H}_{12}\text{O}_6\text{N}_2$. Reagents reacting with keto groups gave indefinite results, it thus appearing that, at least in basic solns., the compds. (I) and (II) do not react in the quinoidal form. The Ac derivs. (not described) do not have basic properties, strange to say. With concd. HCl, phloroglucinol and CH_3Ac (excess) gave first a yellow hydrochloride, $\text{C}_{11}\text{H}_{10}\text{O}_4\text{HCl}$, and later, an orange salt, $\text{C}_{17}\text{H}_{14}\text{O}_6\text{HCl}$, the latter a condensation product of phloroglucide.

M. HEIDELBERGER.

Double halides of quinine and urea. II. P. G. GOLUBEV. *J. Russ. Phys. Chem. Soc.* **47**, 14-7(1915); (cf. C. A. **8**, 2549).—A double hydriodide of quinine and urea, $\text{C}_{20}\text{H}_{24}\text{O}_2\text{N}_2\text{HI} \cdot \text{CH}_4\text{ON}_2\text{HI} \cdot 5\text{H}_2\text{O}$ (a), was made by mixing hot solns. of quinine bisulfate and urea. If the diln. is not too great (8-10%), the cooled soln. deposits within 24 hrs. a mass of long, transparent, bright, yellow crystals (yield, 80-5%), m. $62-4^\circ$, sol. in 18 parts of cold H_2O , loses all of its H_2O of hydration in the air. At its 1st recrystn. from 8-10 parts of hot H_2O it leaves a small amt. of a red, amorphous powder (not examd.). (a) may also be made from urea and com. quinine dihydriodide, but then it contains more of the red powder. Heated to 100° , (a) decomp. into $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2 \cdot 2\text{HI} + \text{CO}_2 + 2\text{NH}_3$. A small amt. of an insol. red powder is also produced in this

decompn. On evapg. a soln. of (a) in 20-5 parts of H_2O by exposure to the air at ordinary temp., partial decompn. takes place with formation of *quinine sesquihydriodide*, $C_{20}H_{24}O_2N_2 \cdot 1.5H_2I$ (b), white, silky, filiform crystals, m. $42-5^\circ$, sol. in 22 parts of cold H_2O . Being considerably lighter than (a), (b) floats on the surface when the 2 are shaken with H_2O , and may thus be sepd. from (a). (b) may be changed to (a) by dissolving it in H_2O and adding a little urea and 2-3 drops of HI soln. The white com. *Chininum hydriodicum* was found to be impure $C_{20}H_{24}O_2N_2 \cdot HI \cdot H_2O$. H. M. GORDIN.

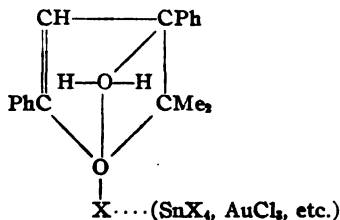
Action of anhydrous aluminium chloride and trioxymethylene on cyclohexane. A. M. NASTYUKOV AND N. V. GURIN. *J. Russ. Phys. Chem. Soc.* 47, 46-52(1915).—Neither C_6H_{12} nor C_6H_{14} interact with $AlCl_3$ and $(CH_2O)_3$. Naphthenes, C_7H_{16} , C_8H_{18} and cyclohexane (a) react under these conditions, forming both dehydrogenation and condensation products, together with sol. formolite. From the reaction product of (a) no definite compd. could be isolated, save a small amt. of C_6Me_6 . H. M. G.

Relation between absorption and structure. V. A. ISMAIL'SKII. *J. Russ. Phys. Chem. Soc.* 47, 63-100(1915).—A critical exam. of the proposed hypothesis on the relation between color and structure. Both the carbonium hypothesis of Baeyer and Villiger (*Ber.* 38, 571) and the quinoid or quinone-carbonium hypothesis of Gomberg (*Ann.* 376, 183) and other investigators are considered inadequate to account for the various phenomena of halochromy. The existence of colored substances in which the carrier of color is in some cases an org. group acting as anion (anhalochromy), while in other cases it acts as cation (cathalochromy), and the possibility of converting the same skeleton of C atoms from the position of cation (chromonium state) to that of anion (chromaci state) speak against the carbonium hypothesis which ascribes color to the basic properties of individual C atoms. Against the quinoid hypothesis speaks the fact that the absorption of light changes continuously when the constitutional factors of the colored substance are changed, it being impossible to tell where the benzoid form ends and the quinoid begins. The most promising hypothesis is that of Kaufmann (*Valenzlehre*, 480) and Gebhard (*J. prakt. Chem.* 84, 561) which ascribes color to a particular condition of the whole mol. resulting from a "shattering," of the valences of a central C atom which becomes the center of color. This hypothesis, in connection with the electronic principle of competition, will be elaborated in another paper. H. M. GORDIN.

Oxonium compounds. A. FAVORSKII AND É. VENUS. *J. Russ. Phys. Chem. Soc.* 47, 133-41(1915).—The *pinacol*, $PhC : CCPh(OH)C(OH)Me_2$ (a), made by the interaction of $BzC(OH)Me_2$ with $PhC : CMgBr$ (yield, about 44%), m. $93-3.5^\circ$. By heating (a) with 20% H_2SO_4 a new oxonium base, *hydroxydimethyldiphenyldihydrofurane* (b), $HOCPh.CH : CPh.O.CMe_2$, m. $101-2^\circ$, was obtained; *hydrochloride*, $C_{18}H_{18}O_2 \cdot$

$2HCl \cdot 2H_2O$ (from (b) in concd. HCl), greenish yellow crystals, m. $61-2^\circ$; *hydrochloride*, $C_{18}H_{18}O_2 \cdot 2HCl$ (from (b) and HCl in Et_2O), yellow crystals, m. $105-7^\circ$; *chloroplatinate*, $(C_{18}H_{18}O_2 \cdot HCl)_2PtCl_4$, orange powder; *chloroaurate*, $C_{18}H_{18}O_2 \cdot HCl \cdot AuCl_3$, yellow powder; *chlorostannate*, $C_{18}H_{18}O_2 \cdot HCl \cdot SnCl_4$, pale green powder; *hydrobromide*, $C_{18}H_{18}O_2 \cdot 2HBr$ (from (b) and HBr in C_6H_6), orange powder, m. 157° in open and 154° in a closed capillary, decomp. when placed in H_2O , first into a yellow hydrated salt, and then into free (b) and acid; *bromostannate*, $C_{18}H_{18}O_2 \cdot HBr \cdot SnBr_4$, yellow powder, m. $180-2^\circ$ in an open and $179-80^\circ$ in a closed capillary; *hydriodide*, $C_{18}H_{18}O_2 \cdot 2HI$, lilac-brown powder, m. $174-6^\circ$ (in a closed capillary); *acid sulfate*, $C_{18}H_{18}O_2 \cdot 2H_2SO_4$ (from (b) and H_2SO_4 in Et_2O), yellow, very hygroscopic powder, m. 163° ; *trichloroacetate*, $C_{18}H_{18}O_2 \cdot 2CCl_3CO_2H$, pale green powder, m. $116-8^\circ$ (decompn.); *acetyl derivative*, $C_{18}H_{17}AcO_2$ (from (b) and Ac_2O), colorless crystals, m. $141-2^\circ$, is not decompd. by alc. KOH and, instead of basic, has acid properties, being sol. in dil. alkalies, giving a soln. from which

it is not extd. by Et_2O . As seen from the comp. of the above salts, the simple salts contain 2 mols. of acid for 1 of (b), hence in them both O atoms are tetravalent. In the double salts, however, there is only 1 mol. of acid for 1 of (b), hence in these 1 O atom only is tetravalent. Since in oxonium bases the basic properties of the O of an OH are very weak, it must be the cyclic O of (b) that is tetravalent in the double salts, the other O being divalent. It is, however, also possible that the double salts are formed with elimination of 1 mol. of acid, giving compds. of the following formula in which both O atoms are tetravalent:



(X = halogen). It is not quite clear why the Ac deriv. with the more basic O intact is devoid of basic properties. H. M. GORDIN.

Stereoisomerism of symmetrical diethyldiphenylethane. A. I. L'YEPIN AND V. N. REIKH. *J. Russ. Phys. Chem. Soc.* 47, 149-60(1915).— EtPhCHOH (a) was made by the action of EtMgBr on BzH ; yield, 77%. Heating with HBr in a sealed tube to 100° converted (a) into EtPhCHBr (b); yield, 78%. By warming (b) to 50° with Na in C_6H_6 a mixt. of PhCH:CHMe , PhBr and *sym. diethyldiphenylethane*, $(\text{CH-PhEt})_2$, was obtained. The latter was produced in 2 stereoisomeric modifications: a liquid of agreeable odor and violet fluorescence (c), b_{767} $297-8^\circ$, d_{20}^{20} 0.9591, n_D^{20} 1.54622; and a solid (d), m. 90° , b_{767} $304-5^\circ$. Oxidation with CrO_3 and KHSO_4 in AcOH converted both (c) and (d) into EtBz . (c) and (d) are partly converted into each other when they are heated with a trace of I in a sealed tube to $250-65^\circ$. Since (c) and (d) contain 2 asym. C atoms in *sym.* arrangement, the hydrocarbon, $\text{C}_{18}\text{H}_{22}$, ought to exist in 4 stereoisomeric modifications. Of these (c) probably is the *dl*-, and (d) the *i*-modification. H. M. GORDIN.

Isomerism of the organo-metallic combinations of pyrrole and their interaction with ethyl carbonate and with ethyl chlorocarbonate. V. V. CHELINTZEV AND S. G. KARMANOV. *J. Russ. Phys. Chem. Soc.* 47, 161-9(1915).—The chief product of the interaction of $\text{C}_4\text{H}_4\text{NMgBr}$ (from Mg , EtBr and $\text{C}_4\text{H}_5\text{N}$) with Et_2CO_3 is *ethyl N-pyrrole-carboxylate* (a), b_{748} $179-80^\circ$, d_{40}^{20} 1.0697, n_{20} 1.4779. Along with (a) are produced small amts. of what seems to be the corresponding α -ester (Oddo, *C. A.* 4, 2460) and of what probably is carbonylpyrrole (Ciamician and Magnani, *Ber.* 18, 419), for which the name carbpyrrole is proposed. The formation of (a) proves that, contrary to Hess (*C. A.* 8, 2706), pyrrol-Mg compds. are, like the K derivs. of pyrrole, capable of giving, according to the conditions, either *N*- or α -pyrrole compds. With the K compds. the tendency is to form *N*-derivs., while the pyrrol-Mg compds. tend to form α -derivs. Most probably in both cases there is a mixt. of the 2 tautomeric forms, CH:CH.CH:CH.NR and CHR.CH:CH.CH:N which, according to the

conditions, change into one another, the ring itself undergoing isomerization. A repetition of Oddo's expts. with ClCO_2Et corroborated his statements, but it was not possible to obtain his $\alpha\text{-C}_4\text{H}_4\text{NCO}_2\text{Et}$ in *cryst.* form. H. M. GORDIN.

Methods of obtaining α,α -dipyrrol ketone. V. V. CHELINTZEV AND D. K. SKVORTZOV. *J. Russ. Phys. Chem. Soc.* 47, 170-6(1915).—Ciamician's method (*Ber.* 18, 1828) for making α,α -dipyrrol ketone (a) gives a very poor yield. The following

2 methods are much better: $\alpha\text{-C}_4\text{H}_4\text{NCO}_2\text{H}$ is changed by means of PCl_5 to the chloride, $\text{C}_4\text{H}_4\text{NHCOCI}$, and the latter is treated with a pyrrol-Mg compd. (b), e. g., that obtained from $\text{C}_4\text{H}_5\text{N}$ and iso-AmMgCl. Yield, over 11%. The 2nd method consists in treating (b) with COCl_2 , 2 mols. of (b) giving 1 mol. of (a). Yield, 28.5%.

H. M. GORDIN.

Action of salts of heavy metals on magnesium-organic compounds. N. V. KONDUIROV AND D. A. FOMIN. *J. Russ. Phys. Chem. Soc.* 47, 190-8(1915).—The interaction of Mg-org. compds., e. g., EtMgI , EtMgBr or PrMgBr , with CuCl , CuBr , CuI , CuCN , CuCNS , CuBr_2 , FeCl_3 , FeCl_2 , CoCl_2 , NiCl_2 , $\text{Fe}(\text{CNS})_2$, $\text{Cr}(\text{CNS})_3$ or $\text{Mo}(\text{CNS})_3$, gives a mixt. of satd. and unsatd. hydrocarbons and Mg salts, while the salt of the heavy metal is reduced, frequently to the metallic state. Thus EtMgBr and CuBr gave C_2H_6 , C_2H_4 , MgBr_2 , and Cu . The aryl-Mg compds. give under these conditions hydrocarbons of double the mol. wt. of the aryl group. Thus PhMgX gives Ph_2 . A repetition of the expts. of Iotzich and Rozhdestvenskii (*J. Russ. Phys. Chem. Soc.* 1908, 1113) with CCl_3CHO and AcPh showed that the reaction is of the same kind as the above, though with CCl_3CHO they failed to isolate the C_6H_6 . The main results of Bennett and Turner (*C. A.* 8, 2361) were corroborated, but K. and F. think CrCl_3 is of value only for making aromatic hydrocarbons, and that CrCl_3 and EtMgBr give not diisamyl, but C_4H_{10} and C_4H_{12} .

H. M. GORDIN.

Action of pyridine on some sulfurated and selenated organic compounds. M. RAFFO AND G. ROSSI. Univ. Bologna. *Gazz. chim. ital.* 45, 28-34(1915).—In a preceding note (*C. A.* 8, 2683) it was shown how $\text{C}_4\text{H}_5\text{N}$ acts catalytically on certain S compds. to give H_2S and more complex compds. PhSH (a), PhCSNH_2 (b), and allylthiourea (c), were similarly treated and the previous results were here, too, verified. In these 3 cases $\text{C}_4\text{H}_5\text{N}$ acts as a catalyzer, giving $(\text{PhS})_2$ with (a), $(\text{C}_4\text{H}_5\text{NCPH})_2\text{S}$ (d) with (b), and an isomer of (c) with (c). Similarly it was thought that $\text{C}_4\text{H}_5\text{N}$ ought to give the same effect with Se derivs. Diphenylselenourea (e) b. with $\text{C}_4\text{H}_5\text{N}$ gave H_2Se , PhNH_2 , carbanilide and $\text{PhN:C}(\text{NHPh})_2$. The PhSH was boiled with a small amt. of $\text{C}_4\text{H}_5\text{N}$ for 10-12 days; the $(\text{PhS})_2$ m. $60-1^\circ$. (b) boiled similarly until H_2S was no longer evolved (many days) gave a yellow cryst. substance (d), $\text{C}_{22}\text{H}_{20}\text{N}_2\text{S}$, m. $202-4^\circ$, identical with the compd. obtained from $\text{PhC}(\text{NH}_2):\text{NH.HCl}$ and the Na salt of PhCSNH_2 (Jamieson, *J. Am. Chem. Soc.* 26, 177), and constitution of which is now detd. by the method of prepn. (c) boiled some days with $\text{C}_4\text{H}_5\text{N}$ evolve H_2S and $\text{C}_4\text{H}_5\text{NCS}$ and gave a cryst. substance, m. 117° , isomeric with (c), $\text{MeCH}_2\text{S.C}(\text{NHPh})_2\text{N.CH}_3$.

(Prager, *Ber.* 22, 2993). When (e) was treated with $\text{C}_4\text{H}_5\text{N}$ and boiled a little H_2Se was evolved. After the $\text{C}_4\text{H}_5\text{N}$ had been removed by distn. the temp. was raised and PhNH_2 passed over (b. $180-2^\circ$). The next fraction, carbanilide, passed over at 260° and crystd. in the receiver, m. 235° . The tarry residue, was treated with Et_2O . The Et_2O was washed with dil. H_2SO_4 and the acid soln. after decolorizing with charcoal was made alk. with NH_3 . The yellowish ppt. was $\text{PhN:C}(\text{NHPh})_2$, m. 143° .

E. J. WITZEMANN.

Introduction of the guanidine nucleus into the molecule of the polypeptides. I. Synthesis of guanidoglycylglycine. ANTONIO CLEMENTI. Univ. Heidelberg. *Gazz. chim. ital.* 45, 56-9(1915).—The chem.-physiol. importance of guanidine (a) arises from the intimate relation between (a) and urea, the presence of the (a) nucleus in creatine and creatinine, the participation of the (a) nucleus in the protein mol. and the formation of urea from the latter by the hydrolyzing action of an imidolytic ferment. C. has worked out a process for prepg. simple guanidopolypeptides which was successfully applied to the prepn. of guanidoglycylglycine (b) or glycocyamylglycine. Glycocyamine is said to be the mother substance of creatine (Jaffe, *Z. physiol. Chem.*

48, 430 (1903)). 1.13 g. glycylglycine (Fischer) in a small amt. of H_2O + 0.36 g. CNNH_2 + a few drops of NH_4OH were kept at room temp. and showed crystals in 4.5 days. In 10 days a mass of white needles of (b) had sepd. (b) is insol. in EtOH and Et_2O , difficultly sol. in H_2O , browns $218-20^\circ$, blackens and decomps. 235° ; the biuret and $\text{Na}_2\text{Fe}(\text{CN})_6\text{NO}$ tests are negative. E. J. WITZEMANN.

Phototropy in solutions. I. B. FORESTI. Univ. Bologna. *Atti accad. Linzei* 23, 270-6 (1914).—Numerous phototropic solids are known but only 1 substance (diphenantholamine) is known which is phototropic in soln. (Schmidt, Lump, *C. A.* 3, 544). Stobbe and Nowak (cf. *C. A.* 8, 114) studied the action of light on PhCH:NNH-Ph (a) in EtOH , but Baly and Tuck (*J. Chem. Soc.* 1906, 988) had shown that this is an oxidizing action and does not take place in the absence of O. F. observed that the same action takes place more quickly in C_6H_6 but not out of contact with the air. 1-2 g. (a) in 100 cc. C_6H_6 in diffuse light becomes rose-colored in 24-48 hrs. and becomes phototropic. Exposed to direct sunlight the rose color becomes lemon-yellow in 15-30 sec., and reverses in 10-15 mins. The change in color may be thus produced and reversed many times. But if the soln. is exposed to the sun too long it loses its capacity for reversing and remains yellow. A lack of O prevents the soln. from becoming phototropic; excess of O causes the soln. to lose its phototropic capacity. If phenylhydrazones (b) altered by contact with the air are used, the phototropy is obtained at once without the presence of O. Such transformed (b) always has an odor of BzH so that the product studied is of unknown constitution. When solns. of (b) are treated with BzH and O the phototropy is accentuated; with much BzH and little O the soln. is colored orange-brown without becoming phototropic. Anhydrous solns. of (a) in C_6H_6 do not become phototropic in contact with the air, but if BzH is added the phototropy appears at once, so that moisture is probably necessary for the hydrolysis by which BzH is produced. The change is probably composed of 2 phases: (1) the BzH is formed; (2) the combined action of O + BzH produces the phototropic substance. Of other solvents tried only PhMe and xylene gave the same effect. Padoa and Minganti (*C. A.* 8,

1368) have shown that $\text{A}_2 \xrightleftharpoons[\text{dark}]{\text{light}} 2\text{A}$ represents the equil. between 2 phototropic forms

and that light has a depolymerizing action. But since in this case light causes an exaltation of the tone of color instead of a diminution and since the phototropic soln. preserves its properties in atms. of inert gases (thus excluding the auto-oxidation and

reduction of Stobbe and Mallison, *C. A.* 7, 2566) it becomes probable that $2\text{A} \xrightleftharpoons[\text{dark}]{\text{light}} \text{A}_2$

represents an action of light. As will be shown below, light acts on phototropic solns. to restrict the region of absorption which Jones and Uhler (*C. A.* 1, 814) have said indicates an increase in mol. complexity. A 40 cm. tube containing 0.5 g. (a) in 100 cc. C_6H_6 was examd. with light having a continuous spectrum and the soln. stable in the dark (rose) absorbed the violet, blue and green, i. e., the visible spectrum from $550\mu\mu$ on. After having been illuminated, absorption began at $510\mu\mu$, i. e., it became permeable to green rays. Aq. solns. which would absorb all but definite wave lengths were interposed between the light and the dark stable soln.: chrysoidine (concd.), absorbs $682-625\mu\mu$, the phototropic soln. remains rose colored; chrysoidine (dil.), $682-582$, rose; chrysoidine + nitrosodimethylaniline, $672-558$, rose-yellow; brilliant green + nitrosodimethylaniline, $568-502$, lemon-yellow; brilliant green and crystal violet, $505-442$, gold-yellow; crystal violet, $475-400$, rose-yellow. The max. effect lies between $508-502\mu\mu$. The temp. coeff. was detd. by the method of P. and M., i. e., by the time necessary to produce a certain modification in the color. In this way the temp. coeff. for decoloration for $20-30^\circ$ was 1.20, $30-40^\circ$ 1.17, and $40-50^\circ$ 1.12. In the coloration reaction the velocity was found to be independent of the temp. E. J. W.

Scission of decahydroquinoline into its optical antipodes. II. L. MASCARELLI AND F. NIGRISOLI. Univ. Bologna. *Atti accad. Lincei* 23, II, 276-81 (1914); *Gazz. chim. ital.* 45, I, 1, 106-19 (1915).—Other compds. besides decahydro- β -naphthol (C. A. 6, 3096) have the peculiarity of occurring in a smaller number of stereoisomers than are theoretically possible. M. and N. state that this always occurs when in bicyclic compds. the 2 C atoms common to both nuclei (*i. e.*, 9 and 10) become asym. owing to the introduction of substituents. C atoms 9 and 10 must always show an opposite rotation in order to maintain the stability of the ring and accordingly the number of theoretically possible isomers is diminished by 2. Decahydroquinoline (*a*) fulfills the same requirements. The pure compd., m. 48.5°, b. 203-5°, was split as the *d*-bromocamphorsulfonate into the *d* and *l* optical antipodes. A mixt. of equal parts of the 2 antipodes of the free base as well as the hydrochloride showed the same properties as the original material, so that synthetic (*a*) must be a racemic mixt. (*a*) was synthesized according to Skita (C. A. 7, 2558) by reducing quinoline with H_2 + colloidal Pt. All reductions do not give (*a*) (cf. Skita, *Chem. Ztg.* 1914, 605). *d*-Decahydroquinoline *d*-bromocamphorsulfonate, needles from H_2O , m. 239-40°, sol. in hot EtOH and MeOH, also in AcOH and $CHCl_3$, $[\alpha]_D^{25}$ 69.53° (in 2.03% aq. soln.) and $[\alpha]_D^{25}$ 72.26° (in 0.80% aq. soln.), $[M]_D^{25}$ 320.0 (av.). *d*-Decahydroquinoline, $C_{10}H_{17}N$, compact, white mass, b. 200-2°, softens 70°, m. 75-6°, $[\alpha]_D^{25}$ 4.57° (in 2.84% EtOH soln.) and 4.75° (in 4.00% EtOH soln.), $[M]_D^{25}$ 6.69 (av.). The odor resembles that of the fatty acids and suggests peppermint oil, sol. in org. solvents, hygroscopic, absorbs CO_2 ; hydrochloride, crystals from H_2O , m. 303-4°, $[\alpha]$ in H_2O soln. is very small. *l*-Decahydroquinoline *d*-bromocamphorsulfonate is difficult to purify and showed somewhat variable physical consts. The purest product was obtained as crystals, m. 192°, $[\alpha]_D^{25}$ 61.3° (av. of a number of detns. in H_2O), $[M]_D^{25}$ 276.0 (av.). *l*-Decahydroquinoline, colorless highly refractive oil, b. 200-1°, solidifies on cooling into a cryst. mass, m. 74-5°, softens 70°, $[\alpha]_D^{25}$ -4.58° (in 7.31% EtOH soln.), $[M]_D^{25}$ -6.37°; the hydrochloride was obtained as tablets from $HCl \cdot H_2O$, m. 305°, blackens 300°; its optical rotation in H_2O is very small. Besides the above described salts considerable of a "rubbery" residue was obtained from the mother liquor from which other products have not been sepd. as yet.

E. J. WITZEMANN.

Scission of decahydroquinoline into its optical antipodes. III. L. MASCARELLI. Univ. Cagliari. *Atti accad. Lincei* 23, II, 281-3 (1914); *Gazz. chim. ital.* 45, I, 127-32 (1915); cf. preceding abstr.—Exact details on the fractional sepn. of the fractions obtained from *l*-decahydroquinoline *d*-bromocamphorsulfonate. The fraction, m. 175°, was taken as the product sought since the mol. refraction coincided with that calcd. from the components. M. ascribes the difficulty of purification of the product to the probable presence of 2 forms of *d*-bromocamphorsulfonic acid and cites observations of other authors in support of this. The small abs. rotation of the 2 decahydroquinolines is ascribed to the small asymmetry of the compds.

E. J. WITZEMANN.

Some new derivatives of azoxybenzene. BRUNO VALORI. Univ. Florence. *Atti accad. Lincei* 23, II, 284-92 (1914).—It was previously noted (C. A. 8, 79) that in detg. which of the 2 possible formulas $(PhN(:O):NC_6H_4R)$ and $(PhN:N(:O)C_6H_4R)$ represents the constitution of the azoxyphenols (*a*), the criteria used in the case of the azoxybenzenes (*b*) do not apply. The latter do not react with Br and the 2nd form does not react with HNO_3 but both forms of (*a*) react. In general (*a*) furnishes derivs. more easily than (*b*). Ordinary azoxybenzene in concd. AcOH soln. gives no NO_2 deriv. with cold HNO_3 (d. 1.48) but azoxyphenetole (*c*), $(EtOC_6H_4)_2N_2O$ gives a di- NO_2 compd. With (*a*) in $CHCl_3$ Br gives a mono-Br (*d*) and di-Br deriv. (*e*). (*d*) (m. 126°) reduced in EtOH-HCl with Sn gives *p*- $NH_2C_6H_4OEt$ and 4,2- $NH_2BrC_6H_4OEt$ (*f*), and is probably 3,4- $Br(EtO)C_6H_4N:N(:O)C_6H_4OEt$, (*e*) m. 153°, reduced similarly gives

2 mols. (f) so that it is $3,4\text{-Br(EtO)C}_6\text{H}_2\text{N}(\text{:O})\text{NC}_6\text{H}_5(\text{OEt})\text{Br}$. Another di-Br deriv., m. 165° , is formed in very small amts. HNO_3 acting on (c) in AcOH gives a mono- NO_2 deriv. (like (f)) m. 153° , and a di- NO_2 deriv. (like (e)) m. 185° . In order to further verify Angeli's expts. on azoxyphenol (g) the behavior of the Et deriv. was studied. $\text{Ph(N}_2\text{O)C}_6\text{H}_4\text{OEt}$, m. 72° , in AcOH gave with HNO_3 a compd. which seems to be $4,3\text{-HO(O}_2\text{N)C}_6\text{H}_2\text{N:NPh}$ and a mono- NO_2 deriv., $4,3\text{-EtO(O}_2\text{N)C}_6\text{H}_2\text{N:N(O)Ph}$, so that in this case too the NO_2 enters more easily into the nucleus attached to N free from O when OEt is substituted in it. (g), m. 156° , is thus $\text{PhN(O):NC}_6\text{H}_4\text{OH}$ and its di- NO_2 deriv., m. 197° , is probably $4,3,5\text{-HO(O}_2\text{N)}_3\text{C}_6\text{H}_2\text{N:N(O)Ph}$. The isomer of (g) is $\text{PhN:N(O)C}_6\text{H}_4\text{OH}$ (h), which is confirmed by the fact that its Et deriv. m. 75° , in AcOH gives with Br a dibromo deriv. which with Sn, etc., gives (f) and $1,4\text{-BrC}_6\text{H}_4\text{NH}_2$ and therefore is $3,4\text{-Br(EtO)C}_6\text{H}_2\text{N(O):NC}_6\text{H}_4\text{Br}$. In this case 1 Br enters the PhN: group according to the rule. The same isomer of (g) with HNO_3 in AcOH gives a mono- NO_2 deriv. (NO_2 adjacent to OH), m. 171° , and a little of an isomer m. 263° , and a di- NO_2 deriv., m. 185° . 1 g. (c) in 6 cc. CHCl_3 + 0.33 cc. Br_2 in 2 cc. CHCl_3 after standing 0.8 hr. was treated with NaHSO_3 , the CHCl_3 was removed, the residue taken up in EtOH and *monobromoazoxyphenetole*, yellow needles, m. 126° , was obtained. 1 g. of this, covered with EtOH, was heated 0.5 hr. with 3 g. Zn + 15 cc. of satd. EtOH-HCl. The EtOH was distd. off, the residue made alk. and distd. with steam. On acidifying the distillate with HCl white crystals of the hydrochloride of $p\text{-NH}_2\text{C}_6\text{H}_4\text{OEt}$ and (f) were sepd. from the more sol. part. The *dibromo derivative*, fine, yellow needles, m. 153° , was obtained by warming 4 g. of the mono-Br compd. with excess of Br_2 and purifying as above. 0.25 g. (c) dissolved in 25 cc. AcOH is cooled and treated with 10 cc. HNO_3 in 10 AcOH; *mononitroazoxyphenetole*, bright yellow needles, m. 153° , seps. The preceding (0.5 g.) in 30 cc. of 99% AcOH + 30 cc. HNO_3 in 20 cc. AcOH was thrown into H_2O after 15 mins. in order to sep. the *dinitro derivative*, yellow cryst. powder, m. 185° . 0.6 g. of the Et deriv. of (g) in 3 cc. of 99% AcOH + 3 cc. HNO_3 in 2 cc. AcOH seps. *mononitroethoxyazobenzene*, yellow needles, m. 128° . 1 g. of this covered with 8 g. concd. H_2SO_4 on the H_2O bath 5 mins. and thrown into H_2O seps. *mononitrohydroxyazobenzene*, red-yellow cryst. powder, m. 129° . (g) m. 150° (0.9 g.), in 5 cc. AcOH + 3 cc. HNO_3 in 3 cc. AcOH pptd. *dinitroazoxyphenol*, golden-yellow needles, m. 197° . Ethoxyazoxybenzene, m. 75° , (0.5 g.) in 14 cc. AcOH + 1.6 cc. Br_2 in 2 cc. AcOH pptd. *dibromoethoxyazoxybenzene*, colorless powder, m. 135° . 0.5 g. of (h), m. 117° , in 5 cc. of 99% AcOH + 1.5 cc. HNO_3 in 1.5 cc. AcOH ppts. *mononitroazoxyphenol*, minute needles, m. 171° (NO_2 adjacent to OH). E. J. W.

The iso-oleic acid of the seeds of ivy. F. C. PALAZZO AND A. TAMBURELLO. Florence. *Atti accad. Lincei* 23, II, 352-6 (1914).—In a preceding paper (*Arch. farm.* No. 15 (1913)) a nonsatd. acid in the form of its glyceride was noted as constituting the major part of the fatty material in these seeds. It was thought to be erucic acid. More material has been obtained and it was found to be iso-oleic acid (a). The fats constitute 30-32% of the wt. of the air-dried seeds, m. 25.2° , f. 21.4° , n_D^{20} 1.402, acid no. 3.99, sapon. no. 190.5, I no. 91.8. Of the Pb salts 70-80% is insol. in dry Et_2O and this constitutes the iso-oleic acid salt. Recrystd. from hot EtOH, decompd. with HCl, etc., the various fractions showed uniform characteristics; m. $29\text{-}30^\circ$ (erucic acid m. $33\text{-}4^\circ$); b_{10} 254.5° , i. e., the b. p. of oleic acid (erucic, b_{18} $237\text{-}8^\circ$). The I no. and acid no. of the purified acid are 89.85 and 200.1, resp., as compared with the calcd. values, 90 and 198.5. The analysis of the Pb salt corresponds to that of Pb oleate. 2.6 g. of the acid in 100 cc. of 95% EtOH in the presence of Pd black absorbed the calcd. amt. of H_2 in a few mins. and deposited shining laminas of stearic acid, m. $69\text{-}70^\circ$, b_{18} 232° , acid no. 194.9. Of the known iso-oleic acids petroselinic acid (b), $\text{HO}_2\text{C(CH}_2)_4\text{CH:CH(CH}_2)_8\text{Me}$, m. $33\text{-}4^\circ$, f. 27° , and an iso-oleic acid, $\text{HO}_2\text{C(CH}_2)_{10}\text{CH:CH}$

(CH_2I_2 Me, of Fokin (C. A. 6, 2409), m. $34-5^\circ$; the b. ps. are not given. Fokin obtained 2 dihydroxystearic acids, m. 122° and $85-8^\circ$, resp., on oxidizing (c). The acid (a) oxidized with KMnO_4 gave the same HO acid, m. 122° , acid no. 178. Likewise with HNO_3 (a) gave the corresponding stereoisomer while F.'s acid remained unchanged. The elaidinic acid obtained m. 54° , which is identical with that of the isomer of (b) (Vongerichten, Köhler, Ber. 42, 1638(1908)); acid. no. 200.2, calcd. 198.5. The d_{40} 0.8700 and n_{40} 1.4533 of (a) coincide with the values observed for (b) so that the only difference is the m. p. and P. and T. think this is due to a difference in technique in detg. the m. p. and describe their own carefully. It is concluded that (a) and (b) are identical. The Et_2O -sol. portion of the Pb salts was composed of the ordinary Pb oleate containing a little of some less satd. acid. The pure oleic acid was isolated and identified. It was thus shown the oleic acid can occur in nature along with petroleic acid.

E. J. WITZEMANN.

Vanadylsalicylates. G. A. BARBIERI. Univ. Ferrara. *Atti accad. Lincei* 23, II, 408-11(1914); cf. C. A. 9, 617.—The vanadyl radical reacts to give vanadylsalicylates, $\text{OV}(\text{OC}_6\text{H}_4\text{CO}_2\text{M})_2$, analogous to the cuprisalicylates (Piria, Ann. 93, 262 (1855); Ley, Erler, C. A. 2, 2079) and the palladosalicylates (C. A. 9, 298). While the common vanadyl salts are green or blue, the vanadyltartrates are violet and the salicylates are white or yellow as solids and green in soln. The aq. solns. of alkali vanadylsalicylates with sol. salts of Ca, Ba, or Tl ppt. the corresponding vanadylsalicylates (a) as white cryst. powders. The Tl salt is anhydrous; the others are hydrated. The Ag salt was not obtained because AgNO_3 was reduced by VO and Ag was pptd. (a) are stable, can be recrystd. from H_2O and are not decompd. by weak alkalis. The stability of (a) is thought to depend on the same cause as in the case of the tartrates and their constitution is analogous to that assigned to the chromioxalates by Werner. *m*- and *p*- $\text{HOC}_6\text{H}_4\text{CO}_2\text{H}$ do not form complexes with Cu, Pd, or VO and it is thought that because the OH is farther from the CO_2H than in the *o*-deriv. it is more difficult to establish the secondary union between the metal and the HO and CO_2H groups. The same difficulty has been observed with the NH_4 acids in which NH_4 is β or γ to the CO_2H . 5 g. NH_4VO_3 in 50 cc. 20% H_2SO_4 was reduced with a stream of SO_2 , the excess of SO_2 was removed by boiling the soln. neutralized with NH_3 . 25 g. $\text{HOC}_6\text{H}_4\text{CO}_2\text{NH}_4$ in 100 cc. H_2O were added and NH_3 to make the mixt. alk. On cooling ammonium vanadylsalicylate, $\text{OV}(\text{OC}_6\text{H}_4\text{CO}_2\text{NH}_4)_2 \cdot 3\text{H}_2\text{O}$, seps. as white crystals, little sol. in cold H_2O ; NH_4 salts reduce its solubility. 5 g. NH_4VO_3 were calcined to remove NH_3 , dissolved in HCl, reduced with SO_2 , etc., neutralized with K_2CO_3 and treated with 20 g. *o*- $\text{HOC}_6\text{H}_4\text{CO}_2\text{H}$ + 15 g. K_2CO_3 in 150 cc. H_2O ; on cooling potassium vanadylsalicylate, $\text{OV}(\text{OC}_6\text{H}_4\text{CO}_2\text{K})_2$, seps. The NH_4 salt + CaCl_2 gives calcium vanadylsalicylate, $\text{OV}(\text{OC}_6\text{H}_4\text{CO}_2)_2 \cdot \text{Ca} \cdot 3\text{H}_2\text{O}$. Similarly thallium vanadylsalicylate, $\text{OV}(\text{OC}_6\text{H}_4\text{CO}_2\text{Tl})_2$, was obtained.

E. J. WITZEMANN.

The bases formed on alkylating pyrroles. G. PLANCHER AND BRUNO TANZI. Univ. Parma. *Atti accad. Lincei* 23, II, 412-7(1914).—P. and Ravenna have recently (C. A. 8, 1763) taken up the study again of the bases formed by the action of alkyl iodides on pyrroles, and have stated that they are constituted like the indoles: i. e., may be pyrrolenine or methylenepyrroline. P. and Zambonini (C. A. 8, 1764) found that MeI acting on $\text{C}_4\text{H}_5\text{NMgX}$ in the presence of K_2CO_3 gave $\text{C}_4\text{HMe}_2\text{N}$ + MeI. Oddo and Nameli (C. A. 8, 1272) thought that $\text{C}_4\text{H}_5\text{NMgBr}$ + MeI form dihydropyridine but could not sep. it. P. and Z. studied the action of CHCl_3 on $\text{C}_4\text{HMe}_2\text{N}$ and believed that evidence for the pyrrolic formula was found, analogous to the earlier results with indole (P. and Carrasco, *idem* 14, I, 62, 704, etc.). All properties of the new bases are analogous to those of indolenine but a formula has not yet been assigned. The expts. on the alkylation of pyrrole are continued. 4.35 g. Mg +

29 g. MeI + 17 g. 2,5- $C_4H_7Me_2N$ in Et_2O gave a deriv.; the Et_2O was evapd. and 35 g. iso-PrI was added and the mixt. boiled 18 hrs. The aq. acid soln. was extd. with Et_2O and the Et_2O residue fractionated under 16 mm.: (1) 3 g. b. $90-103^\circ$; (2) 4 g. $103-8^\circ$; redistd. in air a fraction b. $216-7^\circ$ was found to be 2,5-dimethyl-3-isopropylpyrrole (a). Iso-PrNH₂ condensed with $(CH_3CO_2Et)_2$ in AcOH gave diethyl N-isopropyl-2,5-dimethylpyrrole-3,4-dicarboxylate, which when sapond. in dil. KOH gave the free acid, m. 200° (decompn.) and the latter distd. gives $\alpha, \alpha', N-Me_2(C_4H_7)C_4H_2N$, b. $182-3^\circ$, which differs from (a), thus proving (a) to be the 3-iso-Pr instead of the N-iso-Pr compd. The soln. extd. with Et_2O was made alk. and distd. with steam; a base, $C_{12}H_{19}N$, b₁₀ $86-110^\circ$, seps.; the picrate $C_{18}H_{23}N_5O_7$, m. $173-4^\circ$. An isomeric picrate, m. 107° , was also obtained, of which the free base has a marked camphor-like odor. These isomers are dimethyldiisopropylpyrrolenine, i. e., $(C_4H_7)_2C.CH.CMe.N:CMe$ or

$C_4H_7C.CH.CMe.N:CMe(C_4H_7)$. The product from 1.2 g. Mg + 6 g. MeI + 6 g. C_4H_7-

Me_2N reacting with 8.4 g. iso-PrI and boiled 12 hrs. finally gave the hydrochloride and picrate, m. $152-3^\circ$, of a base, $C_{11}H_{19}N$; with an odor like menthol, which is tetramethylisopropylpyrrolenine, i. e., either $C_4H_7(Me)C.CMe:CMe.N:CMe$ or

$MeC:CMe.CMe:NCMeC_4H_7$. The product from 31 g. EtBr + 5.55 g. Mg + 16.5

g. C_4H_9N (b. $130-1^\circ$), treated with 38.8 g. MeI and boiled 4 hrs., gave 3 fractions from the Et_2O ext. of the acid aq. soln.: (1) 1 g. b. $100-25^\circ$; (2) 6 g. b. $125-35^\circ$; (3) 0.5 g. b. $135-48^\circ$. Much of the C_4H_9N remained unchanged. The picrate, m. $218-9^\circ$, of a base, $C_7H_{12}N$, was sepd., i. e., trimethylpyrrolenine, either $MeC:C.CH:N.CMe_2$ or

$Me_2C.CH:CH.N:CMe$. The product from 2.2 g. Mg + 14.23 g. EtI + 10 g. 2,3,5-

$C_4H_7NMe_2$ was boiled 18 hrs. with 14.3 g. EtI. The Et_2O ext. of the acid aq. soln. gave back most of the pyrrole deriv. unchanged but the soln. from the Et_2O extn. gave finally 10 g. of a picrate, m. $199-200^\circ$, of a base, $C_9H_{14}N$, having a refreshing odor. A small amt. of another impure base was sepd., which is $EtMeC.CH:CMe.N:CMe$ or

$MeC:CH.CMe:N.CEtMe$. Hess and Wissing (Ber. 37, 1420) found $C_8H_{12}N$ here

which seems to be wrong. The product from 3.95 g. Mg + 23 g. MeI + 20 g. $\alpha, \alpha'-Me(iso-Pr)C_4H_7N$ was boiled 17 hrs. with 23 g. MeI and gave finally a picrate, m. $121-2^\circ$, of a base, $C_{10}H_{17}N$, with a refreshing odor, which is a trimethylisopropylpyrrolenine, i. e., one of 4 possible isomers. It has thus been shown that using the MgX deriv. (1) C_4HMe_2N gives a base with 1 more alkyl with MeI and iso-PrI; (2) 2,3,5- $C_4H_2Me_3N$ gives a base with 1 more alkyl; (3) $\alpha, \alpha'-C_4H_7Me_2N$ gives a base with 1 more alkyl; (4) $\alpha, \alpha'-C_4H_7Me(C_4H_7)N$ gives a base with 2 more alkyls; (5) C_4H_9N gives a base with 3 more alkyls. It was therefore shown that it is not necessary to methylate pyrrole completely in order to obtain these bases. E. J. WITZEMANN.

Vicinal 1,2,3-trinitrobenzene: a new trinitrotoluene and the corresponding dinitrohalogen substitution products. G. KÖRNER and A. CONTARDI. *Atti accad. Lincei* 23, II, 464-71 (1914).—Of the 3 $C_6H_3(NO_2)_3$, required by the theory only the 1,3,5- and 1,2,4-derivs. are known and all attempts to obtain the 1,2,3-deriv. have failed. It was easily obtained by substituting NO_2 for NH_2 in 2,6- $(O_2N)_2C_6H_3NH_2$, (a), m. 137.8° . 18 g. (a) suspended in 45 cc. HNO_3 (d. 1.38) was satd. at 0° with N_2O_5 , the excess N_2O_5 removed with an air current and most of the diazo nitrate (very explosive) was pptd. Crushed ice (45 cc.) was added and the ppt. collected on a Pt cone and washed with a little ice- H_2O . A soln. of 90 g. $CuSO_4.5H_2O$ + 30 g. $NaNO_2$ per l. was

prepd. The nitrate suspended in a l. of ice- H_2O was poured into 5 kg. crushed ice and then rapidly treated with the CuSO_4 soln.; a white cryst. mass seps. and N is evolved. After 12 hrs. 1,2,3-trinitrobenzene (b), white laminas from EtOH, m. 127.5° , was filtered off. EtOH- NH_3 reacts in the cold with (b) to give (a) even more easily than the sym. deriv. KOH or NaOH gives the corresponding o-dinitrophenolate. (b) may also be obtained by pouring the diazotization mixt. into 120 g. NaNO_2 in H_2O + 5 kg. ice. In both processes 18 g. (a) give 16 g. (b). 3 isomers of $\text{MeC}_6\text{H}_3(\text{NO}_2)_3$ are known but the 4th has never been encountered either in the lab. or commercially. By using 20 g. 4,3,5- $\text{H}_3\text{N}(\text{O}_2\text{N})_2\text{C}_6\text{H}_2\text{Me}$, m. 168° , and treating with 50 g. HNO_3 (d. 1.38) and working by the 1st method as with (a), 3,4,5-trinitrotoluene (c), colorless laminas, m. 137.5° , was obtained (yield 60%). The 2nd method gives a 60% yield in this case too. (c) reacts at once with alks., and with EtOH- NH_3 gives the parent PhNH_2 deriv. 550 g. H_2SO_4 (d. 1.8) at 60° are treated with 10 g. (c) and then at the same temp. gradually with 14 g. CrO_3 and kept at 60° for 16 hrs. This was poured into ice and the temp. was kept below 10° . The cryst. ppt. (9 g.) was 3,4,5-trinitrobenzoic acid, (d), opaque white needles from Et $_2\text{O}$, m. 168° (decompn.). Boiled, with H_2O (d) evolved N_2O_5 vapors and gave 4,3,5- $\text{HO}(\text{O}_2\text{N})_2\text{C}_6\text{H}_2\text{CO}_2\text{H}$, m. 236° . In excess of NH_3 (d) gives the NH_4 salt of chrysanic acid. In abs. MeOH (d) at 110° gives dinitroanistic acid. These properties prove its constitution and show why these derivs. are not obtained by ordinary nitration. Heated, (d) loses CO_2 to give (b). The diazo nitrate of (a) suspended in H_2O and poured on CuCl soln. (25 g. H_2O + 12 g. NaCl + 100 g. conc. HCl + excess Cu, about 20 g.) and then into crushed ice, evolves N and ppts. 2,6- $(\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{Cl}$, yellow prisms from EtOH, m. 88° , identical with that obtained by Borsche and Rantscheff (*Ann.* 379, 152). A better result is obtained by pouring the diazotization mixt. into an excess of CuCl_2 soln., etc. Using CuBr 1-bromo-2,3-dinitrobenzene (e), yellow prisms, m. 107° , is obtained. With EtOH- NH_3 in a sealed tube at 150° (e) gives (a). With CuBr_2 a better yield (22 g. of (e) instead of 9 g. from 18 g. (a)) is obtained. Treating the diazonium nitrate of (a) with KI gives 2,6- $(\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{I}$ (identical with a prepn. previously obtained by K.). In the same way were obtained the corresponding 4-chloro-3,5-dinitrotoluene, bright yellow needles, m. 114.5° ; 4-bromo-3,5-dinitrotoluene, yellow prisms, m. 118.4° ; and 4-iodo-3,5-dinitrotoluene, lemon-yellow needles, m. 158° . The best yield was obtained by the CuX_2 method. With EtOH- NH_3 the aniline was regenerated.

E. J. WITZEMANN.

Strychnine and brucine. R. CIUSA AND L. VECCHIOTTI. Univ. Bologna. *Atti accad. Lincei* 23, II, 480-3 (1914).—C. and Scagliarini (*C. A.* 6, 3270) showed that isostrychnine with Br in glacial AcOH and subsequent treatment with boiling EtOH gives the compound (a), $\text{HBr.C}_{20}\text{H}_{21}\text{NBr}_3(:\text{NH})\text{CO}_2\text{Et}$. The supposition that the deriv. is a hydrobromide is supported by the fact that by treatment with NH_3 the free base, $\text{C}_{20}\text{H}_{21}\text{NBr}_3(:\text{NH})\text{CO}_2\text{Et}$, colorless needles, sol. in acids and EtOH, was obtained. The chloroaurate, $\text{C}_{20}\text{H}_{17}\text{O}_2\text{N}_3\text{Br}_3.\text{HAuCl}_4$, was obtained as yellow needles, difficultly sol. in H_2O . When (a) is treated with dil. NaOH and then with dil. NH_3

a mixt. of Br derivs. is obtained from which the hydrobromide $\text{HBr}(\text{C}_{20}\text{H}_{21}\text{NBr}_3) \begin{array}{c} \diagup \text{CO} \\ | \\ \diagdown \text{N} \end{array}$

was isolated by extg. with boiling dil. HBr; yellow scales containing 1 mol. of H_2O of crystn. Brucine treated with HNO_3 gives cacotheline (b), the nitrate of the nitrated base $\text{C}_{20}\text{H}_{21}(\text{NO}_2)_3\text{O}_2\text{N}_3$. (b) treated with $\text{NH}_4\text{OH.HCl}$ + Na_2CO_3 gives a dioxide, $\text{C}_{20}\text{H}_{19}\text{O}_4\text{N}_3(:\text{NOH})_2.3.5\text{H}_2\text{O}$, gold-yellow needles, m. $319-20^\circ$, sol. in alkalis and acids, insol. in org. solvents. This deriv. is to be studied further. E. J. WITZEMANN.

Aromatic nitro derivatives. II. Trinitrobenzoic acid and dinitrotoluidine corresponding to β and γ -trinitrotoluenes. MICHELE GIUA. Milan. *Atti accad. Lincei* 23,

II, 484-90(1914).—The $(\text{O}_2\text{N})_3\text{C}_6\text{H}_2\text{Me}$ (α, β, γ) are as yet imperfectly known. The sym. α -deriv. has acquired great importance as a substitute for picric acid in explosives, and the β - and γ -derivs. were studied by Hepp (*Ann.* 215, 366 (1882)). Will (cf. *C. A.* 8, 1590) detd. the constitution of the β -deriv. as 2,3,4- $(\text{NO}_2)_3\text{C}_6\text{H}_2\text{Me}$. W. found that it is formed on nitrating either 2,3- or 3,4- $(\text{O}_2\text{N})_2\text{C}_6\text{H}_2\text{Me}$ and that with $(\text{NH}_4)_2\text{S}$ it gives dinitrotoluidine. Of the possible $(\text{O}_2\text{N})_3\text{C}_6\text{H}_2\text{CO}_2\text{H}$ only the sym. deriv. is known which was derived from the α -deriv. above. This acid is important because with it Meyer's esterification law was established experimentally. The $(\text{O}_2\text{N})_3\text{C}_6\text{H}_2\text{CO}_2\text{H}$ to be described were derived from the β - and γ -derivs. and give esters easily under normal conditions, which agrees fully with W.'s results and excludes the possibility of 2 NO_2 groups being *o*- to the Me in the β -deriv. W. found that the β - and γ -derivs. give different colors with NH_3 which change later in acetone. G. found that an NO_2 is substituted by NH_3 . The corresponding dinitrotoluidines (*a*) may be obtained in this way (Körner, Laudenhimer). The 1st phase is thought to be due to the formation of an addition product which gradually undergoes changes to give (*a*), having a different color. The β - and γ -derivs. were obtained by nitrating 100 g. *m*- $\text{NO}_2\text{C}_6\text{H}_4\text{Me}$ in 250 g. of a mixt. of anhydrous HNO_3 - H_2SO_4 (30% HNO_3) on a boiling H_2O bath for 6 hrs., and pouring into ice and H_2O ; there was formed 140 g. of oil (di- NO_2 -derivs.) which was placed in 500 g. of HNO_3 - H_2SO_4 mixt. and heated 6 hrs. The mixt. of β - and γ -derivs. obtained was recrystd. and gave finally not more than 15% of β -compd. 2.5 g. of the β -deriv. in 8 cc. HNO_3 (d. 1.52) at 150 - 60° in a sealed tube for 6 days and 1 day at 210° gave 2,3,4-trinitrobenzoic acid (*b*), prisms, m. 202 - 3° , loses CO_2 at 219° . 5 g. β -deriv. in 200 cc. concd. H_2SO_4 + 6 g. CrO_3 added gradually, and heated at 50 - 60° for 4 hrs. and then poured on ice seps. (*b*) and gives it more easily. (*b*) is very sol. in EtOH and AcMe, less so in H_2O and C_6H_6 . With excess of alkali (*b*) gives a red color. 2 g. (*b*) in 10 cc. EtOH (95%) + 1.5 cc. concd. H_2SO_4 boiled for 10 mins. seps. the ethyl ether, m. 79 - 80° . The H_2O soln. of (*b*) with AgNO_3 ppts. the silver salt, $\text{C}_7\text{H}_2\text{O}_2\text{N}_3\text{Ag}$, yellows in the air, explodes violently 230° . 4 g. of the γ -deriv. similarly treated with HNO_3 gave 2,4,5-trinitrobenzoic acid (*c*), brilliant laminas, m. 190 - 1° (loss of CO_2); also obtained by oxidizing with CrO_3 - H_2SO_4 . (*c*) gives a red-yellow color with alkalis. Boiled with 15 cc. EtOH + 1.5 cc. H_2SO_4 15 mins. 2 g. (*c*) gave the ethyl esters, shining laminas, m. 84° ; similarly the methyl ester, m. 102° , was obtained. The silver salt is also explosive on warming. 1.14 g. of the β -deriv. in 15 cc. acetone + 1.7 cc. NH_4OH (17%) gives a green color which becomes red in some hrs. Poured into H_2O after some days a compd., $\text{C}_7\text{H}_7\text{O}_2\text{N}_3$, needles, m. 93 - 4° , seps. 2.27 g. of the γ -deriv. similarly treated gave a compd., $\text{C}_7\text{H}_7\text{O}_2\text{N}_3$, needles, m. 192 - 3° .

E. J. WITZEMANN.

The Walden inversion. CECIL L. HORTON. *Chem. News* 111, 29-41(1915); cf. *C. A.* 8, 679.—A theory is advanced to explain the mechanism of this inversion. It is based on the formation of an additive intermediate product and on a consideration of the attraction or otherwise of the $-\text{CO}_2\text{H}$ and other groups involved, for the addendum. The case of the differing action of KOH on a chloro monobasic acid, where inversion does not occur, and on a di-acid, such as *d*-chlorosuccinic acid, where inversion results, is treated of. The action of Ag_2O is also considered, as well as the actions of HNO_3 and NOCl on NH_2 acids. For a complete discussion of the theory reference should be made to the original article as it is hardly suitable for abstracting.

NORMAN A. SHEPARD.

Aliphatic diazo compounds. H. STAUDINGER. Zürich. *Z. angew. Chem.* 27, I, 354-5(1914).—A whole series of new representatives of this at present relatively small class of compds. may be prepd. by the oxidation of the hydrazones of aldehydes and ketones. The products are diazo compds. and not tetrazones, as Curtius thought.

MeCN_2 and PhMeCN_2 could not previously be obtained in a pure condition and though diazo compds. containing only aromatic rests, like Ph_2CN_2 (a) and $(\text{MeC}_6\text{H}_4)_2\text{CN}_2$ (b), were previously isolated, they were considered to be very unstable. These substances are well crystd. and strongly colored. (b) resembles KMnO_4 . These new diazo compds. do not show all the reactions of $\text{N}_2\text{CHCO}_2\text{Et}$ because of their greater tendency to split off N. Of the new reactions observed, the behavior toward COCl_2 is most interesting. α -Chloro-substituted acid chlorides are thus formed, which can be converted into ketenes by the removal of halogen. (a) is thus converted into $\text{Ph}_2\text{CClCOCl}$ and finally into $\text{Ph}_2\text{C:CO}$. With $(\text{COCl})_2$ either $\text{ClCH}_2\text{COCO}_2\text{H}$ derivs. or α -diketones are formed, e. g., $\text{Ph}_2\text{CClCOCOC}$ from (a) and $(\text{COCH}_2\text{Cl})_2$ from CH_2N_2 . By the action of CSCl_2 substances of the compn. of thio-acid chlorides are obtained. These compds., however, have none of the properties of such substances. They do not give thioketenes with metals, but are converted into dichloroethylene derivs. (a) apparently gives $\text{Ph}_2\text{C:CClSCl}$, which is converted into $\text{Ph}_2\text{C:CCl}_2$ with the sepn. of S. It is a question whether CSCl_2 does not react here in its tautomeric form Cl.C.SCl . These thio compds. are colorless, while *thiobenzoyl chloride*, which was prepd. for comparison, is highly colored and shows the normal reactions of acid chlorides. Interesting results were obtained by the action of unsatd. substances on diazo compds. Nascent CO, from Ni(CO)_4 , gave no ketene, even at high pressure. By the action of SO_2 on (a) a sulfene $\text{Ph}_2\text{C:SO}_2$ was first formed, which could not be obtained in a pure state. It was identified by conversion into its Me ester, $\text{Ph}_2\text{CHSO}_2\text{Me}$. The free sulfene could not be obtained pure because it either reacted with H_2SO_4 , forming BzPh , or with the excess of (a), forming an addition product which readily loses N and SO_2 with the formation of $(\text{Ph}_2\text{C:})_2$.

NORMAN A. SHEPARD.

Colchicine. III. The study of several cleavage products. A. WINDAUS. *Innsbruck. Sitzb. Heidelberger Akad. Wiss.* [18] 1914, 9 pp.; through *Chem. Zentr.* 1914, II, 1455; cf. *C. A.* 5, 3417, 3418. I. The action of potassium permanganate on colchicine. The $(\text{MeO})_3\text{C}_6\text{H}(\text{CO}_2\text{H})_2$ obtained by the action of hot KMnO_4 soln. on colchicine is not 3,5,6-trimethoxy-*o*-phthalic acid, as previously stated, but must be the 3,4,5-acid. This conclusion is drawn from the work of Voswinkel and de Weerth (*C. A.* 6, 2604) and of Bargellini and Molina (*C. A.* 6, 3271) and also from the fact that the acid from colchicine is converted into gallic acid by boiling HI. II. The action of potassium permanganate on colchicinic acid. This acid, $(\text{HO})_3\text{C}_6\text{H}_2\text{O}(\text{OH})\text{-NH}_2$, is converted by hot KMnO_4 into oxalic and succinic acids. This latter acid, along with a very small amt. of picric acid, is also obtained by oxidation of colchicine with HNO_3 . III. The behavior of colchicine with molten caustic potash. After heating colchicine with 6 times its wt. of KOH and a small amt. of H_2O at 220° and then at 245° , the melt is dissolved in water. On treating this aq. soln. with hot concd. KMnO_4 , both terephthalic and trimellitic acids are formed. Colchicinic acid, treated in the same manner, also gives these same acids. This indicates that there is present in colchicine, besides the pyrogallol ring, a 2nd ring, which is broken down by oxidation, giving terephthalic and trimellitic acids.

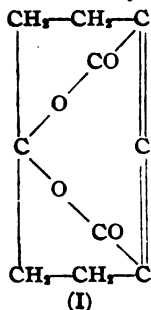
NORMAN A. SHEPARD.

Colchicine. IV. The action of iodine and caustic potash on colchicine. A. WINDAUS. *Sitzb. Heidelberger Akad. Wiss.* [18] 1914, 9 pp.; through *Chem. Zentr.* 1914, II, 1455-6; see preceding abstr.—(Exptl. work by L. Krellwitz.) By treating colchicine in cold dil. NaOH with I in KI at a low temp., both oxidation and iodation take place with the formation of the compound $\text{C}_{10}\text{H}_{22}\text{O}_6\text{NI}$ (a), according to the equation: $\text{C}_{10}\text{H}_{22}\text{O}_6\text{N} + 4\text{I} + 5\text{NaOH} = (\text{a}) + 3\text{NaI} + \text{Na}_2\text{CO}_3 + 3\text{H}_2\text{O}$. The group $-\text{COH}$ is thus replaced by I. The new substance, unlike colchicine, does not give the FeCl_3 reaction and thus does not contain the enol group. Replacement of the I by H does not restore the enol character. Of the five atoms of O then, 3 are linked in MeO groups,

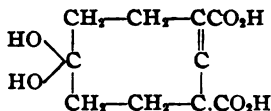
1 in the Ac rest on the N, and the 5th as an —OH group. (a) seps. in pointed prisms from alc., m. 228–30°, difficultly sol. in dil. Na_2CO_3 , but sol. in cold dil. NaOH. If the resulting soln. is dild. and heated to boiling, hydrolysis occurs, with the sepn. of (a) unaltered. This substance is therefore a very weak acid. Though the I is not removed by boiling KOH, it is easily replaced by H by reduction with Zn dust and AcOH. The resulting product, $\text{C}_{19}\text{H}_{21}\text{O}_4\text{N}$, seps. from dil. alc. in needle-like prisms, m. 150° (decompn.). It contains H_2O of crystn., which is with difficulty removed; after drying, it m. above 200°, is easily sol. in dil. alkalies, only slightly sol. in Na_2CO_3 and dil. acids. Boiling alc. HCl removes AcOH, with the formation of the salt $\text{C}_{19}\text{H}_{21}\text{O}_4\text{N} \cdot \text{HCl}$, which seps. in leaves shriveling above 200° and m. 241°. The Ac rest has thus been removed from the N, leaving the NH_2 group in the form of its hydrochloride. (a) gives with Ac_2O an Ac deriv. m. 144–5°.

NORMAN A. SHEPARD.

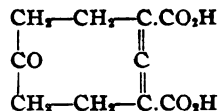
The constitution of anemonin. YASUHIKO ASAHINA. Univ. Tokyo. *J. Pharm. Soc. Japan* 1915, No. 396; cf. C. A. 8, 1780.—To the cold soln. of 2 g. anemonin (a) in 20 cc. 0.5N KOH, 1% KMnO_4 was added with violent agitation until the color persists (about 640 cc.). The temp. was not allowed to rise above 3°. (Under these conditions $(\text{CH}_3\text{CO}_2\text{H})_2$, the chief product isolated by H. Meyer on oxidizing (a) with KMnO_4 , is not obtained.) After filtering from MnO_2 , the soln. was decolorized with NaHSO_3 , almost neutralized with dil. H_2SO_4 and then concd. until K_2SO_4 began to sep. This residue was extd. 7 times with AcOEt , dried over Na_2SO_4 and evapd. $\text{CO}(\text{CH}_3\text{CH}_2\text{CO}_2\text{H})_2$; (b) sepd. from the concd. soln. in yellow radiating leaves. Yield, 6 g. from 30 g. (a). After 1 recrystn. from AcOEt and decolorization with bone-black in Et_2O , it seps. pure in rhombic crystals. With $\text{NH}_2\text{CONHNH}_2 \cdot \text{HCl}$ in concd. H_2O soln. (b) gives a semicarbazone which seps. in prisms on the addition of AcONa soln. This product, m. 204°, is difficultly sol. in most organic solvents and is especially valuable for identifying this acid. The formation of (b) cannot be explained by H. Meyer's formula for (a). (*Monatsh.* 20, 634.) A. considers this substance to have a dilactone and not an anhydride structure and assigns to (a) formula (I). This structure



(I)



(II)



(III)

accounts for the formation of (b), the addition of 4 ats. H, and the optical inactivity (the formula is sym.) of (a). By hydrolysis of the lactone ring, anemoninic (II) and anemonic (III) acids are formed.

NORMAN A. SHEPARD.

Inversion of sucrose by invertase. IX. Is the reaction reversible? C. S. HUDSON AND H. S. PAINE. Bur. Chem., Dept. Agr. *J. Am. Chem. Soc.* 36, 1571–81 (1914); cf. C. A. 9, 1342.—A soln. of the enzyme invertase which was prepd. by the rapid autolysis of yeast under the influence of PhMe, and purified by clarification with neutral $(\text{AcO})_2\text{Pb}$ and H_2S , and by subsequent dialysis, was allowed to act upon aq. invert sugar solns. which were maintained at various degrees of slight alkalinity and acidity in an attempt to detect a possible synthesis of sucrose by the enzyme. Although numerous expts. under various conditions were tried, not one showed any indication

of such a synthesis. A repetition of Osaka's expts. (*J. Coll. Sci., Imp. Univ. Tokyo*, 25, Art. I), which indicate the synthesis of sucrose from invert sugar in concd. soln., in the presence of HCl, shows that the change of polariscopic rotation which he observed is not due to synthesis, but is caused by the decomg. action of the acid upon fructose. A repetition of similar expts. by Visser (*Z. physik. Chem.* 52, 275) shows that his supposed synthesis of sucrose was only a change in rotation which is caused by the influence of HCl upon the rotatory power of fructose. An exam. of the expts. of Kohl (*Bot. Centr., Beih., Abt. I* 23, 64f-64o) and of Pantanelli (*C. A.* 1, 3025) on the synthesis of sucrose by the action of invertase upon invert sugar solns. shows the exptl. evidence to be very doubtful. Invertase from yeast accomplishes a complete hydrolysis of sucrose to yield invert sugar; the reaction does not establish a mobile equil. and is not a reversible or balanced reaction within the limits of detection.

H. S. PAINE.

Presence of a glucoside in the sunflower. AUGUSTO ZANOTTI. Bologna. *Boll. chim. farm.* 53, 4-5 (1914).—Sunflower leaves with the stems were cut into small pieces if green, or coarsely ground if dry, and extd. with H₂O (4 parts of H₂O for the green and 10 parts for the dry leaves). This soln. was filtered and the residue was extd. anew with H₂O, the 2nd ext. being added to the 1st; the mixt. was then defecated with basic Pb acetate and the excess of the latter was removed as PbSO₄ (addition of H₂SO₄) in large measure, the last traces being pptd. by H₂S. After 24 hrs. a considerable excess of 95% EtOH was added to the liquid (pptn. of a white, amorphous ppt. of Ca salts), the latter was rendered slightly alk. with Na₂CO₃, the alc. was removed by distn. and the remaining aq. soln. was slowly evapd. to dryness on a sand bath. The residue was dissolved in 96% alc. and the soln., after filtration, was again evapd. to dryness. The final, brown-colored residue, which was composed in great part of a glucoside, was deliquescent, sol. in H₂O and in alc. and insol. in Et₂O; its aq. soln. was alk. This soln. reduced NH₃-AgNO₃ after the addition of NaOH or KOH; after boiling with a dil. acid it reduced Fehling soln., as well as alk. Bi subnitrate. No reaction was observed with picric and tannic acids; a light blue ppt. was obtained with CuSO₄, and dil. Fe₂Cl₃ gave a red ppt. which redissolved with the production of an orange soln. Neutral (AcO)₂Pb caused a white ppt. The action of caustic alkalies and heat caused the soln. to assume a dark yellow color. A characteristic odor was evolved when K₂Cr₂O₇ and H₂SO₄ were added to the soln. Z. suggests the tentative formula C₁₁H₁₈O₆N₂ for the glucoside.

H. S. PAINE.

Optically active *N*-monomethyl derivatives of alanine, leucine, phenylalanine and tyrosine. EMIL FISCHER and WERNER LIFSCHITZ. Univ. Berlin. *Ber.* 48, 360-78 (1915); cf. *C. A.* 7, 2541; 9, 1057.—*p*-Toluenesulfonyl-*d*-alanine, obtained in 67% yield from 18 g. *d*-alanine in 110 cc. of 2 *N* NaOH shaken with 76 g. MeC₆H₄SO₃Cl in 200 cc. Et₂O and treated at 1 hr. intervals with 3 100-cc. portions of the same NaOH, the Et₂O removed after 4 hrs. shaking, the filtered aq. soln. satd. with 5 *N* HCl and the resulting oil seeded and allowed to stand 15 hrs. in the ice chest, needles from 13 parts H₂O, sinters about 130°, m. 134-5° (the m. ps. given are cor.), yields beautifully cryst. quinine and brucine salts, $[\alpha]_D^{20}$ in alc. -6.81°, and of the acid recovered from the quinine salt recrystd. 3 times from H₂O -7.26° (cf. Gibson, *C. A.* 9, 612, who calls his compd. an *l*-deriv.). Its hydrolysis requires long heating with conc. HCl at 100°, but there is no marked racemization; the *d*-alanine recovered after 8 hrs. with HCl of d. 1.19 showed $[\alpha]_D^{20}$ 9.5°. From 15 g. in 125 cc. of 2 *N* NaOH shaken about 20 min. with 18 g. MeI at 65-8° until completely dissolved, kept 20 min. more at the same temp., cooled and pptd. with HCl, is obtained 13 g. of the *N*-methyl derivative, needles or thick prisms from 70 parts H₂O, sinters about 117°, m. 121.5-2.5°, $[\alpha]_D^{20}$ -6.67°, hydrolyzed by HCl (d. 1.19) after 8 hrs. at 100° to *d*-*N*-methylalanine hydrochloride, needles from

alc.-Et₂O, sinters 158°, m. 165.5–6.0°, $[\alpha]_D^{20}$ 5.74° in H₂O, very hygroscopic, deliquesces in the air, gives no ppt. with KI.BiI₃, converted by boiling with PbO into the free *alanine*, needles with 1 H₂O from alc. (yield, more than 75%), m. about 300° (partial decompn.) when heated rapidly, partially subliming, tastes somewhat sweet. *Copper salt*, blue rhombic tables with 2 H₂O. *p-Toluenesulfo-l-leucine* (a), obtained in 50 g. yield from 30 g. formyl-*l*-leucine boiled 1.5 hrs. in 10 parts of 10% HCl, concd. to crystn. under 15–20 mm., taken up in a little H₂O, evapd. to dryness, dissolved in 75 cc. H₂O, neutralized with *N* NaOH, treated with more NaOH (about 450 cc. in all) until just dissolved, then with 72 g. MeC₆H₄SO₃Cl in 375 cc. Et₂O and shaken 4 hrs. with 279 cc. of 2 *N* NaOH added in 3 portions, sepd. from the Et₂O, satd. with 5 *N* HCl and crystd. from 1400 cc. of 20% alc., needles or prisms, m. 124°, $[\alpha]_D^{18}$ 4.40° in alc. *N-Methyl derivative* (b), obtained in 30 g. yield from 28.5 g. of (a), 6-sided tables from CS₂-petr. ether, m. 91–2°, $[\alpha]_D^{18}$ –21.09° in alc.; *ammonium salt*, needles from alc.-Et₂O, m. about 136°. *l-N-Methylleucine*, obtained in 64% yield after 15 hrs. heating of (b) with 10 parts of HCl (d. 1.19) at 100° or after 10–15 min. at 85–90° with 1 part PH₄I and 15 parts HI (d. 1.96), cryst. ppt. from H₂O-acetone, sublimes in needles on cautious heating with only slight decomp., $[\alpha]_D^{19}$ 20.44° in H₂O, sol. in 22.45 parts H₂O at 25°, tastes faintly bitter; its aq. soln. acidified with H₂SO₄ gives with phosphotungstic acid, even at relatively large dilns., a resinous ppt. quite easily sol. on warming; the satd. aq. soln. is pptd. by satd. (NH₄)₂SO₄; with a little concd. HNO₃ is obtained a *nitrate*, needles or prisms from alc.-Et₂O. *Hydrochloride*, needles, $[\alpha]_D^{19}$ 21.29° in H₂O. *Copper salt*, elongated 4- or 6-sided plates with 1 H₂O. *p-Toluenesulfonyl-d-phenylalanine*, obtained almost quant. from formyl-*d*-phenylalanine, hair-like needles from alc., m. 164–5°, $[\alpha]_D^{19}$ 2.42° in acetone, is *l*-rotatory in CHCl₃. *Sodium salt* seps. with 3.5 mols. H₂O. *N-Methyl derivative* (c), rectangular tablets with C₆H₆ of crystn. from C₆H₆-petr. ether, m. (solvent-free) 92–3°, $[\alpha]_D^{20}$ 32.63° in acetone; it is obtained pure through the *sodium salt*, needles with 2 H₂O, hygroscopic when dehydrated. *d-N-Methylphenylalanine hydrochloride*, obtained in 91% yield from (c) heated 16 hrs. with HCl at 100°, rectangular tablets from alc.-Et₂O, easily loses HCl, *l*-rotatory in H₂O, the rotation increasing on addition of HCl. Free *alanine*, from the HCl salt in alc. neutralized to litmus with 10% aq. LiOH, felted needles from 40 parts boiling H₂O, becomes strongly electrified on rubbing, sublimes partially undecompd., tastes sweetish bitter, easily sol. in dil. acids and alkalies, gives in faintly ammoniacal soln. with AgNO₃ on boiling a cryst. ppt. sol. in HNO₃, forms in acid soln. with phosphotungstic acid a resinous ppt. quite sol. on heating and in excess of the phosphotungstic acid, $[\alpha]_D^{18}$ –48.22° in 0.1 *N* NaOH, –17.7° in *N* HCl at 20°. *p-Toluenesulfonyl-l-phenylalanine*, m. 164–5°, $[\alpha]_D^{21}$ –2.11° in acetone; *sodium salt*, seps. with 3.5 H₂O. *N-Methyl derivative*, m. 92.5–4.0°, $[\alpha]_D^{19}$ –32.06° in acetone; *sodium salt*, seps. with 2 H₂O. *l-N-Methylphenylalanine*, $[\alpha]_D^{19}$ 49.06° in 0.1 *N* NaOH. *Ethyl N-p-toluenesulfonyl-l-tyrosine*, obtained in 65 g. yield from 60 g. HOC₆H₄CH₂CH(NH₂)CO₂Et.HCl, 12 g. soda and 60 cc. H₂O shaken with 360 cc. CHCl₃ and then with 47 g. MeC₆H₄SO₃Cl in 150 cc. CHCl₃, allowed to stand some hrs., again shaken 2 hrs. with 12 g. more soda in 60 cc. H₂O and the CHCl₃ layer dried with Na₂SO₄, concd., seeded and pptd. with petr. ether, needles, m. 114°, $[\alpha]_D^{17}$ 6.76° in alc., gives the Millon reaction, hydrolyzed by 5 *N* NaOH after 20 min. on the H₂O bath to *N-p-toluenesulfonyl-l-tyrosine* (yield, 40 g. from 45 g. ester), needles or prisms from 30% alc., m. 187–8°, $[\alpha]_D^{21}$ –0.85° in alc. $[\alpha]_D^{20}$ –8.58° in 0.5 *N* NaOH, easily sol. in excess of alkali, while the monoalkali and ammonium salts are relatively but little sol. in cold H₂O. Heated 75 min. at 70° with 3 mols. MeI in 3 mols. of 0.5 *N* NaOH, it gives almost quant. *N-p-toluenesulfonyl-O,N-dimethyl-l-tyrosine*, quadrangular plates from dil. alc., m. 141–2°, $[\alpha]_D^{20}$ –26.75° in alc., behaves towards Millon's reagent like *O,N*-dimethyltyrosine (Friedmann and

Gutmann, C. A. 5, 482); 5 g. heated 15 min. in a H_2O bath with 25 cc. HI (d. 1.96) and 3.5 g. PH_4I , gives $p\text{-MeC}_6\text{H}_4\text{SH}$ and 2.4 g. of $l\text{-N-methyltyrosine}$, $[\alpha]_D^{19}$ 19.75° in 11% HCl, identical with natural ratanhine (Goldschmiedt, C. A. 7, 589; by mistake, he reports it as being l -rotatory). The Me ester m. 111–2° (G., 116–7°). C. A. R.

Diacylamides. OTTO MUMM, HUGO HESSE AND HANS VOLQUARTZ. Univ. Kiel. Ber. 48, 379–91 (1915); cf. C. A. 4, 1750.—While many alkyl derivs. of acid amides are known in the 2 isomeric forms $RCONHR'$ and $RC(:NH)OR'$, thus far (with 1 possible exception; cf. Kuhara, C. A. 5, 1278) the corresponding acyl compds. have been obtained in only 1 form, to which has generally been assigned the amide structure, $RCONHCOR'$. In the prepn. of diacylamides by shaking an imide chloride in Et_2O or ligroin with the Na salt of an acid in H_2O , the O -acyl compd. is probably an intermediate product and rearranges into the N -acyl isomer: $RCCl:NR' + NaO_2CR'' \longrightarrow RC(O_2CR''):NR' \longrightarrow RCONR'COR''$, and attempts have now been made in various ways to isolate 2 such isomeric forms. To show whether intramol. rearrangement is possible under the conditions of the expt. $PhCCl:NPh$ was treated with $m\text{-O}_2NC_6H_4CO_2Na$ on the 1 hand, and $m\text{-O}_2NC_6H_4Cl:NPh$ with $BzONa$ on the other; if there were no rearrangement the products should be different, but as a matter of fact they were identical, $O_2NC_6H_4CONPhBz$. A residue of high mol. wt. was next chosen as the entering acyl; $PhCCl:NPh$ and Ph_3CCO_2Na gave *triphenylacetylbenzanilide*, microscopic needles from C_6H_6 , m. 185–6°, which again was identical with the product from $BzONa$ and *triphenylacetanilide imide chloride*, prismatic columns from ligroin, m. 137°; this chloride was obtained by warming with PCl_5 *triphenylacetanilide*, m. 167–8°, which, in turn, was prepd. from Ph_3CCOCl and $PhNH_2$. Similarly, $PhCCl:NPh$ with mono-Na malonate gave *malonylmonobenzanilide*, prisms from C_6H_6 , m. 100–1° (gas evolution); with $(CH_3CO_2Na)_2$, *succinyldibenzanilide*, prisms from $MeOH$, m. 146–7°; with Na fumarate, *fumaryldibenzanilide*, m. 194° (decompn.). It was thought that if the entering (aromatic) acyl or the imide chloride were substituted in the o -position, the rearrangement of the O - into the N -acyl compd. might be prevented, but again no isomeric forms could be detected. $PhCCl:NPh$ and $o\text{-MeC}_6\text{H}_4CO_2Na$ gave *o-toluybenzanilide*, m. 134–5°; $o\text{-MeC}_6\text{H}_4N:CPhCl$ and $NaOBz$ yielded *dibenzoyl-o-toluidide*, prisms from alc., m. 111–2°; *dibenzoyl-o-nitroanilide*, 4-sided tables from alc., was obtained from $O_2NC_6H_4N:CPhCl$ and $NaOBz$. *Dibenzoyl-m-toluidide*, needles from alc., m. 140–1°; *p-toluidide*, prisms from alc., m. 142–4°; *m-nitroanilide*, prisms from alc., m. 150–1°; *methylamide*, $MeNBz$, prismatic columns from alc., m. 94–5°; *benzylamide*, prisms from alc., m. 108°, were similarly obtained from $BzONa$. Thinking the strength of the acid whose radical enters might influence the stability of the O -acyl compd., salts of acids of the most varied strength and of various phenols were tried but again, except in the case of $PhOH$ itself, no isomers were obtained. $PhCCl:NCH_2Ph$ and $PhCH:CHCO_2Na$ gave *cinnamoylbenzoylbenzylamide*, prisms from alc., m. 113°. $PhCCl:NPh$ and $PhONa$ give $PhC(OPh):NPh$ (Hantzsch, Ber. 26, 926 (1893)), m. 105°, which, when heated 1 hr. at 240° and crystd. from alc., rearranges into $BzNPh_2$, m. 180°, obtained from $BzCl$ and $NHPh_2$ (Hofmann, Ann. 132, 166 (1865)). *Benzanilide-o-nitrophenyl ether*, from $PhCCl:NPh$ and $O_2NC_6H_4ONa$, cubes from alc., m. 116°, could not be converted into an isomer. *Benzpicrylanilide*, long needles from alc., m. 195–6°; *benzpicryl-o-toluidide*, light yellow rhombs from alc., m. 223–4°; [*o*-hydroxybenzoyl] *benzanilide*, prisms from C_6H_6 , m. 189°; [*o*-hydroxybenzoyl] *bens-o-toluidide*, needles from alc. or C_6H_6 , m. 122–3°. Treatment of $PhCCl:NPh$ in the presence of C_6H_5N with acids in abs. Et_2O (Claisen, Ann. 291, 106 (1896)) gave products identical with those obtained as above from the salts. The above syntheses do not permit of deciding whether in the diacylamides both acyl groups are really attached to the N or whether the compds. are not perhaps at

least partially *O*-acylated derivs. It was now attempted to clear this up by so choosing the acid residues that here would be a possibility of intramol. ring formation; from the structure of the resulting cyclic compd. it should then be possible to deduce that of the diacylamide. PhCCl:NPh and $o\text{-H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{Na}$ give diphenylquinazolone (*C. A.* 4, 3233), so that the $\text{H}_2\text{NC}_6\text{H}_4\text{CO}$ residue must be attached to the N; on the other hand, the 3 isomeric $\text{O}_2\text{NC}_6\text{H}_4\text{N:CPhCl}$ and $\text{H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{Na}$ yield benzoylanthranil, so that the $\text{H}_2\text{NC}_6\text{H}_4\text{CO}$ must be attached to the O. With $\text{MeNHC}_6\text{H}_4\text{CO}_2\text{Na}$ is obtained [*o*-methylaminobenzoyl]benzanilide, prisms from AcOEt , m. 188° , which when boiled several hrs. with dil. HCl changes into an (apparently cyclic) isomer, $\text{NMe.C}_6\text{H}_4\text{CO.NPh.CPhOH}$, m. 142° . In some

cases, the decompn. of the diacylamides at room or elevated temp. may also throw light on their structure. Thus, *oxalylidibenzanilide*, from PhCCl:NPh and $(\text{CO}_2\text{K})_2$ prisms from alc., m. $212\text{--}3^\circ$ (gas evolution), when heated 1 hr. at $220\text{--}30^\circ$, gives 1 mol. each of CO , CO_2 and BzNPhCPh:NPh , showing that at least 1 side of it is acylated on the O. *Oxalylidibenz-o-toluidide*, m. $171\text{--}3^\circ$. When $(\text{CO}_2\text{K})_2$ reacts on $p\text{-O}_2\text{NC}_6\text{H}_4\text{N:CPhCl}$, not only does the *O*-acyl at once rearrange into the *N*-acyl compd. but the *Bz* is also replaced by a HO_2CCO group and the product obtained is *dioxalyl-p-nitrobenzanilide*, $\text{O}_2\text{NC}_6\text{H}_4\text{N(COCO}_2\text{H)}_2$, needles from AcOH , m. 270° (decompn.), converted by dil. HCl into $\text{O}_2\text{NC}_6\text{H}_4\text{NHCOCO}_2\text{H}$. $\text{HO}_2\text{CCO}_2\text{Na}$ and PhCCl:NPh likewise yield an *O*-acyl compd. which, however, spontaneously loses 1 mol. each of CO and CO_2 and forms BzNHPh . The great tendency of the *O*- to rearrange into the *N*-acyl derivs. is probably conditioned by partial valences on the migrating C and the N atom. That the compds. sometimes react like *O*-acyl derivs. is probably due to the fact that they exist in a tautomeric equil. of the 2 forms.

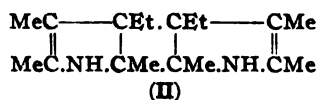
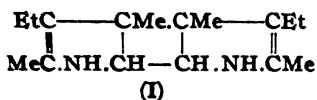
CHAS. A. ROULLER.

The use of aqueous mercuric acetate solution for the investigation of the terpene-constituents of ethereal oils. L. BALBIANO. Turin. *Ber.* 48, 394-400(1915).—By means of satd. $\text{Hg}(\text{OAc})_2$ paraffins, aromatic hydrocarbons, cycloparaffins, olefins and terpenes can be detected and detd. in mixts. of hydrocarbons. Purest pinene, prepd. by Wallach's method from the nitroso chloride (*Ann.* 258, 344(1890)), when boiled 2-4 hrs. under a reflux condenser with the required amt. of $\text{Hg}(\text{OAc})_2$ in 4 parts. of H_2O , is completely decompd.; a large part resinifies but about 50% is converted into dihydroxypinene (isolated as the semicarbazone); no appreciable amt. of cymene is formed. Petr. ether and pinane are not attacked and a large part is recovered when mixts. with pinene are treated as above with $\text{Hg}(\text{OAc})_2$. Camphene boiled 2 hrs. with aq. $\text{Hg}(\text{OAc})_2$ in the presence of AcOH gives a ppt. of the compd. $\text{C}_{10}\text{H}_{16}\text{O}(\text{HgOAc})_2$ (a) which regenerates camphene with Zn and HCl on the H_2O bath; if C_6H_6 or pinane are also present, they are largely recovered unchanged. The following is an example of a mixt. analyzed by this method: 5 cc. pinene, 2 cc. cymene, 2 cc. pinane and 1 g. camphene are boiled 2.5 hrs. with 33 g. $\text{Hg}(\text{OAc})_2$ in 132 cc. H_2O ; from the steam distillate of the reaction mixt. there seps. 3.5 cc. of an oily mixt. of cymene and pinane which no longer reacts with $\text{Hg}(\text{OAc})_2$, showing that the reaction is complete. From the ppt. of HgOAc and (a) there is obtained, by treatment with Zn and HCl and subsequent steam distn., about 0.6 g. camphene. The aq. soln. is concd. on the H_2O bath, the residue dissolved in Et_2O , the soln. washed with H_2O and concd.; there remains a red-yellow oil which with $\text{H}_2\text{NCONHNH}_2\cdot\text{HCl}$ and KOAc in alc. gives 0.8 g. of dihydroxypinene semicarbazone.

CHAS. A. ROULLER.

Polymerizations in tri- and tetra-alkylated pyrroles. HANS FISCHER. Univ. Munich. *Ber.* 48, 401-6(1915).—*Biskryptopyrrole* (I) is obtained as the HCl salt when kryptopyrrole (a) in Et_2O is treated with dry HCl . When 4 g. (a) picrate in 40 cc. AcOEt is boiled 2 hrs. or allowed to stand 15 hrs. at 48° and cooled in ice, 2 g.

unchanged (a) picrate seps. in about 2 hrs.; the mother liquors, treated with petr. ether and rubbed, yield in 4-5 hrs. orange-red crystals which, when treated with CHCl_3 , leave a small residue (0.02 g.) of a yellow picrate m. above 290° which does not give the Ehrlich aldehyde reaction. The CHCl_3 soln., treated with Et_2O , yields 0.5 g. of the orange *picrate* of (I), m. $154-5^\circ$ (cor.), gives a negative Ehrlich reaction; with NaOH



this yields the free (I) as an oil which does not depolymerize up to 170° *in vacuo* but above 200° the oil which distills over gives the picrate of (a). Phyllopyrrole (b) is polymerized even more easily; when its picrate is boiled only 0.5 hr. with AcOEt , on cooling there crysts. a product, m. $103-4^\circ$ (cor.), having approx. the comp. of Piloty's hemopyrrole g (C 51.59, H 5.74, N 14.70%); complete polymerization is effected by boiling 6.1 g. (b) and 11 g. picric acid in 170 cc. AcOEt for 2 hrs.; on treating with petr. ether to incipient turbidity, freeing the crystals of tar by rubbing with AcOEt or alc. and crystg. from alc. or CHCl_3 and petr. ether, there is obtained 5.3 g. of the light yellow *picrate*, m. 147.5° , of *bisphyllopyrrole* (II), which is non-cryst. and is not or only very slightly volatile with steam, being partially depolymerized by the steam, for the distillate contains a small amt. of (b); by distn. *in vacuo* at about 150° , about 50% of (b) is recovered from (II). That the polymerization does not occur at room temp. was shown in a special expt. Piloty's hemopyrrole e is polymerized (a), probably formed by long boiling with AcOEt in the sepn. of the pyrrole picrates; it is not originally present in the pyrrole mixt. F. in his work pours the boiling solvent on the pyrrole picrates, boils a few sec. at most, quickly filters and at once cools with ice. Hemopyrrole g is essentially (b) contaminated with the bis compd., and hemopyrrole f is doubtless a similar bis compd. Contrary to P.'s experience (C. A. 9, 57), F. again finds that phyllopyrrolecarboxylic acid is easily obtained from the phono acid and NaOMe (KOME is better) heated 3 hrs. at 225° (cf. C. A. 7, 1495). It is similarly obtained from the isophono acid (C. A. 8, 1770).

CHAS. A. ROULLER.

Synthesis of high molecular derivatives of papaverine. MARTIN FREUND AND KARL FLEISCHER. Univ. Frankfurt a/M. Ber. 48, 406-9 (1915).—Like narcotine and hydrocotarnine (C. A. 6, 2600-1), papaverine (a) contains a free H atom in the 5-position of the isoquinoline residue and like them it condenses with opianic acid (b) and HCHO . *Opian(lact)ylpapaverine*, $\text{C}_{40}\text{H}_{49}\text{O}_8\text{N}_2$, obtained in 46 g. yield from 33.9 g. (a) and 21.0 g. (b) allowed to stand 3 days in 120 cc. H_2SO_4 (90 g. of 96% acid: 10 g. H_2O), poured into cold H_2O , satd. with dil. NH_3 , filtered and warmed moderately with alc., microscopic needles from alc.- CHCl_3 , m. $168-70^\circ$, sol. in concd. H_2SO_4 , without color but turning a bright violet on the addition of a trace of dil. acid. *Hydrochloride*, thick felted needles with 1 H_2O , decomp. 167° . *Methylenedipapaverine* $\text{C}_{44}\text{H}_{49}\text{O}_8\text{N}_2$, obtained in 20 g. yield from 33.9 g. (a) and 25 cc. of 35% aq. HCHO allowed to stand 4 days with 80 cc. of H_2SO_4 (80 g. of 96% acid: 20 g. H_2O), filtered, dissolved in hot H_2O , pptd. hot with 10% NH_3 , filtered and warmed with alc., m. $204-6^\circ$, sol. without color in concd. H_2SO_4 and turning intensely blue on addition of a trace of dil. HNO_3 . *Dihydrochloride*, seps. with 2 H_2O .

CHAS. A. ROULLER.

Inversion of sucrose (LAMBLE) 2. Peptone (BERNARDI) 11A.

II. BIOLOGICAL CHEMISTRY.

WILLIAM J. GIES, PAUL E. HOWE, EDGAR G. MILLER, JR.

A. GENERAL.

FRANK P. UNDERHILL.

Sensitiveness of the peroxidase reaction. A. BACH. *Genf. Ber.* 47, 2122-4 (1914).—The sensitivity of a very pure prep. of peroxidase made by pptn. with EtOH and subsequent filtration of the aq. soln. on a special filter so as to hold back only the colloidal ferment, was found to be of the order of 1 to 500 million when allowed to react with guaiacol and H_2O_2 for five min. Increasing the reaction time to 20 min. and 24 hrs. increased the sensitiveness to 1 to 1 billion and 1 to 2 billion, resp. E. M. F.

Notes on the mechanism of biological oxidation processes. OSCAR LOEW. *Ber.* 47, 2462-4 (1914).—L. regards the oxidative processes of the body as taking place not as a result of activated O, but rather by means of "labilized" H atoms of the proteins of the cells so that they react readily with mol. O_2 . The H_2O_2 formed in the reaction is at once removed by the catalase always present. This process he terms induced oxidation. E. M. FRANKEL.

Electric charge of the protoplasm and other substances in living cells. J. F. McCLENDON. Minneapolis. *Intern. Z. physik. chem. Biol.* 1, 159-62 (1914).—The anthocyan in vacuoles of living cells of red cabbage is red and cathodic (electrically positive). If alkali be added to the medium the anthocyan becomes blue and anodic before the death of the cell. It appears therefore to be an amphoteric electrolyte like egg albumen. E. M. FRANKEL.

Absorption of water through skin of the frog. J. F. McCLENDON. Minneapolis. *Intern. Z. physik. chem. Biol.* 1, 169-72 (1914).—Absorption of H_2O by a frog leg in which the circulation has stopped is the result of the osmotic pressure of the fluids in and between the cells of the tissues. E. M. FRANKEL.

Abderhalden's protective enzymes. C. BRAHM. Berlin. *Z. angew. Chem.* 27, I, 464-6 (1914).—Outline of theory and methods used. E. M. FRANKEL.

Optical rotation, adsorption and centrifugalization of pepsin solutions. M. RAKUZIN. *J. Russ. Phys. Chem. Soc.* 47, 141-3 (1915).—The rotation of pepsin in H_2O is $[\alpha]_D +64.5^\circ$. When an aq. soln. of pepsin is shaken with 10% by wt. of soln. of Al_2O_3 for 1 hr. there is a drop in the rotation and in the sp. gr., showing positive adsorption, while if the pepsin soln. be boiled for a few min. with 3% of gelatin the rotation drops to 0° (gelatin being levorotatory), but the sp. gr. increases, showing negative adsorption. An attempt to cause a sepn. of pepsin by centrifugalizing its soln. failed. H. M. GORDIN.

Optical and other properties of albumins. I. Rotation, adsorption and centrifugalization of egg albumen. M. A. RAKUZIN. *J. Russ. Phys. Chem. Soc.* 47, 144-7 (1915).—The rotation of egg albumen is $[\alpha]_D -39.73^\circ$, showing that the 2 modifications of albumin (Panormov, *J. Russ. Phys. Chem. Soc.* 1898, 302) are in the egg in unequal proportions. When a 50% soln. of egg albumen is digested for 24 hrs. *in vacuo* with 10% by wt. of soln. of Al_2O_3 the rotation decreases, showing positive adsorption, while if the albumen soln. is warmed for 15 min. to $40-50^\circ$ with 1% of gelatin the *l*-rotation and the sp. gr. increase, showing negative adsorption (gelatin being levorotatory). **II. Rotation, adsorption and centrifugalization of casein solutions.** *Ibid* 147-9.—A soln. of casein in H_3PO_4 (1:12) or in AcOH has $[\alpha]_D -86.6^\circ$, while in a 2% soln. of borax or in $H_2O + 0.2\%$ pepsin + 2% HCl $[\alpha]_D -95.3$ to 95.4° . When a soln. of casein containing 2% of borax is shaken with 10% by wt. of soln. of Al_2O_3 for 1 hr. the sp. gr. and the rotation decrease, showing positive adsorption. The latter is still

greater if the mixt. be digested for 24 hrs. Centrifugalization of a borax-containing soln. of casein caused a sepn. of but an insignificant amt. of it. H. M. GORDIN.

Spectroscopic investigation of the reduction of hemoglobin by tissue reductase. D. F. HARRIS AND H. J. M. CREIGHTON. Dalhousie Univ. and Swarthmore College. *J. Biol. Chem.* 20, 179-201 (1915).—Reductase was obtained from the liver of the cat, rabbit, pigeon, frog and mackerel, from cat and pigeon muscle juice, from the heart of the cat and rabbit and from the kidney, stomach and cortex cerebri of the cat. Its reducing action on oxyhemoglobin at 40° was studied spectroscopically. The liver juice of all the animals had the greatest reducing power, that of the pigeon reducing the oxyhemoglobin to the one-banded condition instantly at room temp. The muscle juice of the cat showed only slight reducing action while that of the pigeon brought about reduction in 2 mins. The juices of the other organs showed varying degrees of activity. Sol. Prussian blue was also reduced to the leuco base by the juices studied. The reductase is not specific as the reductase of any one animal reduces the blood of any other. The rate of reduction increases with the temp., being most rapid between 10 and 40° and decreasing rapidly above 40° and below 10°. Below 0° inhibition is complete but the juice regains its activity on raising the temp. The activity of the cat liver juice decreases with age and practically disappears after 8 days. A logarithmic curve is obtained by plotting the reducing power against the age of the juice. The decay in the activity of reductase follows the unimolecular law. The expts. show the presence in the tissues of mammals, birds, amphibia and fishes of an intracellular enzyme having energetic reducing powers. The authors believe "that reductase is the chief factor in causing dissociation of O from oxyhemoglobin in the tissues" and that internal respiration is *originated by reductase*, which removes O from the oxyhemoglobin and from the lymph in a nascent condition, in which it is applied to the oxidizable substances in the cell through the activity of an oxidase. ALFRED P. LOTHROP.

Glucolysis. IV. Catalytic influence of oxidative glucolysis. WILHELM BEYSEL AND WALTHER LÖB. Berlin. *Biochem. Z.* 68, 368-401 (1915); cf. *C. A.* 7, 492.—The oxidation of glucose, HCHO and glycolaldehyde is accelerated by PO₄; thus there is a catalysis of the action of the HO-ion by the PO₄-ion which cannot be produced by the glycoll or boric acid ion, even if the solns. used have the same or larger HO-ion concn. than the PO₄-soln. The accelerating action of the PO₄ increases with the amt. of PO₄ added; the H-ion exponent, p_H 7.4-7.5, which is about that of blood alkalescence, is the most suitable for the PO₄ ion glucolysis. Slight amts. of glycoll produce a direct retardation of the oxidation by H₂O₂, an effect not shown by boric acid salts. In the oxidative PO₄ glucolysis of grape sugar in blood alkalescence there is formed besides hydroxy acids, HCO₂H and CO₂ from the decompn. of pentoses and HCHO. HCHO and glycolaldehyde behave towards PO₄, borates and glycoll, when oxidized by H₂O₂, essentially the same as grape sugar. C. J. WEST.

Chemistry of the proteolytic enzymes. E. HERZFELD. Univ. Zürich. *Biochem. Z.* 68, 402-35 (1915); cf. *C. A.* 8, 3560.—The active enzyme preps., upon dialysis, give more compds. reacting with ninhydrin and split off from the same proteins more such compds., than less active compds. In the dialysis of pepsin, the dialysate always gives the biuret reaction (comparable with the peptones), while trypsin dialysate gives a negative biuret (comparable with the amino acids). The decrease of such dialyzable compds. in acid or alk. solns. is also seen in their action upon protein compds., where a correspondingly smaller amt. of the dialyzable substs. results. These facts lead to the conclusion that dialyzable protein decompn. products, peptones and amino acids, may participate in the catalysis of protein hydrolysis. This conclusion was confirmed in a series of expts. in which it was shown that peptones accelerate proteolytic processes. There seems to be a certain specificity, in that peptone from

albumin catalyzes the hydrolysis of albumin more than that of fibrin, while it has no effect upon that of casein and edestin. In the same way, a synthetic peptide, leucylglycine, exerts a catalytic action. In the hydrolysis of such a peptide the amino acids have a strong catalytic action. This is also seen in the hydrolysis of proteins, glycooll, leucine, glutaminic acid and alanine accelerating the reaction strongly, phenylalanine slightly, while asparagine and tryptophan had no effect. A mixt. of amino acids has the same effect. The amt. of decompn. is less in the presence of 0.5% Na_2CO_3 . In expts. which ran for 1000 hrs., the last period was characterized by a decrease (synthesis?) of the decompn. products. Certain expts. are reported showing that an active trypsin prepn. does not lose all its activity when heated; glycooll in 0.5% Na_2CO_3 shows a similar behavior.

C. J. WEST.

Peptone. II. ALESSANDRO BERNARDI AND EMMA FABRIS. Univ. Bologna. *Biochem. Z.* 68, 436-40(1915); cf. C. A. 8, 1796.—The insol. portion obtained by treating the aq. soln. of Witte peptone with $\text{Cu}(\text{OH})_2$ is washed free of Cu with hot H_2O , dissolved in hot NH_4OH and the blue soln. satd. with H_2S . The filtrate is evapd. to dryness, extd. with H_2O and satd. with NaCl , MgSO_4 or best with AcONa . When a conc. of 21% NaOAc is reached a yellow subst. ppts. which is only partly sol. in H_2O . Extd. with H_2O , concd. to a thick sirup and poured into abs. alc., there ppts. a brownish yellow substance, $\text{C}_{47}\text{H}_{137}\text{N}_{19}\text{O}_{37}\text{S}_2$, rather sol. in H_2O , pptd. by phosphotungstic acid, but not by FeCl_3 , MgSO_4 or AcOH . It gives a negative biuret reaction, positive Millon and xanthoproteic reactions and becomes turbid upon adding AcOH . The mother liquor from the AcONa ppt. is concd. and poured into alc., giving a compound, $\text{C}_{44}\text{H}_{124}\text{N}_{11}\text{O}_{24}\text{S}$, which is sol. in cold H_2O , has a very weak alk. reaction, is pptd. by picric and phosphotungstic acids; the ppt. with AcOH , ZnSO_4 or HCl is sol. in excess of the reagent. It gives a positive biuret, Millon and xanthoproteic reaction.

III. *Ibid* 441-3.—A 10% aq. soln. of the earlier described compd. $\text{C}_{44}\text{H}_{124}\text{N}_{11}\text{O}_{24}\text{S}$ is satd. with dry HCl at 0° , the dark violet soln. concd. on the H_2O bath, extd. with Et_2O and the residue extd. with AcMe . The AcMe ext. is concd. to dryness, the residue extd. with H_2O , the ext. treated with $\text{Cu}(\text{OH})_2$, the clear blue soln. concd. and poured into AcMe . This gives a compound, $\text{C}_{14}\text{H}_{32}\text{N}_4\text{O}_{10}\text{Cu}_2$, forming blue needles which begin to decomp. at 200° , m. 211° (decomp.). It is sol. in hot H_2O .

C. J. WEST.

Behavior of cane sugar under the influence of the silent discharge. WALTHER LÖB. Berlin. *Biochem. Z.* 69, 36-8(1915).—Cane sugar is hydrolyzed by the silent discharge. Fifty cc. 2.5% sugar soln., containing 48.2 mg. and 57.2 mg. reducing sugar, contained 110 mg. and 302.4 mg. after the action of the silent discharge for 12 hrs. In a 30 hr. expt., acid formed corresponding to 0.35 cc. 0.1 N NaOH . A secondary decompn. by H_2O_2 was prevented by carrying the action out in a vacuum of 20 mm.

C. J. WEST.

Electroculture. I. Influence of the silent discharge upon enzyme reactions. WALTHER LÖB AND A. SATO. Berlin. *Biochem. Z.* 69, 1-35(1915).—Aq. solns. of starch are hydrolyzed by the action of the silent discharge both in the presence and absence of O. The part of the starch not hydrolyzed in this process is changed, perhaps in the sense of a polymerization, perhaps otherwise, so that it is more stable towards diastase than the untreated starch. The elec. treatment of pancreatin solns. retards considerably the diastatic properties of the same. In the same way the reaction between diastase and starch is retarded. Silk peptone solns. are hydrolyzed only to a very slight degree, giving free NH_3 . Amino acids and non-colloidal N substances are present only in traces. Casein and fibrin are stable. The tryptic properties of pancreatin solns. are retarded by the discharge. The reaction between enzymes and casein is slightly retarded. Tributyrin is hydrolyzed by the action of the silent discharge. The lipase of the pancreatin is weakened by the discharge.

C. J. WEST.

Activation of soy urease by human serum. RUDOLF NEUMANN. Berlin. *Biochem. Z.* 69, 134-40(1915).—Human serum increases the urea-splitting activity of soy urease about 8 times. A quant. difference in this auxoureatic action could not be established for sera of different diseases, the amt. being fairly const. in all cases. Fluid from a pleural puncture had the same effect as serum. That from lumbar puncture is not as active, the greatest activity being found in a case of tubercular meningitis.

C. J. WEST.

The (serologically demonstrable) protein of honey is the same as that of the bee (Langer) and not of the pollen (Küstenmacher). JOSEPH LANGER. Graz. *Biochem. Z.* 69, 141-4(1915).—L. restates his views (*C. A.* 3, 2716; 4, 332) as opposed to the conclusions of K. (*C. A.* 5, 2488).

C. J. WEST.

Recent work on vitamines. H. L. WATSON-WEMYSS. *Edinburgh Med. J.* 14, 186-93; *J. Comp. Path. Therap.* 28, 53-9(1915).—A review.

C. J. WEST.

B. METHODS AND APPARATUS.

STANLEY R. BENEDICT.

Identification of traces of bilirubin in albuminous fluids. A. A. HYMAN VAN DEN BERGH AND J. J. DE LA FONTAINE SCHLUTTER. *Proc. K. Akad. Wetenschappen* 17, 807-10(1914); *J. Chem. Soc.* 108, II, 116.—To detect with certainty the presence of small quantities of bilirubin in blood serum or other albuminous fluid, 20 cc. of pure acetone are added to 10 cc. of the serum, and the more or less intensely yellow soln., after removal of the albumin ppt., is evapd. in a vacuum at the ordinary temp. until the acetone has been removed. The residual aq. soln. is treated with ether to remove the fatty substances, 2 cc. of CHCl_3 are added, and the mixt. is faintly acidified with HCl and well shaken. The CHCl_3 soln. contg. the bilirubin is thoroughly washed with water to remove all the HCl, and is dried, if necessary, with anhydrous Na_2SO_4 . Bilirubin can be detected in the yellow CHCl_3 soln. by the usual tests, by the reactions of Gmelin and of Ehrlich, and by the isolation of yellow, microscopic crystals. The following remarkable observation has been made during the exam. of the serum of 2 patients suffering from obstructive jaundice, and only in these 2 cases. After the blood serum had been treated by the preceding method, the final CHCl_3 soln. was allowed to evap. slowly at 0° ; when the concn. had reached a certain value the yellow color of the soln. changed suddenly to green, evidently owing to a change of bilirubin to biliverdin.

E. J. C.

Determination of urea. A. DESGREZ AND R. MOOG. *Compt. rend.* 159, 250-3 (1914).—The urea is decompd. in the presence of infusorial earth as a catalyzer with a soln. prepd. by dissolving 50 g. Hg in 100 g. 36°Bé . HNO_3 , and the liberated gas after absorption of the CO_2 measured over CHCl_3 . Allantoin reacts in the same way. A new form of ureometer is described for use with this method.

E. M. FRANKEL.

Quantitative gravimetric determination of small amounts of urea in dilution greater than 1 : 1000. R. FOSSE. *Compt. rend.* 159, 253-6(1914).—The method of F. (cf. *C. A.* 8, 3450) is shown to be applicable to solns. of urea containing 0.01-0.1%, 0.01 g. being estd. with an accuracy greater than 1%.

E. M. FRANKEL.

Determination of protein ammonia. L. W. WINKLER. Budapest. *Z. angew. Chem.* 27, I, 440(1914).—100 cc. of H_2O are treated with 1-2 drops of conc. H_2SO_4 , and approx. 0.05 g. powdered $\text{K}_2\text{S}_2\text{O}_8$ and boiled on the steam bath for 15 min., cooled to room temp. and treated with 5 cc. of a reagent contg. equal parts of Nessler and Na K tartrate solns. Enough NH_4Cl soln. (1 cc. = 0.1 mg. NH_3) is added to make the color of the soln. the same as the color developed by mixing the same quantity of H_2O with the same reagents (the boiling being omitted). The amt. of NH_3 added is

equal to the protein NH_3 . Care must be taken to recryst. the $\text{K}_2\text{S}_2\text{O}_8$, as the reagent may contain $(\text{NH}_4)_2\text{S}_2\text{O}_8$ (cf. *C. A.* 7, 2175). E. M. FRANKEL.

Toxic products in food and their detection. CHAS. H. HIGGINS. *Centr. Bakt. Parasitenk., Abt. I* 74, 193-7(1914).—In testing the presence of toxic substances in food, usually gelatin, a soln. of the sample is made in *N* NaCl soln. or distd. H_2O which is heated to 60° during 1 hr. Gradually increasing doses (from 1 to 10 cc.) of this soln. are injected subcutaneously into guinea pigs. If no symptoms or deaths occur within 5 days, the food is passed as being suitable for human food. If they do occur, further tests are made to det. whether bacteria or sol. toxins are present. J. H. LEWIS.

Methods of measuring and researches with tryptoprotease. F. M. MARRAS. *Centr. Bakt. Parasitenk., Abt. I* 74, 505-15(1915).—All the methods that have been suggested for measuring proteases that act in an alk. medium are reviewed and criticized. M. compared the serum plate method of Jochmann-Müller, the casein tube method of Fuld-Gross, and the gelatin plate method of Ferns. In his opinion the gelatin plate method, besides being certain and simple, requires a shorter time and a lower temp. for reaction. JULIAN H. LEWIS.

Experiences with the phenolsulfonephthalein method of testing the function of the kidney. OTTO HESS. Cologne Academy. *Bull. Johns Hopkins Hosp.* 26, 52-4(1915).—A report is made of the results of 300 tests of kidney function using the phenolsulfonephthalein method. The test is superior to other color tests. It shows how much of the parenchyma is involved and is of much value in the differential diagnosis of doubtful renal tumors. It can be applied immediately without any dietary prep. and can be used even in uremic conditions. There is a parallelism between the phthalein excretion and that of NaCl and N, and diet and treatment may be prescribed from the results of this test alone in cases which could not be recognized as chronic nephritis by other available clinical methods. A. P. LOTHROP.

Preparation of a dry urease powder and several properties of soy urease. MARTIN JACOBY AND SUGGA. Berlin. *Biochem. Z.* 69, 116-26(1915).—The soy bean meal is extd. 6 times with petroleum ether, then with 5 vols. H_2O for 16-24 hrs. at 0° , the ext. filtered or centrifuged and the soln. concd. to dryness in a stream of air at room temp., and the residue ground to a powder. This is difficultly and not completely sol. in H_2O . To test the activity of the preps. 20 cc. urea soln. (2%), 1 cc. toluene and 1 cc. olive oil were used. Treatment with alc. gives H_2O -insol. prepn. with about the same activity. Heating to 70° destroys a greater part of the activity of the urease, while 60° has very little effect. Trypsin digestion has no influence upon its activity. The action of papayotin, even at 60° , has no influence upon the activity, but if the urease-papayotin mixt. is dialyzed, there is a considerable decrease in the activity of the urease action. This may be due to the loss of auxosubstances, though the urease prepn. itself was not changed by dialysis. C. J. WEST.

Arginase. I. A new titrimetric method for the detection of arginase. ANTONINO CLEMENTI. Univ. Heidelberg. *Atti accad. Lincei* 23, II, 517-23(1914).—The new method is based on the action of arginase on arginine in H_2O giving 1 mol. urea + 1 mol. ornithine. By use of the formol titration method of Sørensen the presence of arginase may be detd. by detg. quantitatively the amt. of additional free NH_2 groups that it gives rise to by the hydrolytic decomp. of arginine into urea and ornithine. The theoretical considerations and experimental data on the behavior of arginine and ornithine and urea with respect to the formol titration show that this latter method is an appropriate method for quant. detns. of the hydrolytic action of arginase. The results obtained by the application of this method to the detection of arginase confirm the hypothesis and show that the action of arginase doubles the amt. of 0.2 *N* NaOH

required for the formal titration of the arginine salt used. Arginase is not only present in the juice collected with a Büchner press as found by Kossel and Dakin but also in the aq. ext. of mammalian livers.

E. J. WITZEMANN.

C. BACTERIOLOGY.

ERNEST D. CLARK.

A study of the "tellurite reaction" with the colon-typhoid group and other organisms. LEWIS DAVIS. *Centr. Bakt. Parasitenk., Abt. I* 75, 180-92 (1914).—Correction to abstract in *C. A.* 9, 923. In the sentence reading "with the colon bacillus, the 'tellurite (K_2TeO_3) reaction' is almost negative," the word "negative" should be "instantaneous."

E. J. C.

Production of lactic acid by acetic bacteria. A. OSTERWALDER. *Z. ges. Brauw.* 37, 35 (1914).—Certain acetic bacteria often produce lactic acid during fermentation, but only in presence of alc. Malic acid is attacked by these bacteria without formation of lactic acid.

J. GAUB.

New group of bactericidal substances derived from hexamethylenetetramine. WALTER A. JACOBS AND MICHAEL HEIDELBERGER. *Rockefeller Inst. Proc. Nat. Acad.* 1, 226-8 (1915).—While previous attempts to improve the action of $C_6H_{12}N_4$ (A) as an internal antiseptic have dealt chiefly with double salts with acids, phenols, and metallic salts, use is now made of the known fact that A functions as a tertiary base and forms quaternary salts with org. substances containing aliphatically bound halogen. These salts are almost all bactericidal, the action varying with the character of the halide used, and often being undiminished in the presence of serum. Aq. solns. of the salts soon decompose, forming finely divided ppts. of the methylene derivs. of the amines corresponding to the halides used, and to these are ascribed the bactericidal properties of the salts. In many instances the salts showed remarkable specificity when tested against different strains of bacteria. The chem. and bacteriological results are in course of publication.

M. HEIDELBERGER.

The proteolytic action of streptococci, staphylococci, and *Bacillus coli* cultures. EUGEN ROSENTHAL AND JOSEPH AUGUST PATAI. *Centr. Bakt. Parasitenk., Abt. I* 73, 406-13 (1914).—The curve of the production of amino acids by these organisms reached inside of 1 hr. a relatively high value which varied between 54.6 and 84.8 mg. of amino acid per 100 cc. of culture medium. There was not such a rapid rise on the 2nd day. The abs. amt. of amino acids produced by streptococci and staphylococci showed no difference but was considerably more than that produced by *B. coli*. Virulent organisms produced more amino acids than avirulent ones.

J. H. LEWIS.

The production of amylolytic and glucolytic bacterial enzymes. EUGEN ROSENTHAL AND JOSEPH A. PATAI. *Centr. Bakt. Parasitenk., Abt. I* 74, 369-73 (1914).—The curve of the production of amylolytic enzymes by different strains of streptococci, staphylococci, and *B. coli* rose gradually in height and reached its max. about the 9th or 10th day. The max. for the curve of glucolytic enzymes was reached on the 1st or 2nd day. The rate and amt. of production of the amylolytic enzymes by virulent and avirulent strains of the organisms showed no significant difference. The amt. of glucolytic enzymes produced by the virulent organisms is somewhat smaller than that produced by the avirulent ones.

JULIAN H. LEWIS.

The bacterial enzymes that liquefy gelatin and their antienzymes. P. BERTIAU. Louvain. *Centr. Bakt. Parasitenk., Abt. I* 74, 374-82 (1914).—The method of measuring bacterial action on gelatin which avoids the inconveniences of all others, in B.'s opinion, consists in measuring 1 cc. of a 10% soln. of gelatin into a series of test tubes. To these are added 1 cc. of dilns. of the enzymes in bouillon. After incubating 1 hr. at 37° the tubes are put into the ice-box. The amt. of digestion of the gelatin is meas-

ured by the solidity of the contents of the tubes, using as a control 1 cc. of the gelatin soln. plus 1 cc. of plain bouillon. Very active solns. of bacterial gelatinase can be obtained from bouillon cultures which contain a small amt. of gelatin and are freed of bacteria by filtration. By immunization of rabbits, very strong antienzymes which are specific can be obtained. Bacterial gelatinase is not to be confused with trypsin, as is shown in the expts. with antienzyme.

JULIAN H. LEWIS.

The bacterial action of glycerol on pathogenic bacteria. G. SKEFFERT. *Centr. Bakt. Parasitenk., Abt. I* 74, 644-50(1914).—A series of pathogenic bacteria was inoculated into a number of dilns. of pure glycerol with or without the addition of protein, and kept at different temps. for 45 days. The bactericidal action of glycerol was greatest at 37° and least at 0°. Its action was directly proportional to its conc. The effect of the presence of protein could not be detd. The bacteria studied are arranged in the order of their sensitiveness to glycerol.

JULIAN H. LEWIS.

The formation of hematoxin by cholera vibrios. OTTO LÖWY. Vienna. *Centr. Bakt. Parasitenk., Abt. I* 75, 319-29(1915).—In order to learn whether or not cholera vibrios can produce an hemolysin, a series of expts. was carried out with 103 strains of this organism isolated from stools during the Serb-Bulgarian war. It was found that none of these strains caused the laking of red corpuscles when grown on sheep or goat blood plates, or in broth containing the same kind of blood. They do, however, produce a proteolytic enzyme which decolorizes hemoglobin that has escaped from injured red cells. This enzyme is found in other than cholera vibrios. A centrifuged bouillon culture of the cholera vibrios did not cause hemolysis of washed guinea pig or rabbit corpuscles. It is decided that if a vibrio possesses hemolytic properties, it is not a cholera vibrio.

JULIAN H. LEWIS.

Is silica an indispensable constituent of plant food? MARSHALL LUNDIE. *S. African J. Sci.* 9, No. 10; *Chem. News* 110, 200-2(1914).—Wheat was grown to maturity on a water culture medium containing no silica. Silica is apparently not essential to plant growth but seems to have a protective influence against parasitic fungi (rust).

E. M. FRANKEL.

Notes on plant chemistry. P. Q. KEEGAN. *Chem. News* 110, 211-2(1914); cf. *C. A.* 8, 3667.

E. M. FRANKEL.

D. BOTANY

CARL L. ALSBERG.

Flow of protoplasm. G. LAKON. *Ber. botan. Ges.* 32, 421-9(1914); *Zentr. Biochem. Biophys.* 17, 409-10(1914).—The epidermis cells of onion skins constitute a peculiarly suitable object for the investigation and demonstration of protoplasm flow which appears here as the so-called circulation. It is quite immaterial whether sprouting onions or those freshly gathered or in winter rest are used. Osmotically active solns. promote protoplasm flow in the highest degree; the optimal conc. of such solns. depends on the osmotic pressure which prevails in the cells in question. This flow is entirely independent of any increased vitality of the cells; the phenomenon occurs with the same speed in resting organs as in those which are rapidly growing. Neither is protoplasm flow connected with the migration of material in the cells. Contrary to the case with the epidermis cells of onion skins, the action of salt solns. on the cells of the leaves of *Elodea canadensis* is minimal; a 0.005% H_2SO_4 soln. is, however, an especially suitable medium for producing a certain and lively flow of protoplasm in elodea. H_2SO_4 has no effect on protoplasm flow; simple injury by poisons is not sufficient to set the protoplasm in motion, a more sp. action of the poison being required. Protoplasm flow may be produced in elodea in growing the plants by allowing the tips of the shoots to project from the H_2O into the air.

H. S. PAINE.

Bacillus oxalatigenes N. sp.; is oxaluria of bacterial origin? D. DE SANDRO. *Portici. Il policlino*. 20, 138-44; *Zentr. Biochem. Biophys.* 17, 437(1914).—There was isolated from the feces of a woman a bacterium which produced short, very mobile rods in agar in a few hrs.; these rods showed a light-refracting central point (spore formation) which did not absorb aniline dyes and which gradually became larger and of oval shape. Ca oxalate crystals (the amt. of which gradually increased) were formed after 10-15 days when slices of potatoes with H₂O were inoculated with these bacteria and kept in an incubator. The name "oxalatigenes" is proposed for this bacterium on account of its property of producing oxalic acid. It is possible that this bacterium plays a role in the production of oxaluria. H. S. PAINE.

Protoplasm flow. F. JACOB. *Jena. Inaug. Diss.*, Jena, 1913, 52 pp.; *Zentr. Biochem. Biophys.* 17, 409(1914).—The membranes of the observed plant hairs (*Episcia cupreata*, *Gaura biennis*, *Onosma echinoides*) which exhibit protoplasm flow are very slightly permeable to H₂O and HgCl₂, but extremely permeable to O. When the hairs project from a medium which is impermeable to O, protoplasm flow continues longer than when O is excluded. The plant hairs are also capable of withdrawing from the plant the O which is required for protoplasm flow. A definite relation between O transport and protoplasm flow was not detected in the hairs which were studied; protoplasm flow is, however, distinctly dependent on the presence of O. A decrease in the duration of protoplasm flow was generally observed when inhibition of the latter by substances (paraffin oil, olive oil, etc.) impermeable to O was repeated. After cessation of protoplasm flow the latter responded readily to short aeration. H. S. PAINE.

Study of belladonna. W. UNGER. *Nouveaux remèdes; Giorn. farm. chim.* 62, 409(1913).—Belladonna adapts itself readily to varying environment, but the leaves and flowers are more luxuriant and the content of alkaloids is greater in the case of plants grown in the sun. The resp. contents of alkaloids in the fresh leaves of plants grown in the sun and those grown in the shade were as 518 to 331. H. S. P.

Some effects of the brown-rot fungus upon the composition of the peach. L. A. HAWKINS. *Am. J. Botany* 2, 71(1915).—In peaches rotted by the brown rot fungus, *Sclerotinia cinerea*, the pentosan content remains practically the same, the acid content is increased and the amt. of alc.-insol. substance which reduces Fehling soln. when hydrolyzed with dil. HCl decreases. The total sugar content decreases, while the sucrose practically disappears. J. J. SKINNER.

Normal and abnormal permeability. W. J. V. OSTERHOUT. *Am. J. Botany* 2, 93-4(1915).—O. answers the criticism of Höber on his investigations on the permeability of protoplasm, and states that he does not claim that the penetration in pure NaCl represents the normal condition. It is emphasized that in sea H₂O the permeability of *Laminaria* is much less than in pure NaCl, for other salts are present, especially CaCl₂, to antagonize the action of NaCl. Claim is made that there is no justice in speaking of normal impermeability of protoplasm to salts unless it is assumed to mean a rate of penetration lower than that found in dead cells. J. J. SKINNER.

Glucoside in the sunflower (ZANOTTI) 10.

E. NUTRITION.

PHILIP B. HAWK.

NORMAL.

Combustion processes in the organism. R. HÖBER. *Kiel. Z. Electrochem.* 19, 738-46(1914).—An address. E. M. FRANKEL.

Dextrinized malt in infant-feeding. THEODORE LE BOUTILLIER. *Am. J. Pharm.* 87, 162-3(1915).—A brief preliminary report of the result of adding dextrinized malt to milk mixts. in infant feeding, replacing the lactose formerly used. The general con-

clusions reached as a result of expts. carried on during the last 2 years are that malt sugar has marked advantage over either milk sugar or cane sugar in the feeding of infants unable to assimilate or thoroughly digest the milk sugar or cane sugar, and in the feeding of infants suffering from diarrhea.

W. G. GARSSLER.

The metabolism of vegetarians as compared with the metabolism of non-vegetarians of like weight and height. FRANCIS G. BENEDICT AND PAUL ROTH. Carnegie Inst. *J. Biol. Chem.* 20, 231-41(1915); *Proc. Nat. Acad. Sci.* 1, 100-1(1915).—Observations were made for the most part on members of the staff of the Battle Creek Sanitarium, Mich. The unit respiration app. was used and precautions were taken as to muscular repose, absence of food in the stomach and a non-febrile temp. Male vegetarians have a slightly less metabolism per kg. of body wt. and per sq. m. of body surface than have individuals of the same wt. and height on a mixed diet. The difference is very small and disappears altogether with female vegetarians. The basal gaseous metabolism is apparently not affected by living upon a vegetarian diet for a longer or shorter period. The av. respiratory quotient of 22 vegetarians was 0.83 compared with a quotient of 0.81 with 132 individuals on a mixed diet, indicating that vegetarians in the post-absorptive condition do not have available any larger proportions of glycogen than have non-vegetarians.

A. P. LOTHROP.

The metabolism of athletes as compared with normal individuals of similar height and weight. FRANCIS G. BENEDICT AND H. M. SMITH. Carnegie Inst. and Syracuse Univ. *J. Biol. Chem.* 20, 243-51(1915); *Proc. Nat. Acad. Sci.* 1, 102-3(1915).—The subjects were selected from among the students of Syracuse Univ. who were actively engaged in athletic sports from 1 to 3 hrs. daily and were distinctively trained athletes. The values for control individuals of approx. the same wt. and height were taken from a table published in a recent paper (cf. *C. A.* 8, 3318). None of the athletes showed a lower metabolism than the non-athletes and a very large proportion showed a considerable increase. The authors conclude "that the greatly increased proportion of active protoplasmic tissue present in the trained, hardened athlete is alone sufficient to account for the increase in the metabolism, and that this is not only an absolute increase, but from the nature of the comparison the metabolism is likewise increased per kg. of body wt. and per sq. m. of body surface. It would thus appear that the increase in the metabolism noted with athletes points strongly towards the earlier conception that the katabolism of the body is proportional not to the surface of the body, but to the active mass of protoplasmic tissue."

A. P. LOTHROP.

A comparison of the basal metabolism of normal men and women. F. G. BENEDICT AND L. E. EMMES. Carnegie Inst. *J. Biol. Chem.* 20, 253-62(1915); *Proc. Nat. Acad. Sci.* 1, 104-5(1915).—The values obtained in a study of the metabolism of 89 men and 68 women (cf. *C. A.* 8, 3318) are discussed and the metabolism of men and women are compared. The metabolism of men is about 5-6% greater than that of women of similar wt. and height, the difference being due to the fact that women probably have a larger proportion of subcutaneous fat, man therefore having a larger amt. of active protoplasmic tissue (cf. preceding abstr.). Most of the expts. were made with individuals between 20 and 30 years of age and hence no individual case can in any way affect the general deductions.

A. P. LOTHROP.

Factors affecting basal metabolism. FRANCIS G. BENEDICT. Carnegie Inst. *J. Biol. Chem.* 20, 263-99(1915); *Proc. Nat. Acad. Sci.* 1, 105-9(1915).—Body wt. affects the basal metabolism, larger bodies giving off more heat than smaller ones but there is no relationship between the total body wt. and the total heat production. Heat production is not detd. by body surface and a very large amt. of evidence points to the fact that the variations between metabolism and body surface are not due to errors in the formulas used for computing body surface. The proportion of inert

body fat and active protoplasmic tissue has a great influence as is indicated by the greater metabolism shown by athletes, taller individuals and by men as compared with women, the latter having a greater proportion of inert body fat. Another important factor is the stimulus to cellular activity which is influenced by age, sleep, diurnal variation, prolonged fasting, character of the preceding diet and the after-effects of severe muscular work. "It is clear that the basal metabolism of an individual is a function, first, of the total mass of active protoplasmic tissue, and, second, of the stimulus to cellular activity existing at the time the measurement of the metabolism is made. Apparently at present no law can be laid down that will cover both of these important variables in the basal metabolism of an individual."

A. P. LOTHROP.

The metabolic relationship of the proteins to glucose. N. W. JANNEY. Montefiore Home, N. Y. *J. Biol. Chem.* 20, 321-50(1915).—Expts. were performed using hardy mature dogs whose general tone remained excellent during the entire exptl. period. The animals were phlorhizinized and, after fasting 2 days, were fed diets containing ovalbumin, human serum albumin, gelatin, fibrin, edestin, gliadin and zein, all specially purified. Glucose and N were detd. hourly. Under optimal conditions the animal and vegetable proteins are metabolized at the same rate. All the extra glucose and N are eliminated by the 9th hour after ingestion. "Each protein produces a definite amt. of glucose in the phlorhizinized organism. The various yields represent 50-80% by wt. of the protein administered. These yields approximate the ratios which the glucogenetic amino acids of the proteins in each case bear to the total amino acids, as actually detd. by hydrolysis. From the standpoint of amt. at least, dextrose must be considered one of the chief intermediary products of protein metabolism, and of certain proteins the most important. The amts. of glucose yielded by the metabolism of proteins stand in no obvious relationship to their ability to promote growth." A. P. L.

The comparative nutritive value of certain proteins in growth, and the problem of the protein minimum. THOMAS B. OSBORNE AND LAFAYETTE B. MENDEL. Conn. Agr. Expt. Sta. and Yale Univ. *J. Biol. Chem.* 20, 351-78(1915).—Normal growth is completed satisfactorily on a diet containing a minimum of 12% casein. The addition of isolated cystine to the food containing 9% casein, without any other supplement, renders the ration decidedly more adequate for growth. With 9% edestin, the addition of lysine causes some improvement in growth, although not as marked as in the case of the cystine-casein mixt. Lactalbumin is much more efficient in promoting growth, for a normal rate is maintained on a diet containing only 9% lactalbumin, due probably to a more perfect balance in the proportions of the essential amino-acid groups it contains. "The economy of the different proteins as nutrients in growth appears to be closely bound up with their amino acid make-up." Failure to grow cannot usually be attributed to a lack of energy in the diet. To ascertain the protein minimum, exactly equiv. amts. of energy in the form of foods with unlike proportions of individual proteins should be fed, the minimum for growth or the limit of intake for maintenance being detd. by observing failure to make proper gains or to maintain wt. A. P. L.

The influence of the plane of protein intake on growth. E. V. MCCOLLUM AND MARGUERITE DAVIS. Univ. Wisconsin. *J. Biol. Chem.* 20, 415-28(1915); cf. C. A. 9, 642.—Rats were fed a mixt. of skim-milk powder, dextrin and butter-fat, the protein content of the ration varying between 2 and 10%. Other rations used for comparison contained 6% wheat protein, 4% wheat embryo protein or 2.45% egg protein. The lowest plane of protein intake derived from milk which can maintain young rats without loss of wt. is 3% of the food mixt. As the protein is raised between 3 and 8%, there is a progressive increase in the rate of growth. For a time rats may grow at about half the normal rate on a diet containing 6% wheat kernal protein but 2.45% of egg protein is not sufficient for maintenance without loss of wt. For a period of 6 weeks a ration

containing but 4% wheat embryo protein compares favorably with a similar plane of milk powder protein intake and is somewhat better than 6% of protein from the entire wheat kernel.

A. P. LOTHEP.

Origin of cholesterol. I, II. P. DEZANI. Turin. *Giorn. accad. med. Torino* 1914, 149-58; *Zentr. Biochem. Biophys.* 17, 416.—I. D. attempted to ascertain whether animals possess the power to produce the cholesterol essential to their development in case this compd. is excluded from their food. The cholesterol content of a number of white mice was detd., while other mice of the same litter were fed a mixt. of corn meal and casein which had been extd. for 6 days with alc. and Et_2O . These animals wasted away rapidly and all died within a period of 23 days. Detn. of cholesterol in the entire bodies of these animals, as well as in the feces, showed that no synthesis of cholesterol had taken place. D. was also able to det. that these mice had not utilized cholesterol in their metabolism. II. In a 2nd series of expts. mice were kept alive by gradually adding to the food (which had been extd. with alc. and Et_2O) the substances (salts, lecithin, fat) which are important in animal metabolism and which had been removed from the food by the original treatment. These animals developed in a perfectly normal manner; they were killed after 23 days and the cholesterol content of the entire body and feces was detd. The control animals which were killed at the same time showed an av. content of 0.182 g. cholesterol, while the mean cholesterol content of the exptl. animals was 0.242 g., thus indicating that a synthesis of cholesterol had occurred. Cf. C. A. 9, 1338.

H. S. PAINE.

Metabolism of white races living in the tropics. I. Protein metabolism. W. J. YOUNG. Australian Inst. Tropical Med. *Ann. Trop. Med.* 9, 91-108(1915).—No marked variations from the averages obtained in temperate climates were found. In every case the neutral S was high but whether this is due to an increased metabolism or not, only further expt. will show.

C. J. WEST.

Protein requirements under different conditions. The problem of the nitrogen minimum. EMIL ABDERHALDEN, GOTTFRIED EWALD, ANDOR FODOR AND CARL ROSE. Univ. Halle. *Arch. ges. Physiol.* 160, 511-21(1915).—The N minimum depends upon the compn. of the food, especially upon the content of N-free organic food. Expts. are reported dealing with diets of potatoes and Swedish bread. During the potato period an addition of 4.5 g. N is sufficient to maintain the N equil. 4.37 g. gave a slightly negative value while 4.98 g. gave a positive balance. Using Swedish biscuit 5.9 g. N were necessary to maintain an equil. Thus under these conditions the minimum is around 4 g. From a practical standpoint this value must be such that it will furnish the cells of the tissues with sufficient N-containing substances to enable them to perform their functions. During the expt. the uric acid and purine N excretion were const. Creatine was not excreted. The amt. of creatinine was const. During the bread diet the ammonia N was markedly increased.

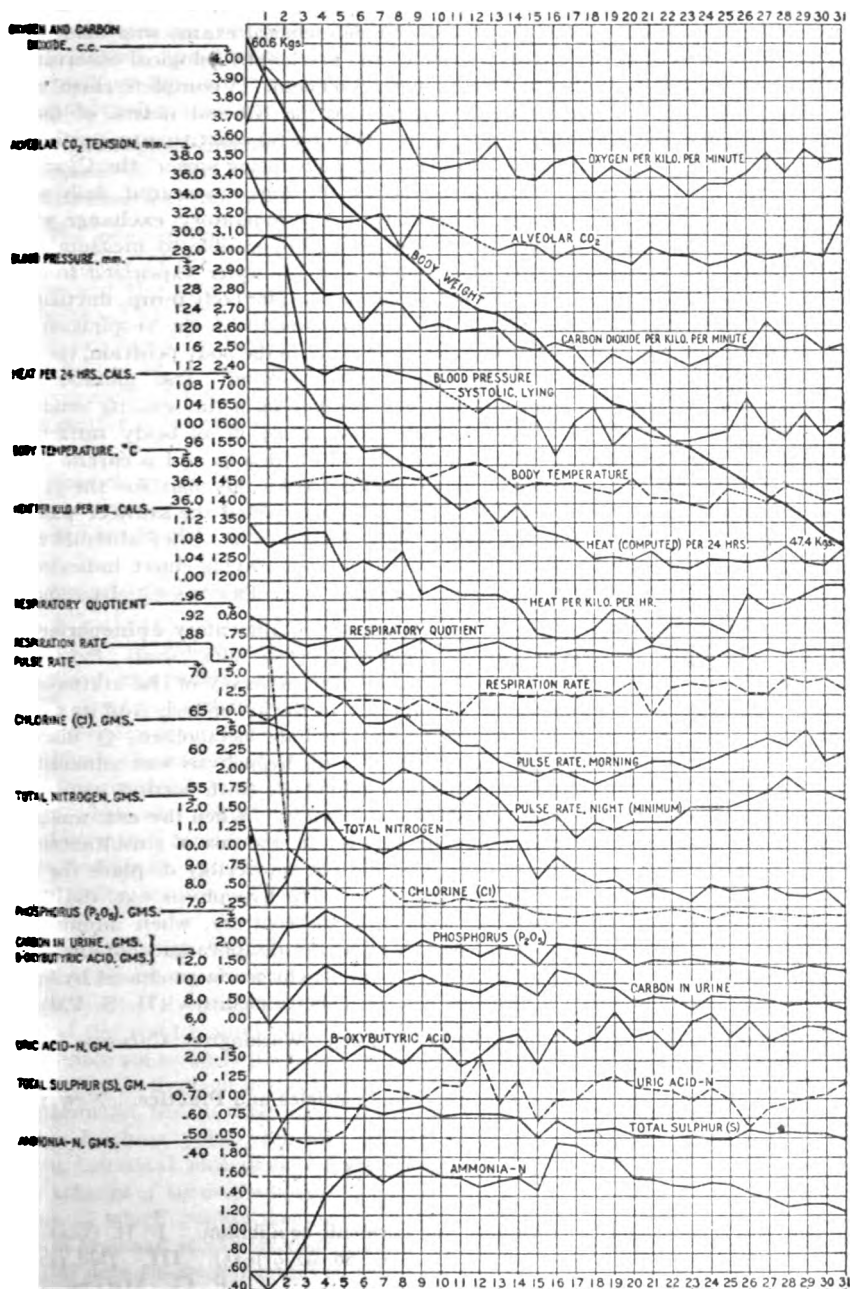
C. J. WEST.

ABNORMAL.

Chemical and physiological studies of a man fasting thirty-one days. FRANCIS G. BENEDICT. Nutrition Lab., Carnegie Inst. Washington, *Publ. No.* 203, 416 pp. (1915).—Attention is called to the important relationship between numerous diseases and the various stages of nutrition and the fact that many pathological cases border on complete or nearly complete inanition, making a study of the physiology and chemistry of normal fasting of special importance. An extensive study of a Maltese was made. A preliminary period of 3 days with food, was followed by 31 days of complete abstinence from food and drink other than distd. water, and finally a 3-day realimentation period. The expt. was very successful in all except the last period, when, due to the fact that the subject insisted on breaking the fast by the consumption of excessive

METABOLISM CHART OF A MAN FASTING 31 DAYS

APRIL 14 - MAY 15, 1912



amts. of acid fruit juices, intestinal disorders developed. Measurements were made of the body wt., insensible perspiration, rectal temp. fluctuations, pulse-rate, blood pressure, and the morphology of the blood. The mechanics of respiration and the alveolar air tension were also observed. A complete clinical exam. was made every 2nd day with a record of subjective impressions and psycho-physiological observations. The intestinal flora were studied and the skin excretion detd. A complete chem. exam. was also made of the urine, including the partition of the Na and detns. of the Cl, P, S, total acidity, and β -hydroxybutyric acid. The mineral constituents, particularly the Ca, Mg, Na and K excretion, were studied and the reducing power, the C, and the energy of the urine were detd. Throughout the fast the urine was examd. daily with a microscope and tested for albumin. The study of the respiratory exchange was of special significance. In the respiration calorimeter it was possible to measure simultaneously the CO_2 excretion, the O consumption, and the water vaporized from the lungs and skin. Direct heat measurements, when corrected for body temp. fluctuations, gave the exact heat production. From the results obtained with the respiration app. B. studied the effect of various factors, such as changes in the body position, the work of writing, and breathing O-rich atms. upon the metabolism. The metabolism of the subject during sleep was compared with his metabolism in the waking condition. The energy transformation per kg. of body wt. and per sq. m. of body surface was computed. From the numerous respiration expts. with both app. and a careful record of daily activity, the total balance of income and outgo for this man for the 31 days could be computed with great accuracy. For the whole period the subject was able to exist in a fairly normal mental condition. It is impossible in a brief abstract to attempt an adequate summary of the results but the accompanying chart indicates the trend of some of the most important factors measured. FRANCIS G. BENEDICT.

Influence of the posterior lobe of the hypophysis on alimentary epinephrine and diabetes glucosuria. GIOVANNI QUADRI. Palermo. *Ann. clin. med. Palermo* 5, No. 2; *Zentr. Biochem. Biophys.* 17, 638-9(1915).—After a survey of the status of the present knowledge of the physiology and pathology of the hypophysis and its relation to the suprarenals with especial reference to carbohydrate metabolism, Q. discusses his own investigations. Ext. of the posterior lobe of the hypophysis was administered alone, as well as with epinephrine, to numerous individuals (with normal metabolism and free from fever) suffering from various chronic diseases. When the ext. was given in therapeutic doses, no glucosuria was produced, even in the case of simultaneous ingestion of an excess of carbohydrates; the prep. did not appreciably displace the limit of tolerance of the organism to the ingested sugar. The hypophysis ext. did not in the least intensify epinephrine glucosuria, but, on the contrary, when administered together with epinephrine, had a tendency to cause the disappearance of the glucosuria (which was produced solely by the epinephrine); glucosuria produced by epinephrine was greatly diminished in a severe case of diabetes mellitus. H. S. PAINE.

BENEDICT, F. G.: *A Study of Prolonged Fasting*. Washington: Carnegie Institution. 416 pp. \$4.00.

WACHENHEIM, F. L.: *Infant Feeding. Its Principles and Practice*. New York: Lea & Febiger. 340 pp. \$2.00.

F. PHYSIOLOGY.

ANDREW HUNTER.

Ductless glands, internal secretions, and hormonal equilibrium. F. H. GARRISON. I. *Pop. Sci. Monthly* 85, 531-40(1914). II. *Ibid* 86, 92-9(1915). III. *Ibid* 142-52. —An historical review. F. G. MILLER, JR.

Relation between the calcium content of the bones and teeth of children. R. SIMONINI. Bologna. *Soc. med. chir.*, session June 11, 1913; *Zentr. Biochem. Biophys.* 17, 636-7 (1915).—S. attempted to det. whether there is any relation between the Ca content of the jaw bones and the teeth of children. The question was studied under physiol. and pathol. (rachitis) conditions and S. concludes that such a relation does exist, so that a reduced content of Ca in the jaw bones is usually coincident with delayed development and faulty structure of the teeth. H. S. PAINE.

Physiological-chemical problems in ophthalmology. A. JESS. Giessen. *Zentr. ges. Ophth.* 1, 209; *Zentr. Biochem. Biophys.* 17, 648 (1915).—J. reviews the recent work dealing with the physiol. chemistry of the crystalline lens. H. S. PAINE.

The constitution of milk. L. LINDET. *J. agr. prat.* 28, 277-8, 294-5 (1915).—In a study of the secretion of milk by the cow it is pointed out that the sum of the lactose and the salts of the milk is const. and in osmotic equil. with the sol. elements of the blood of the cow. The function of the lactose and sol. salts is to dissolve the casein produced by the cow, forming a colloidal suspension which coagulates under the influence of pressure or of acid fermentation. The ash of the casein was found to be composed of P_2O_5 of organic origin and $CaH_4(PO_4)_2$ which are sol. in H_2O . The fatty matter is in emulsion in the form of minute globules in the serum, sol. in the curd. J. J. SKINNER.

Physiology of the thyroid gland. E. P. HAÜSSLER. *Schweiz. Apoth. Ztg.* 53, 32-7, 46-9 (1915).—A summary of the main known facts and theories, and the results of recent work of F. Blum and co-workers. Cf. *C. A.* 8, 145, 3570, 3587, 3588.

S. WALDBOTT.

Composition of flesh with different diets. G. DIESSELHORST. *Arch. ges. Physiol.* 160, 522-4 (1915); cf. *C. A.* 5, 3600.—Because of exptl. difficulties, the earlier conclusions are probably incorrect and worthless. C. J. WEST.

Blood characters: their variability and interdependence. W. F. HARVEY AND H. W. ACTON. *Indian J. Med. Research* 2, 721-32 (1915).—There is little variation in the resistance of red blood corpuscles to the action of hypotonic solns. either among individuals themselves or as between individuals on their 1st arrival at a high altitude and after residence there for 14 days. The same applies to the Cl content of the blood serum. No. and vol. of red blood corpuscles, sp. gr., and hemoglobin content of the blood vary to a considerable extent in conditions of apparent health. These are greater in the Indian than in the European. The correlation between such characters as mentioned above is close. There is an increase in these characters with residence at a high altitude. C. J. WEST.

Arginase. II. The distribution of arginase in the organism and in the class vertebrates. ANTONIO CLEMENTI. Univ. Heidelberg. *Atti accad. Lincei* 23, II, 612-6 (1914).—By applying the method described in *C. A.* 9, 1492, C. verified in general the results obtained by Kossel and Dakin by the $AgNO_3$ pptn. method. In the vertebrate series arginase occurs in the livers of mammalia, amphibia and fish but it is absent in livers of birds and most reptiles. Arginase is also present in the kidneys of mammalia, but in these organs the arginase is not detected by H_2O extn.; it is sepd. with a Büchner press. Likewise arginase was found to be absent in aq. ext. of the spleen, intestinal mucosa and muscles of mammalia, birds, amphibia, reptiles and fish. The kidneys of birds like livers of mammalia, etc., show arginase in the aq. ext. of the tissue, in which respect they are exceptional. The following relations as to the function of arginase in the organism are pointed out: (1) The absence of arginase in the liver of only those vertebrates in which the liver elaborates uric acid in place of urea (birds and reptiles); and the presence of it in all of the remaining vertebrates the livers

of which elaborate urea (mammalia, amphibia and fish). (2) The presence of arginase in the kidneys of mammalia but the impossibility of obtaining it by simple aq. extn. of the kidney tissue of all classes of vertebrates (birds excepted). The above observations prove the effective participation of arginase in the liver in the formation of urea. Some other deductions are given.

E. J. WITZEMANN.

Reply to M. Cloetta and E. Anderes "do the lungs possess vasomotors?" ERNST WEBER. Berlin. *Arch. Physiol.* 1914, 533-52; cf. C. A. 8, 3471. C. J. WEST.

G. PATHOLOGY.

H. GIDEON WELLS.

The influence of salt-concentration on hemolysis. W. W. C. TOPLEY. London. *Proc. Roy. Soc. London (B)* 88, 396-408(1915).—In hemolysis of sheep corpuscles by guinea-pig complement it is found that (a) the presence of an excess of an electrolyte (NaCl) above the normal limit in a hemolytic mixt. prevents the combination of the complement with the red-cell-antibody complex; (b) if the conc. of the antibody be markedly increased it is possible, up to a certain point, to counteract the effect of the increased salt conc.; (c) if the salt conc. be decreased, a decreasing conc. of antibody serves to produce the union of red cells and complement; (d) in an almost completely salt-free medium the combination occurs in the complete absence of antibody.

A. T. CAMERON.

The cerebrospinal fluid in pellagra. W. F. LORENZ. *Pub. Health Reports* 29, 2360-3(1914).—Pressure estns. of the spinal fluid are of doubtful value since very high tension can be obtained in various meningitides, and for this reason an app. is not needed. A lymphocytosis of the cerebrospinal fluid does not occur in uncomplicated pellagra. Globulin excess of the spinal fluid is only occasionally observed. Lange's colloidal AuCl₃ test is uniformly negative in pellagra. The Wassermann is negative except in moribund cases which gave weakly positive reactions with blood serum. The spinal-fluid findings seem inconsistent with the idea that pellagra is an infectious disease of the central nervous system.

J. GAUB.

Further researches on chronic alcoholism and anaphylaxis. E. MANOILOV. *Centr. Bakt. Parasitenk., Abt. I* 73, 314-6(1914).—The author, with Zboromirsky, had previously shown that the serum from a chronic alcoholic will, when injected intravenously or intraperitoneally, make a rabbit or guinea pig sensitive 48 hrs. later to a dose of alc. (given intravenously) that causes no symptoms in a normal animal. In addition, M. gave rabbits and guinea pigs repeated intravenous injections of alc. Inactivated serum from these animals injected into normal ones, made them hypersensitive to a small dose of alc. injected 48 hrs. later intravenously. The symptoms produced in the hypersensitive animals were similar to those of anaphylaxis.

J. H. LEWIS.

Immunization with tetanus toxin-antitoxin mixtures. M. v. EISLER AND E. LOWENSTEIN. *Centr. Bakt. Parasitenk., Abt. I* 75, 348-64(1915).—Guinea pigs given a single injection of tetanus toxin neutralized with antitoxin exhibit no immunity, but if the same mixt. is given the 2nd time, 10-50 days after the 1st injection, they will form within 15-25 days a large amt. of antibody in the circulation. In rabbits, however, a single injection of neutralized toxin did produce immunity. The cells of the guinea-pig tissues *in vitro* are not able to break up the union between toxin and antitoxin, but the liver cells of the rabbit are. The injection of rabbit liver into a guinea pig does not confer upon the latter the power of forming antitoxin after a single injection of the neutralized toxin. Kaolin, like rabbit liver cells, can break up the union between toxin and antitoxin.

JULIAN H. LEWIS.

The non-protein nitrogenous compounds of the blood in nephritis, with special reference to creatinine and uric acid. VICTOR C. MYERS AND MORRIS S. FINE. N.

Y. Post-Graduate Med. School. *J. Biol. Chem.* 20, 391-402(1915).—Concs. of uric acid of 27 mg. per 100 cc. of blood and of creatinine of 33.3 mg. were encountered in cases of nephritis. The retention of these substances is not in itself the cause of uremic symptoms as, in a case of HgCl_2 poisoning, uremic symptoms did not appear until more than a week after the max. concs. of uric acid and creatinine had been observed. A marked rise in uric acid was accompanied by an increase in creatine, pointing to increased tissue destruction as the source of the uric acid. In the spinal fluid the amts. of creatine and uric acid were very low or absent while the conc. of urea and creatinine approached that found in the other tissues in uremia. Some parallelism appeared to exist between the accumulation of urea and creatinine and between uric acid and creatine. In 6 cases of gout the uric acid in 100 cc. of blood ranged from 3.8 to 5.8 mg., values very much lower than found in cases of uremia. ALFRED P. LOTHROP.

Some observations on hypersensitiveness to pneumococcus protein, with special reference to its relation to immunity. PAUL W. CLOUGH. Johns Hopkins Univ. *Bull. Johns Hopkins Hosp.* 26, 37-44(1915).—"Protein" exts., obtained from pneumococci by a modification of Besredka's method, sensitized normal guinea pigs and specifically intoxicated suitably sensitized guinea pigs but would not uniformly cause acute fatal reactions in sensitized animals. After extn., heating for 1 hr. at 60° greatly reduced the toxicity of the ext. due to autolysis during extn. A very slight grade of immunity to infection by living virulent cultures appeared inconstantly in guinea pigs sensitized with exts. of pneumococci and animals highly immunized by repeated subcutaneous injections of living virulent cultures showed also a marked degree of hypersensitiveness to pneumococcus exts. In patients with pneumonia a condition of hypersensitiveness to pneumococcus "protein" could not be demonstrated by local application of protein soln. to the conjunctiva or by intracutaneous injections.

A. P. LOTHROP.

Factors of coagulation in the experimental aplastic anemia of benzene poisoning with special reference to the origin of prothrombin. S. H. HURWITZ AND C. K. DRINKER. Boston. *J. Exp. Med.* 21, 401-24(1915).—Subcutaneous injections of C_6H_6 in rabbits produce marked destructive changes in the hematopoietic organs, especially in the myeloid tissue. C_6H_6 poisoning registers a change not only in the formed elements of the blood but also in the factors of coagulation. The circulating prothrombin is considerably reduced in amt. and in most instances the animals show aplasia of the bone marrow. The extreme aplasia of the marrow without a fatal diminution in the circulating prothrombin suggests that either other tissues and organs in addition to the bone marrow are concerned in the prothrombin formation or a minimum amt. of myeloid tissue suffices to maintain the quant. of prothrombin above a dangerous level. The myeloid tissue plays no part in the production of antithrombin. Bone marrow activity is not essential for the production of fibrinogen.

G. M. MEYER.

Studies on immunity. II. Nature of anaphylatoxin. J. BRONFENBRENNER. Pittsburg. *J. Exp. Med.* 21, 480-92(1915); cf. *C. A.* 9, 920.—The union of fresh serum of pregnant or immunized animals with the corresponding boiled protein (substratum) is accompanied by the formation of poisonous substances. The poison originates from the serum as a result of autodigestion and not from the substratum. The process of autodigestion may be detd. by the specific or non-specific removal of the antitypsin of the serum. The poisons originating from the serum are toxic only for homologous animals. The autodigestion of the serum, if allowed to proceed far enough, may go beyond the toxic stage. The biological properties of these poisons indicate their close similarity to the anaphylatoxin and suggest that the anaphylatoxin of Friedberger is the product of the autodigestion of serum and not of the protein outside of the serum.

G. M. MEYER.

Notes of further observations upon dyspnea and its relation to blood reaction. THOMAS LEWIS AND JOSEPH BANCROFT. Cambridge. *Quart. J. Med.* 8, 97-113 (1915).—It seems possible that many cases of spasmodic dyspnea may result from the sudden flooding of the system with acid products. JOHN T. MYERS.

The rationale or modus operandi of the Wassermann reaction and Abderhalden test. J. E. R. McDONAGH. *Quart. J. Med.* 8, 130-55(1915).—When once a serum has had its adsorption capacity increased, as occurs to the lipoid globulin mol. in a syphilitic case, it is always liable to exhibit the same phenomenon when given the opportunity. Several factors may be responsible for a positive reaction: an excess of lipoid over the protein, a breaking down of the huge lipoid mol. into several smaller ones, and an excess of fatty acids or amino acids. These causes cannot be prevented or differentiated; therefore a positive reaction is not necessarily indicative of syphilis. Since a free fatty acid or a free amino group can inhibit a positive reaction, a negative reaction cannot exclude syphilis. Once the body has had to form a protective substance it goes on forming it after the attaching force has vanished. In the case of syphilis the protective substances are lipoid-globulin complexes which emanate from the lymphocytes. Their production may go on at an ever-increasing rate until the power of the lymphocytes is overtaxed. No relation exists between the positivity of reaction and the oxidase content. In the Abderhalden test it is the oxidase and not the lipoid globulin itself which is responsible for the breaking down of the organ, but the latter has the specific stereochemical configuration. The oxidase is non-specific. There is no evidence that the breaking down of the organ is proteolytic or peptolytic. It may be that all enzymes are oxidases and that the differences in action rest in the stereochemical molecular configuration of the radicals to which the oxidases are attached by means of the ions. Any modification of method which relies on the patient's own serum must be untrustworthy. A standardized complement must be used. Cholesterolized antigen should not be used since any attempt at sharpening the reaction will increase the % of positive results with normal serum. JOHN T. MYERS.

Quincke's disease and pregnancy. G. BALLERINI. Parma. *Ann. ostetr.* 1913, 266-80; *Zentr. Biochem. Biophys.* 17, 426-7(1914).—In the observed cases of angioneurotic, transitory edema (Quincke's disease) during pregnancy G. concludes that the angioneurotic disturbances are an expression of a hyperfunction of the thyroid with overproduction of stimulative hormones; in 1 case the angioneurotic symptoms and cardiac neurosis disappeared after thyroïdin treatment. The Abderhalden reaction indicated the presence of enzymes with a sp. cleaving action on thyroid albumin.

H. S. PAINE.

Remarkable differences in the appearance of anaphylactic inflammation of the cornea in various animals. KÖLLNER. Würzburg. *Arch. Augenheilk.* 77, 289; *Zentr. Biochem. Biophys.* 17, 662-3(1915).—Exptl. anaphylactic corneitis which occurs so readily in rabbits is not produced in all animals in the same manner. Dogs were the only exptl. animals employed which regularly exhibited corneitis as intense or even more intense than that shown by rabbits after injection of horse, cattle and rabbit sera and egg albumen between the corneal lamellae. Guinea pigs, cats and monkeys either showed no atypical changes at all or at most only isolated changes of such a character that it was impossible to det. definitely whether they represented a local hypersensitiveness reaction. At any rate, the latter did not vary in a parallel manner with the degree of the anaphylactic general reaction which was different for the various animals.

H. S. PAINE.

Bence-Jones albuminuria. A. KIMMERLE, O. SCHUMM AND E. FRAENKEL. Hamburg. *Eppendorfer Festschr.* 1914; *Zentr. Biochem. Biophys.* 17, 436(1914).—In the case examd. the urine contd. 2.5-3.5 pts. per mill. of albumin, most of which was due

to the Bence-Jones protein. The urine at times contained some globulin and also traces of nuclealbumin, but no histone. A carefully executed detn. of the coagulation point is very important for the detection of the Bence-Jones protein in urine; the latter only varied to a relatively slight extent during a month period of observation. Pathol.-anatomical investigation indicated a combination of cancerous affection of the liver with extended myelomatosis of the skeleton to which excretion of albumin is to be referred.

H. S. PAINE.

Cholesterol in blood during pregnancy. M. HUFFMANN. *Zentr. Gyn.* 39, No. 3(1915); *J. Am. Med. Assoc.* 64, 865.—The cholesterol content of the blood gradually increases during gestation, reaching its highest point in the last months, then drops to normal in 8 or 10 days, irrespective of lactation.

L. W. RIGGS.

Nature of the idiosyncrasy to egg protein in human beings. Preliminary note. JACOB BRONFENBRENNER, *et al.* Pittsburgh. *J. Am. Med. Assoc.* 64, 1306-7(1915); *cl. C. A.* 9, 920.—Freshly drawn serum of a patient who was subject to asthmatic and severe gastrointestinal disturbances following the ingestion of egg protein, drawn shortly after an attack, was tested by the Abderhalden method with coagulated egg white as substratum. The result showed beyond doubt that the patient's blood contained specific antibody against the egg protein.

L. W. RIGGS.

Gallstones result of transient thickening of the bile. T. ROVSING. *Hospitalstidende* 58, No. 11(1915); *J. Am. Med. Assoc.* 64, 1460.—Bile, like urine, may become abnormally conc. during the course of a febrile disease. Chem. exam. of gallstones from 200 cases showed that freshly deposited stones and all nuclei of gallstones consisted of bile pigment and Ca. The bacteriological exam. of 320 removed gall bladders showed 54% to be entirely sterile, contrary to Naunyn's theory that gallstones are deposited in consequence of an infectious process.

L. W. RIGGS.

The cerebrospinal liquid in tetanus. C. FERRIER. *J. pharm. chim.* 11, 21-2 (1915).—In each of 6 cases of tetanus some cerebrospinal liquid was withdrawn before injection of serum. The reaction was slightly alk. Exam. showed absence of bacteria and of leucocytes, but excessive amts. of dextrose (0.7-0.93 g. per l.) and urea (1.000-1.350 g. per l.), also NaCl (6.6-7.5 g. per l.) and traces of globulins. S. WALDBOTT.

Pathogenesis of diabetes mellitus. A. MASSAGLIA. Univ. Modena. *Centr. allgem. Path.* 21, 65-72(1915).—The function of the pancreas in carbohydrate metabolism is regulated by several other organs, and diabetes may depend on hypofunction of 2 or more organs in each of which taken alone lesions are not found of sufficient degree to account for the diabetes. The spleen is one of the organs producing an internal secretion that acts on the pancreas. Injury to the carotid glands may cause glucosuria if there is hypofunction of the pancreas and other glands. H. G. W.

Passive anaphylaxis and its serological estimation for determining the value of immune sera. MINORU TANAKA. Osaka, Japan. *Z. Immunität.* 23, 389-401(1915).—By injecting antibacterial sera into guinea pigs the animals are made passively anaphylactic to the specific bacteria, which is manifested by a typical fall in temp. after injection of a small amt. of bacterial suspension (0.01 cc.) and typical anaphylactic death after 0.5 cc. It is suggested that the degree of passive sensitization may be found of use in estg. the activity of antibacterial sera.

H. G. W.

The proteolytic power of the blood in anaphylaxis. EDGARD ZUNZ AND PAUL GRÖRGY. Univ. Brussels. *Z. Immunität.* 23, 402-25(1915).—After an intravenous sensitizing dose of ox serum into the dog there appears a specific proteolytic power of the dog blood for ox serum, which can be demonstrated by van Slyke's method for detg. free amino N. This property appears between the 5th and 11th days, reaching its max. after 15 days, and coincides with the appearance of anaphylactic sensitiza-

tion. During anaphylactic shock the proteolytic power disappears, but 4 to 10 days later it is stronger than before. The blood plasma of a sensitized dog shows no demonstrable increase in amino acids, but the uncoagulable blood of a dog dead from anaphylactic shock does contain an excess of amino N. H. G. W.

The gold reaction in the cerebrospinal fluid. WILHELM SPÄT. Kladno. *Z. Immunität.* 23, 426-42(1915).—The gold reaction of Zsigmondy is strongest and most characteristic in paresis and tabes, less constant but characteristic in lues and irregular and not to be interpreted in meningitis. Occasionally positive reactions are observed even in normal fluids. The gold reaction depends upon a reaction on the luetic antibody, which is strongest in paresis, nearly or quite as strong in tabes, and weakest in fresh lues. The positive reactions of normal or meningitis fluids are caused by variations in the protein content. The fact that the color change or pptn. of the Au is usually most marked in high dilns. corresponds to the reaction optimum conc. in immune reactions. The influence of heat on the fluid or the Au indicates that this reaction corresponds to an immune reaction with an inorganic colloid as antigen. H. G. W.

Comparison of the antibody production by antigens prepared by different methods. H. REITER AND S. SILBERSTEIN. Univ. Königsberg. *Z. Immunität.* 23, 443-72 (1915).—Various bacteria killed by different methods are used as antigens, and the alterations in the agglutinin and bacteriotropinogen groups were found not to be affected in parallel degree, the latter being the more resistant. Killing by CHCl_3 had less deleterious effect than killing by 60° or phenol, the latter being more injurious than 60° ; ether came between CHCl_3 and heat; formaldehyde gas had less effect than CHCl_3 , and ozone is nearly as good. Antiformin destroys practically all the agglutinin, but part of the tropinogen remains. H_2O_2 is more injurious than heat, and lactic acid gives variable results. H. G. W.

The peptolytic enzymes in the urine of rabbits after burning or photodynamic injury. HERMANN PFEIFFER. Univ. Graz. *Z. Immunität.* 23, 473-514(1915).—The most constant symptom of burning or photodynamic injury in rabbits is the presence in the blood stream of an enzyme that splits glycyiltrypophan, which is also excreted in the urine. It is present in cases that recover, but less in amt. than after fatal injury. It does not come exclusively from the hemolysis. Sera of burned rabbits kept 2 hrs. at 56° show a pptn. which is approx. parallel to the amt. of enzyme; sometimes a similar pptn. takes place in the urine of the same animals. It was also found that exts. of organs containing the same enzyme undergo spontaneous pptn. at 56° , the kidney exts. containing the most. By mixing tissue exts. with normal rabbit tissues and injection into rabbits, sera are obtained which possess the properties characteristic of serum of burned rabbits; hence the conclusion is drawn that perhaps the enzyme found in burned rabbits results from the entrance into the blood of substances derived from the injured tissues. Possibly similar processes occur when other causes of tissue destruction produce similar conditions. The relation of these phenomena to the protective enzymes of Abderhalden was not detd., but is discussed. H. G. W.

Dependency of the destruction of complement upon the presence of oxygen. MARTIN JACOBY AND MARGARETE JACOBY. Berlin. *Biochem. Z.* 69, 127-33(1915).—If the O is entirely removed from a serum by a current of H it cannot be inactivated by shaking (*C. A.* 4, 1198). Such a serum is quite stable and air can be passed through it for some time before it can be inactivated by shaking. It is possible that in an O-poor medium the complement changes into a stable modification. C. J. WEST.

Agglutinins in the blood of cholera cases. E. D. W. GRIFF. *Indian J. Med. Research* 2, 733-62(1915).—The results of 363 cases are given in a series of charts and protocols. C. J. WEST.

Quantitative research on the phenomena of bacteriolytic sensibilization. F. PORCELLI-TITONE. Univ. Naples. *Atti accad. Lincei* 23, II, 472-7(1914).—The phenomenon through which the bacteriolytic sensitizer is bound to the protoplasm of bacteria is quantitatively regulated by the same laws, according to which the hemolytic sensitizer fixes itself to the erythrocytes, and agglutinin to the corresponding bacterial bodies. In such immunity reactions, antibody and antigen are not combined according to a const. quant. ratio. The quantity of antibody that combines with a given quantity of antigen increases with the increase of the conc. of the antibody in the surrounding liquid. The ratio between the quantity of antibody that is bound to the antigen and its initial conc. in the liquid diminishes as the conc. increases. Between the quantity A of an antibody that combines with any unit of vol. of antigen and the amt. B that remains free in any unit of vol. of surrounding liquid, it seems that the equil. $A = kB^{1/2}$ exists, according to which for 3 mols. bound there will be 2 free. The hypothesis that the antibody is divided in the antigen and in the surrounding liquid as in 2 different solvents where it assumes different mol. wts., seems quite probable.

E. J. WITZEMANN.

H. PHARMACOLOGY.

ALFRED N. RICHARDS.

The antagonistic action of carbon dioxide and epinephrine on the heart. S. W. PATTERSON. Univ. Coll., London, and Univ. Berlin. *Proc. Roy. Soc. London (B)* 88, 371-96(1915).—The expts. were on the heart-lung prep. described by Knowlton and Starling, for the most part with dogs (a few on cats). The results show that CO_2 alone depresses all the functions of the isolated heart. Epinephrine besides dilating the coronary vessels has a sp. action in increasing the rate and strength of ventricular contraction. The effect of CO_2 and epinephrine combined is still to allow of more rapid and stronger contraction and rapid relaxation, and also to lengthen the diastolic period. Thus greater filling of the heart takes place and the heart is in better condition for putting out a maximal output.

A. T. CAMERON.

Physiological and therapeutic action of renal extract on thyroidectomized animals. CARLO ONESTI. Univ. Parma. *Arch. farm. sper.* 19, 28-62(1915).—The survival of thyroidectomized animals subjected to renal opotherapy exceeds that obtained by other investigators who used other methods of treatment. After each administration of the renal prepn. there is a distinct modification of diuresis, with increase in vol. and sp. gr. of the urine and a change from alk. to acid reaction. At the same time the general condition of the animal improves perceptibly.

A. W. DOX.

The action of sugars on the blood vessels. UBALDO SAMMARTINO. Univ. Rome. *Arch. farm. sper.* 19, 170-92(1915).—Small doses of sugar are followed by vaso-dilation and increase in volume of urine, while large doses result in vasoconstriction and decreased secretion.

A. W. DOX.

Use of radioactive substances for destroying living tissues. O. HERTWIG. Berlin. *Sitz. kgl. preuss. Akad.* 1914, 894-903.—Action of radioactive substances on body tissues is elective. It is most powerful on nuclei and embryonic cells. Ova and sperms are very markedly affected by even brief exposure to the emanation of small amts. of Ra. H. studied the action on *Hedra helix*, *Sedum spectabile* and cocainized tadpoles and found that exposed parts soon atrophied. H. could not confirm the statement that emanation from small doses of Ra had an accelerating effect on tumor growth.

E. M. FRANKEL.

Changes in the cerebrospinal fluid after the administration of neosalvarsan. W. KERL AND H. KÄHLER. Vienna. *Wien. klin. Wochschr.* 27, 1098-1101(1914).—In most cases administration of neosalvarsan resulted in an increased sugar content of the cerebrospinal fluid.

H. B. LEWIS.

The influence of thyroid derivatives on the lungs. B. ZONDEK AND W. FRANK-FÜRTER. Berlin. *Arch. Physiol.* 1914, 565-84.—Thyroid ext. and iodothylin caused bronchoconstriction and a dilatation of the capillaries of the lungs. This action is not due to the choline or I content of the thyroid or to the presence of a foreign protein. H. B. LEWIS.

Studies in the biochemistry and chemotherapy of tuberculosis. XII. The action of sodium thiocyanate in tuberculosis. HARRY J. CORPER. Chicago. *J. Infect. Dis.* 16, 38-46(1915).—In search of a chemotherapeutic agent of value in tuberculosis, C. studied the toxicity of NaCNS, its distribution in the tissues of exptl. animals, and its tuberculocidal action. This substance is lethal for rabbits when given intravenously in amts. of 0.4-0.6 g. per kg. Delayed death may occur even from smaller doses. When injected intravenously (0.4 g. per kg.), it is found in the tuberculous tissues in concs. about equal to that in the blood (0.06-0.08%). The conc. in the lungs, heart, kidneys, and testes is not far from that in the blood. The conc. in the liver is less, while it is practically absent from the muscles. It disappears from the tissues (normal and tuberculous) as speedily as it does from the blood, being absent in about 5 days after injection. No evidence of chem. affinity of the NaCNS for any of the normal or tuberculous tissues was obtained. Tubercle bacilli, exposed to concs. of NaCNS up to 1% for 48 hrs. at 37° and up to 0.1% for 7 days at 37° were not killed. No evidence of attenuation was observed. JULIAN H. LEWIS.

An experimental study of lavage in acute carbolic acid poisoning. DAVID I. MACHT. Johns Hopkins Univ. *Bull. Johns Hopkins Hosp.* 26, 98-104(1915).—Carbolic acid in the form of U. S. P. phenol liquefactum was administered to dogs and cats by means of a stomach tube, followed by lavage at different periods of time after the appearance of toxic symptoms. Plain H₂O, aq. solns. of alc. and conc. solns. of Na₂SO₄ were used for washing out the phenol. The chances of recovery depend on the amt. of phenol swallowed, on the promptness with which lavage is begun and on the soln. used for lavage. Food in the stomach greatly increases the chances of recovery. A conc. soln. of Na₂SO₄ is the most efficient agent, recovery being effected in one dog by lavage with such a soln. 45 min. after the first dose of phenol and after a dose of 22 cc. had been given. The action of the Na₂SO₄ is not a chem. one but is probably due to the hindrance of absorption and possibly also to purgation. Administration of alc. after poisoning aggravates the symptoms and hastens death but an animal intoxicated with alc. withstands better the effects of phenol taken afterwards. "*The use of alc. in carbolic-acid poisoning should therefore be strongly discouraged.*" If a soln. of Na₂SO₄ is not available, H₂O is the most efficient medium to employ. Expts. were also made using egg albumen, Na₂SO₄, lime H₂O and syrup of lime but none of them proved satisfactory. A. P. LOTHROP.

Studies in carbohydrate metabolism. VIII. The influence of hydrazine on the utilization of dextrose. FRANK P. UNDERHILL AND ALBERT G. HOGAN. Yale Univ. *J. Biol. Chem.* 20, 203-10(1915).—Hydrazine sulfate (75 mg. per kg.) injected subcutaneously into rabbits causes hypoglycemia but not so consistently as in dogs. Estn. of the amt. of blood sugar shows a marked retardation in the utilization of dextrose injected subcutaneously 2 days after the injection of hydrazine. The diminution of dextrose in the blood after hydrazine poisoning is not explained by any of the results obtained and cannot be due to any increase in the glucolytic processes as, if such were the case, injected glucose would be more quickly disposed of than in the normal rabbit. IX. **The influence of hydrazine on the glyoxalase activity of the liver.** *Ibid* 211-5.—The glyoxalase activity of the liver of dogs poisoned by the subcutaneous injection of 50 mg. of hydrazine sulfate per kg. was quant. detd. by estg. the amt. of mandelic acid formed from 0.2 g. of phenylglyoxal by 50 cc. of 20% tissue ext. in periods

ranging from 30 min. to 9 hr. The glyoxalase activity is not altered to any appreciable extent by the action of hydrazine and the disappearance of glycogen from the liver and the diminished blood sugar content after hydrazine poisoning cannot be due to any interference with the activity of glyoxalase, which is concerned in the intermediary metabolism of carbohydrates.

ALFRED P. LOTHROP.

Collected abstracts from the field of pharmacology (Oct. to Dec., 1914). CARL BACDEM. Bonn. *Zentr. inn. Med.* 36, 161(1915).

JOHN T. MYERS.

Influence of Röntgen rays on the formation of bone callus. K. SALVETTI. *Deut. Z. Chir.* 128, 130-8; *Zentr. Biochem. Biophys.* 17, 412(1914).—The formation of callus is at first disturbed by the action of Röntgen rays; the deposition of Ca salts is, however, promoted.

H. S. PAINE.

Poisoning by calomel after drinking of Vichy water. SPINDLER. *Presse méd.; Giorn. farm. chim.* 63, 205(1914).—Symptoms of acute intoxication were observed in an infant after ingestion of HgCl followed by drinking of Vichy H₂O; intoxication was probably due to a reaction between HgCl and the alkali.

H. S. PAINE.

Influence of iodine on the phenomenon of autolysis. L. KEPINOV. *Nouveaux remèdes; Giorn. farm. chim.* 62, 271(1913).—The introduction of I considerably intensifies hepatic autolysis; KI produces no effect. Injection of Lugol's caustic intensifies autolysis, but not when the exptl. animal dies by the injection. The serum of the animals may acquire autolyzing properties. The antitryptic index is increased by I and KI.

H. S. PAINE.

Mushroom poisoning. M. CLARK, *et al.* Baltimore. *J. Am. Med. Assoc.* 64, 1230-2 (1915).—The pathological picture in these cases resembled that in P poisoning and led to the exam. of the functional condition of the liver and kidney, with the finding of an extremely impaired renal function as shown by the inability to excrete phenolsulfonephthalein, the very high total non-protein and urea N of the blood, the lowered f. p. of the serum, and the absence of diastatic activity in the urine. The positive findings in the galactose test and the high conc. of amino acid in the blood would point to decreased function in the liver. The combination of increased excretion of urine with large excretion of N in association with cumulative phenomena in the blood has also been observed in P poisoning in dogs and in uranium nephritis. Cf. C. A. 8, 1438, 1971, 3803.

L. W. RIGGS.

Chemotherapy and tumors. RICHARD WEIL. New York. *J. Am. Med. Assoc.* 64, 1283-9(1915); cf. C. A. 8, 181.—W. gives a critical discussion of the use of cryst. salts of Se, colloidal Se, colloidal metals, and compds. of metals with organic radicals in the treatment of tumors.

L. W. RIGGS.

Presence of arsenic in the spinal fluid. GEO. W. HALL. Chicago. *J. Am. Med. Assoc.* 64, 1384-5(1915).—Following the administration of Na cacodylate and Na arsenate in varying therapeutic doses, the spinal fluid showed the absence of As. The administration of neosalvarsan was followed by the detection of As in 4 out of 20 cases, and following salvarsan in 2 out of 3 cases.

L. W. RIGGS.

Toxicity of ascarides. A. BRINDA. *Arch. med. enfants* 17, Nos. 11-12(1914); *J. Am. Med. Assoc.* 64, 1035.—The expts. show the extremely toxic action of ascarides ext., the action being evident on the circulation, pulse, blood pressure, respiration, and in the pathologic-anatomic findings. The juice squeezed from ascarides induces convulsions and hemolysis. The evidence points to an extremely active toxalbumin.

L. W. RIGGS.

Hexamethylenamine as disinfectant for the urinary apparatus. H. F. HOST. *Norsk Magazin Laegevidenskaben* 76, No. 2(1915); *J. Am. Med. Assoc.* 64, 1118.—H.'s research indicates that, following the administration of hexamethylenamine,

HCHO is found in the urine in amts. proportional to the conc. of the H ion and the time allowed. It is partially sepd. in the stomach into HCHO and NH_3 , but these products become synthesized again in the intestines. Its action in the bladder depends upon the reaction of the urine and on the length of the intervals between micturition. If the urine is retained for 6 to 7 hrs., a therapeutic effect may result even with slightly alk. urine. H. states in conclusion that F. Hinman (cf. C. A. 8, 181, 3204) was incorrect in the statement that neutral or feebly alk. urines are unable to split off HCHO, as Hinman failed to consider the temp. in testing for HCHO. This reaction is reversible at 37° .

L. W. RIGGS.

Influence of various sugars on action of the heart. K. MIZUNO. *Sei-I-Kwai Med. J.* 34, No. 3(1915); *J. Am. Med. Assoc.* 64, 1455.—A modification of Langendorff's and Wohlgemuth's irrigation app. was employed, and the sugar added to Ringer soln. The results of irrigating hearts of dogs and rabbits at body temp. and the heart of a tortoise at 15° , showed that fructose has the most favorable influence, lactose a similar but less favorable action often causing weakness and consequent stoppage, while cane sugar showed a stimulating and irritating action at first, which soon became arrhythmic and frequent with rapid weakening.

L. W. RIGGS.

Toxicity of trypsin and anaphylactic symptoms produced by it. F. ISHIWARA. *Sei-I-Kwai Med. J.* 34, No. 3(1915); *J. Am. Med. Assoc.* 64, 1455.—I. states that when trypsin in neutral or weakly alk. soln. is injected intravenously in guinea pigs the anaphylactic symptoms occur in about $\frac{2}{3}$ of the cases. This poisonous action does not appear to be due to the enzyme itself, as these actions remain strong after heating the prepn., which, as a rule, abolishes enzyme activity. The toxicity is attributed to the action of the diamino acid which is present in the strength of 91%. I. recommends intravenous injection as the best way of administering trypsin in studying its toxicity.

L. W. RIGGS.

The non-poisonous properties of manganese. TH. BOKORNY. *Chem. Ztg.* 38, 1290(1915); cf. C. A. 8, 1835.—In distinction to the other heavy metals, Mn is non-poisonous if it is in the form of its salts. When yeast was added to a 1% MnSO_4 soln. budding was observed although in a 3% or 5% soln. no action took place. No budding took place in similar solns. of Fe and Ni salts. Yeast steeped for 24 hrs. with MnSO_4 showed no test for Mn with the usual reagents after washing thoroughly; yeast similarly treated with solns. of FeSO_4 and CoSO_4 could not be washed free from the respective metals. The innocuous character of Mn salts is attributed to the fact that, unlike the other heavy metals, Mn does not combine chemically with the protoplasm.

R. L. SIBLEY.

Common salt as a poison for stock. F. R. GUTHRIE. *Agr. Gaz. N. S. Wales* 25, 663-4(1914); *Bull. Agr. Intelligence* 5, 1470.—The death of poultry and pigs has been traced to an excessive amt. of NaCl in the food. In a fowl which had died suddenly the contents of the crop weighed 50 g. and contd. 2.42 g. salt. In one case of poisoning of pigs the food supplied was a mixt. of pollard, barley meal, and 11.66% salt. The toxic effect of the salt appears to be due to its action on the muscles so that the animal becomes unable to walk and finally to stand. Death is caused by asphyxia, due to loss of power in the respiratory muscles.

M. X. S.

Experiments with salvarsan-copper in trypanosomiasis. HAROLD SEIDELIN. *Ann. Trop. Med.* 9, 197-200(1915).

C. J. WEST.

Studies in Blackwater fever. III. Relationship of quinine to blackwater fever. J. W. W. STEPHENS AND W. STOTT. Univ. Liverpool. *Ann. Trop. Med.* 9, 201-12 (1915).

C. J. WEST.

Absorption and storage of digitalis substances in the heart. v. ISSKUTZ. Univ. Heidelberg. *Arch. exp. Path. Pharm.* 78, 155-87(1915).—The absorption of digitalis substances by the heart, because of the firm way they are bound, must be considered as a storage. This explains the long duration of the action of digitalis and the cumulative effects. C. J. WEST.

Experiments on rabbits after removal of the cerebrum. SUKETAKA MORITA. I. Behavior of the blood sugar concentration. *Arch. exp. Path. Pharm.* 78, 188-207 (1915).—Stimulations, such as venesection, constriction, diuretin, ether narcosis, painful irritation of the sensitive nerve elements, do not lead to hyperglucemia in rabbits after removal of their cerebrum. The increased blood sugar concn. produced in such animals is nearly of the same order as that in normal animals. Since in rabbits, which possess no cerebrum, "psychic" hyperglucemia can no longer be considered, it must follow that effects like terror and anger play only a secondary role in sugar mobilization. The point of attack of central stimulants which produce hyperglucemia, as diuretin, is probably not in the hemispheres but in the basal ganglia or in the mid-brain. II. The action of different poisons producing spasms. *Ibid* 208-217.—The action of cocaine-HCl differs in that the clonic muscular spasms and the complete stoppage of respiratory movements are lacking, while tonic cramps and intensive breathing are present. The tolerance for cocaine is considerably increased. Picrotoxin and phenol act as in the normal animal. Clonic muscular spasms in the case of camphor poisoning is connected with the presence of the cerebral hemispheres. Animals poisoned with KCN die more quickly than normal animals. Apomorphine has a cortical point of attack. III. Action of central stimulating agents upon chloral narcosis. *Ibid* 218-22.— β -Tetrahydronaphthylamine and ephedrin are capable of waking animals from a chloral narcosis produced by 0.05 g. per kg. body wt., thus indicating a sub-cortical point of attack. Cocaine and caffeine, contrary to the effect in normal animals, do not have this property. IV. Quantitative investigation of the sleep-producing action of chloral hydrate and urethan. *Ibid* 223-31.—Chloral hydrate and urethan have a more intensive action than upon normal animals. C. J. WEST.

The sugar-stimulating action of epinephrine-like substances. SUKETAKA MORITA. Univ. Vienna. *Arch. exp. Path. Pharm.* 78, 245-76(1915).—The effect of certain epinephrine-like substances upon the production of sugar by the liver after perfusion or subcutaneous injection has been studied. The following figures represent the active concn. in the frog liver (perfusion) expts., the active amt. per kg. rabbit body wt. in the subcutaneous injection expts. and the blood sugar: ethylaminoacetopyrocatechol, 1:1,000,000, 0.002, 0.166; monoethanolaminoacetopyrocatechol, 1:1,000,000, 0.002, 0.150; phenetidoethanolpyrocatechol, 1:500,000, 0.03, 0.187; dimethylaminoacetopyrocatechol, 1:200,000, 0.15, 0.267; diethylaminoacetopyrocatechol, 1:100,000, 0.15, 0.238; aminoacetopyrocatechol, 1:100,000, 0.15, 0.147; *p*-hydroxyphenylamine, ———, 0.15, 0.124; piperidoacetopyrocatechol was inactive. If ergotoxin is injected, the active concn. is much larger. A soln. of β -tetrahydronaphthylamine (1:10,000) does not cause the production of sugar, but if this is replaced by Ringer soln. sugar at once appears in the fluid. The effect disappears after 9 min. Subcutaneous injections of 0.15 g. per kg. does not produce glucosuria. C. J. WEST.

Pharmacological investigation of the vasomotor centers for the splanchnic vascular region of the frog. A. FRÖHLICH AND S. MORITA. Univ. Vienna. *Arch. exp. Path. Pharm.* 78, 277-316(1915).—A method is given which detcs. the action of vascular agents with a central point of attack upon the circulation of the splanchnic vascular region of the frog. Centrally vasoconstrictory are: strychnine, cocaine, β -tetrahydronaphthylamine, strophanthine digitalin, NH_4 , Et_2O and camphor vapor. Caffeine

is slightly vasoconstrictory. Amyl nitrate and heat are vasodilatory. Cocaine in high doses acts through paralysis. Antipyrine, CO₂ gas and *p*-hydroxyphenylethylamine were inactive.

C. J. WEST.

Theory of narcosis. J. TRAUBE. *Arch. ges. Physiol.* 160, 501-10(1915); cf. *C. A.* 7, 3795.—The 1st condition for the action of a narcotic is its small *solution tenacity* ("Haftdruck") towards H₂O. For the slightly volatile narcotics the surface activity towards air is an approximate measure of the soln. tenacity. The driving force of osmosis is the reciprocal soln. tenacity towards H₂O; the resistances are the frictions which oppose the diosmotic substances in the form of gel walls and viscous colloidal fluids. The quotient of 1/soln. tenacity × friction det. the osmotic velocity. The smaller the soln. tenacity towards H₂O and the greater, therefore, the narcotic properties, the greater is its capacity to dissolve or to swell gels (gelatin, Na cholate, protein) as well as to decrease the friction of the protoplasm. Narcotics have, therefore, the capacity to eliminate or to decrease the resistance due to friction which opposes their passage. Narcotics act as catalyzers, accelerating flocculation (lecithin, nucleoproteins), retarding oxidations and other ferment actions (yeast-, zymase- and invertase-action). Narcotics decrease the elec. processes in the nerves corresponding to their narcotic action. The knowledge that the narcotic action of narcotics goes parallel to the catalytic action upon the chem., physical and especially the elec. processes, has considerably increased our ideas of the method of narcosis. The special processes as related to narcosis are not yet known.

C. J. WEST.

Fate of papaverin in the animal organism. KURT ZAHN. Univ. Breslau. *Biochem. Z.* 68, 444-76(1915).—Papaverin may be pptd. quant. from a 2% soln. by adding NH₄OH. It is extd. from organ tissue by rubbing the organ to a paste, adding a little very dil. HCl, treating with 3-4 vols. alc., making ammoniacal, shaking, allowing to stand 1 day, filtering, washing the residue with alc. NH₄OH, evapg. to dryness, taking the residue up in b. H₂O, filtering and pptg. with NH₄OH. The pptn. is complete in from 1 to 4 days. An excess should be avoided as papaverin is sol. in NH₄OH. Papaverin mur., injected subcutaneously into rabbits, cats and dogs, was not found in the organs or the excretory products of the animals, as such, nor as oxidation, decompn. or rearrangement products such as the di-Me ether of protocatechuic acid (veratrumic acid), papaverinsulfonic acid or a glucuronic acid. No information could be obtained as to the organs concerned in the utilization of papaverin. The ratio of the total to the conjugated H₂SO₄ in the urine is the same after papaverin injection. The only variation from the normal is that the urine shows a slight capacity for reducing Fehling soln.; this is markedly increased after b. with dil. HCl. After oral administration of papaverin, in excess of the lethal dose, a large part of the drug may be isolated from the stomach and intestine. In rabbits a dose of 0.12 g. papaverin mur. per kg., given subcutaneously, has no noticeable effect. The 1st effects are noticed with a dose of 0.25 g. and lethal doses are yet higher. Intravenously, 0.1 g. produces disturbances of the respiration. Dogs and cats are much more sensitive: 0.06 g. per kg. produce marked symptoms, while 0.12 g. is lethal after a few hrs. Papaverinsulfonic acid is indifferent in its effect and after subcutaneous injections, 35% can be isolated from the excretory products.

C. J. WEST.

Distribution and fate of colloidal silver in the animal body. III. J. VOIGT. Göttingen. *Biochem. Z.* 68, 477-509(1915); cf. *C. A.* 8, 3473.—Rabbits were injected with from 25 to 528 mg. of a 0.60% nonisotonic collargol soln., either in the ear or jugular vein, the animal killed by bleeding after a given time and the various organs examined microscopically. Most of the Ag was found in the lungs, liver, spleen and kidney.

C. J. WEST.

Poisonous action of ninhydrin. OSCAR LOEW. *Biochem. Z.* 69, 111-5(1915).—Ninhydrin is a poison for different lower and higher forms of life (bacteria, algae, phanerogams, protozoa, mice, guinea pigs). An apparent exception in the case of molds may be explained by the difficulty of reaching the protoplasm of the cells. C. J. W.

I. ZOOLOGY.

R. A. GORTNER.

The life-cycle of Cladocera, with remarks on the physiology of growth and reproduction in Crustacea. G. SMITH. Oxford. *Proc. Roy. Soc. London (B)* 88, 418-35(1915).—By isolating the young *Daphnia* at birth and keeping them at 27°, they have been bred for 19 generations without the appearance of males or ephippial females. In parallel cultures, when the parents were kept more crowded and at a temp. of 10°-17°, 7% males and 10% ephippial females were produced. The crowding does not directly influence the supply of food but appears to act by the accumulation of excretory matter. The parthenogenetic females kept isolated at 27° grow and reproduce more rapidly than those crowded at 10-17°, and store up reserve material almost exclusively in the form of glycogen, while the crowded parents tend to store up fat, and are inhibited in their growth. Storage of fat as opposed to glycogen is especially characteristic of males and ephippial females; it is judged that the fat-storage induced experimentally in the crowded parthenogenetic females at 10-17° is causally connected with the production by them of the sexual forms. The habit of glycogen-storage leads to rapid growth and parthenogenesis (a form of discontinuous growth), while the habit of fat-storage leads to inhibition of growth, and sexual mode of reproduction. In the higher Crustacea the act of growth and moulting is accompanied by heaping up of glycogen in the liver storage-cells as opposed to fat, while in the period between moults fat-storage preponderates. Preponderant fat-storage in the liver is characteristic of female crabs maturing their ovaries and of crabs infected by *Sacculina*, and in both these cases growth is inhibited. Hence both in *Cladocera* and *Decapoda* growth, on the one hand, and sexual maturity on the other, are accompanied by a different type of reserve storage, which is also distinct in the case of the male and the female. This is the physiological fact at the root of the antagonism between growth and sex. Sexual reproduction is a reaction to conditions when continued growth is disadvantageous or impossible. Sexual differentiation is an economy or division of labor by which the female reproductive cell stores the material for development and thereby loses the power of division, while the male cell retains the power of division but relies on the female to supply the material for development.

A. T. CAMERON:

Nature and formation of the fertilization membrane of the echinoderm egg. J. F. McCLENDON. Minneapolis. *Intern. Z. physik. chem. Biol.* 1, 163-8(1914).—No fertilization membrane appears on the egg of a sea-urchin from which the mucous layer has been removed before fertilization even though the egg segments. No membrane comparable in toughness with the fertilization membrane exists on the unfertilized egg.

E. M. FRANKEL.

The "cerodocytes" or "oenocytes" of insects considered from the biochemical view point. A. CH. HOLLANDE. *Arch. anat. micr.* 16, 1-66; *Zentr. Biochem. Biophys.* 17, 409(1914).—Certain yellowish red cells, the so-called "oenocytes" or "cerodocytes" (named from their property of containing wax crystals), are present in almost all insects in the body cavity and region of the tracheae. These cells are not excretion cells; they never contain urates or oxalates and do not absorb pigments. The oenocytes are more closely related to the fat cells and bear a close functional relation to the nutrition of the insects. After a diet rich in fat or after injection of olive oil the oenocytes become loaded with granules which disappear during fast. The wax also

disappears from the cells during metamorphosis or deposition of eggs. Glycogen also occurs in the oenocytes and the latter are, furthermore, capable of storing H_2O . After injection of *intra vitam* staining dyes the latter are absorbed by the lipid granules of the oenocytes. Lipochromes ingested with the food are absorbed by the fat granules.

H. S. PAINE.

Catalases of the lower animals. RUDOLF ZIEGER. Univ. Leipzig. *Biochem. Z.* 69, 39-110(1915).—The catalase content of nearly all groups of animals except the protozoa was tested. No relation could be established between the mode of living, especially the intensity of the oxidation processes, and the catalase content. Neither respiration (air or water) nor food nor movement had a definite influence. That there is some relation between catalase content and metabolism follows from the facts given below. Those organs, which are specially active chemically, as the liver and kidneys, are characterized by a surprisingly large content of catalase. This is true of both vertebrate and invertebrate animals. The intestine showed a variable content, which seems to be dependent upon how far it performs the functions of the liver. The adipose tissue is very rich in catalase, especially in insects, where it must play a role in metabolism. In the lymph there is a well marked parallelism between the catalase content and the amt. of hemoglobin and the preformed constituents. It is shown that in winter, when life is not as active, the catalase content of the intestine of the echinoderms, lumbricus and snails is considerably lower than in summer. In the snail and the hedgehog there is a parallelism between the catalase and glycogen contents of the liver. Unripe eggs are very active, while the ripe eggs have only a slight catalytic power. Eggs rich in yolk, and the embryos of animals, show a marked activity during development without, however, ever reaching the characteristic values for the species. At the time of birth, when the organs assume their full functions, the catalase content increases rapidly to a max. and then decreases. The behavior of the catalase content during the post-embryonic development of insects was studied. As far as investigated, the kinetics of the reaction are expressed by the scheme of Steche and Waentig.

C. J. WEST.

12. FOODS.

W. D. BIGELOW AND F. F. FITZGERALD.

Note on vinegar. J. S. JAMIESON. *Analyst* 40, 106-7(1915).—The comp. is given of a vinegar prepd. from germinated maize and pasteurized, of the same vinegar before pasteurization, and of an ordinary barley malt vinegar. P. B. DUNBAR.

The use of colloidal iron in the determination of lactose in milk. REUBEN L. HILL. Cornell Univ. Med. College. *J. Biol. Chem.* 20, 175-7(1915).—Dil. a 10 g. sample of milk to 25 cc. and add about 3 cc. of 10% colloidal Fe soln.; the last portion of the Fe soln. is added drop by drop with thorough shaking. When pptn. is complete, a clear liquid seps. from the flocculent ppt. Filter into a 100 cc. volumetric flask and wash the ppt. with distd. H_2O until the flask contains about 100 cc. Dil. to the mark and det. the lactose by the Benedict method. About 16 cc. of the dild. sample will be required to reduce 25 cc. of the Benedict soln. The detn. is carried out in a wide-mouthed, 150 cc. Jena, flat-bottomed flask. Dissolve 3-4 g. anhydrous Na_2CO_3 in 25 cc. of Benedict soln. to which has been added 25 cc. H_2O and a little powdered pumice. Run in rapidly about 14 cc. of the lactose soln. and boil at least $1\frac{1}{2}$ min.; then add the last portions a drop at a time until the reduction is complete. When the end point is reached the liquid will have a yellowish tinge, to which the blue color returns very slowly; before reduction is complete the color is blue or greenish

and rapidly becomes bluer. 25 cc. of Benedict soln. are reduced by 0.0676 g. of anhyd. lactose. The method is quick, very accurate and can be used by the ordinary lab. student.

A. P. LOTHROP.

Further data regarding a method for detecting the watering of milk. RZIO COMANDUCCI. Naples. *Boll. chim. farm.* 53, 67-9(1914).—C. submits further data regarding his method (based on the polarization and lactose content) for detecting the watering of milk (*Boll. chim. farm.* 51, 109-10; cf. *C. A.* 6, 2471). Analysis of the milk of 50 cows in 15 dairies in the vicinity of Naples indicated that the manner of milking and the age and breed of the cows had a very slight influence on the polarization and lactose content of the milk, so that the addition of 10% or more of H_2O was readily detected. The mean rotation of the liquid obtained by heating unwatered milk with CCl_3CO_2H and filtering was $+2^\circ 47'$ (Laurent polariscope) in a 100 mm. tube at 15° and the limit of variation was small. Concordant results were obtained when the lactose content was calcd. from the rotation of the above soln. and from the reduction of Fehling soln. by a method described in the original publication mentioned above. C. discusses a criticism of his method by Corradi (*C. A.* 7, 660) to the effect that the limit of variation of the lactose content of unwatered cow milk is so great (3.5-5.5%) that the method will only serve for the detection of watering when relatively large amts. of H_2O have been added. C.'s data indicate that the normal limit of variation of the lactose content is considerably smaller (av. content = about 5.5%) than the above and that the uncertainty in the method arising from this cause does not extend to the detection of watering in cases where more than 10% of H_2O has been used.

H. S. PAINE.

The manufacture of condensed milk, milk powders, casein, etc. R. T. MOHAN. *J. Soc. Chem. Ind.* 34, 109-13(1915).—Discussion of methods of analysis. P. B. D.

Manufacture of cheese from "heated" milk. M. BENSON. *J. Bd. Agric.* 21, 878-89(1915); *J. Soc. Chem. Ind.* 34, 148; cf. *C. A.* 8, 1173.—To obtain a typical cheddar cheese from pasteurized milk, the pasteurizing temp. should not be higher than 88° when the milk is heated very rapidly, or 77° when the period of heating is from 15 to 30 mins. A blue-veined cheese of good quality was obtained when the milk was heated for about 15 mins. to $88-93^\circ$. Cheeses prepd. from heated milk contained: water 33.61-36.22, fat 32.36-34.53, insol. N (probably unaltered casein) 2.49-2.91%. In the case of very rapid heating, the number of organisms in the milk was not effectively reduced below 77° , but at this point the number was reduced to $1/10$ of the total and at $82^\circ C.$ to one $1/88$, while at 93° practically all the organisms were destroyed. There was a much greater reduction when the milk was maintained at 66° for 15 mins. than when it was heated very rapidly to 77° .

E. J. C.

The ripening of Neufchatel cheese. O. LAXA. Prague. *Z. Nahr.-Genussm.* 28, 387-92(1914).—The usual chem. exams. of cheese with a view to its ripening processes do not deal with the differences in comp. of the surface of the cheese, where the ripening begins, and the inner part. In work upon the ripening of different cheeses, Neufchatel cheese has heretofore been classed with Camembert or Brie. L. examd. 2 samples of Neufchatel cheese for H_2O , solids, fat, casein, albumoses and peptones, amino N, NH_3 , acids, and ash. The surface layers showed a further advance in ripening than the interior by the low casein content and a consequently higher amino and volatile acid content. The surface also contained the higher % of insol. ash due to the formation of insol. P_2O_5 , by the action of casein products upon the sol. P_2O_5 , drawn to the surface as the cheese dries out. Analogous analyses of Camembert and Brie cheeses were made. In these the ripening action is likewise from the surface inward. The bacteriol. exam. of Neufchatel cheese yielded results similar to those of Mazé (*Ann. inst. Pasteur* 24, 395-428, 435-466, 543-562(1910)).

L. D. ELLIOTT.

Organic phosphoric acid of wheat. (Preliminary note.) GEORGE CLARKE. *J. Chem. Soc.* 107, 360-1 (1915).—A white, amorphous substance of type $C_{12}H_{22}O_{14}P_{10}Ca_7Mg$ was obtained by extg. wheat with 0.2% HCl and treating as in the prepn. of phytin in mustard (*C. A.* 8, 1957). H. A. PIPER.

Faced pearl barley. J. F. LIVERSEGE AND H. HAWLEY. *J. Soc. Chem. Ind.* 34, 203-4 (1915).—Pearl barley is considered adulterated with mineral facing if the insol. ash content is over 0.1%. H. A. PIPER.

The food value of wood. G. HABERLANDT. *Sitzb. kgl. preuss. Akad.* 1915, 243-57.—H. discusses the possibility of using the starch, oil, and in some cases protein and glucose found as reserve substance in the storage tissues of sap-wood as a food for people and domestic animals. The woody character of the cell walls containing the reserve substance is indigestible and only by grinding into a fine meal, which breaks and disintegrates the cell walls can horses and cattle use wood as a feeding stuff.

H. A. LEPPEL.

Gossypol. A toxic substance in cottonseed. A preliminary note. W. A. WITHERS AND F. E. CARRUTH. *Science* 41, 324 (1915); cf. *C. A.* 6, 2474.—W. and C. have sep'd. from cottonseed kernels a toxic substance which appears to be identical with a substance which Marchlewski (*J. für prakt. Chem.* 60, 80 (1899)) sep'd. from crude cottonseed oil and called gossypol. This substance is quickly oxidized in alc. NaOH. Its oxidation renders it non-toxic, and thus diminishes if it does not entirely remove the toxic properties of cottonseed meal. P. B. DUNBAR.

Utilization of the stalks and leaves of sweet potato plants (*Ipomoea batatas* Lam.) as feed material. T. KATAYAMA. *B. Agr. Japan* 2, 41-74; through *Chem. Zentr.* 1914, II, 731.—Sweet potato tops were used as provender. Fresh stalks like turnip tops are not suited for exclusive feeding. They are best fed together with a plentiful quantity of rough provender. Loss of nutritive matter during fermentation is considerable and a very useful food may be obtained. W. H. FAY.

Toxic products in food and their detection (HIGGINS) 11B. The constitution of milk (LINDET) 11F.

BILLING, G. T. AND WALKER, A. H.: **Meat and Food Inspectors' Examinations.** Model Answers to Questions Set by the Royal Sanitary Institute and Other Examining Bodies. London: Sanitary Publishing Co.

BRANNT, W. T.: **A Practical Treatise on the Manufacture of Vinegar.** Third edition. Philadelphia: H. C. Baird & Co. 567 pp. \$6.00.

U. S., 1,135,351, Apr. 13. J. J. BURCHENAL. Lard-like food product, an incompletely hydrogenized cottonseed oil of I value of 55-80, m. 33-40° and a titer of 35-42°.

U. S., 1,135,417, Apr. 13. J. F. WEAVER. Stock-food formed of flax seed meal 25, cottonseed meal 20, dried sugar cane 50 and molasses 5%.

U. S., 1,135,935, Apr. 13. J. J. BURCHENAL. Lard-like food containing hydrogenated cottonseed oil or other edible hydrogenated fatty oil, with or without an admixture of unhydrogenated oil.

U. S., 1,136,356, Apr. 20. O. E. MERRELL. Desiccating eggs, milk or other liquids in a current of air having a whirling or spiral motion which breaks up the spray of liquid projected into it and takes up the moisture, forming a dry powder.

U. S., 1,136,501, Apr. 20. W. G. ANDREWS. Commercially finished wheat flour is subjected to heavy pressure between warm rolls to rupture the starch cells.

U. S., 1,136,597, Apr. 20. O. M. FRIEND and S. E. FRIEND. Decorticating wheat by moistening, heating and agitating in bulk.

U. S., 1,136,881, Apr. 20. F. D. LARABEE. Wheat flour is subjected to a rubbing action between rolls or disks to break down the starch cells of the flour without materially affecting its granulation.

14. WATER, SEWAGE AND SANITATION.

EDWARD BARTOW.

The amount of lead, copper and zinc in artificial mineral waters, and the determination of these metals. C. REESE and J. DROST. Schleswig-Holstein. *Z. Nahr.-Genussm.* 28, 427-49(1914).—The products of 100 machines for mfg. artificial mineral water were examd. for Pb, Cu and Zn and it was found in the case of Pb that 21 machines delivered water with more than 0.35 mg. per l., 13 with more than 0.6 mg. per l. and 9 with more than 1 mg. per l. Cu was found over 0.35 mg. per l. in 48-9% of the machines, over 0.6 mg. in 21%, and over 1 mg. in 9%. Zn was not detd. as it was found only in traces. The samples were drawn after standing for 12 hrs. under the highest pressure the machines could stand. The Cu and Pb were pptd. as sulfides, sepd., made up to definite vol., and independently detd. by colorimetric comparison of their respective sulfides with known standards. This result was then checked in the case of the Pb by pptg. it in another aliquot as the chromate and comparing the resultant opalescence with a standard PbCrO_4 prepd. at the same time. The Cu was detd. by comparing its ferrocyanide with a standard. A further check was made in the original water by running a colorimetric detn. of both metals pptd. together as sulfides. Full directions for purifying chemicals used and for precautions to be taken are given. The authors claim to be able to recognize as little as 0.01 mg. per l. of either Pb or Cu and to det. accurately 0.10 mg. Zn was detected by pptg. with $\text{K}_4\text{Fe}(\text{CN})_6$. H. L. LOURIE.

Water analysis. (Free chlorine, manganese and phosphorus.) L. W. WINKLER. *Z. angew. Chem.* 28, 1, 22-3(1915).—Detection of HOCl or free Cl in water: To 250 cc. of the water to be examd. and also to an equal quantity of H_2O (blank), add 1 to 2 drops of dil. methyl orange indicator (1 to 5000) and 2 to 3 cc. of 10% HCl . If the water contains HOCl , the color disappears, while the blank remains a rose-red. As little as 0.1 mg. of Cl per l. can be detected. The method is still more sensitive when methyl red is employed (0.01 g. is dissolved in 1 cc. 0.1 N NaOH and made up to 100 cc. with H_2O). One drop in 500 cc. of the water to be examd. permits the detection of 0.02 mg. free Cl. Quant. detn. of Cl.: To 100 cc. water add 0.2 g. KI , 1 cc. starch soln. and 2 to 3 cc. 25% H_3PO_4 . The liberated I is titrated with 0.02 N $\text{Na}_2\text{S}_2\text{O}_3$. The method can also be employed in modified form for the rapid detection of small quantities of Mn in water. To 2 portions of 250 cc. of the water add one drop of methyl orange; to the first portion add 1 to 2 cc. 10% NaOH . After a few min. add 5 cc. of a 10% HCl soln. to both. If Mn is present, decolorization takes place in the first portion after 1 to 2 min. As little as 0.1 mg. of Mn per l. can be detected. The presence of Fe does not interfere, but nitrites and much organic matter diminishes the sensitiveness of the reaction considerably. In the presence of H_2S , the method is unreliable. For the detection of phosphoric acid in water, employ the following method: To 1000 cc. of the water, add 1 cc. of 10% FeCl_3 soln. and 2 cc. of a 10% alum soln. Heat on the water bath for 1 hr. The Fe salt of the H_3PO_4 ppts. Filter through cotton and dissolve the ppt. in HNO_3 . To the soln. add 1 drop of HCl and evap. over the steam bath. Dissolve the residue in a few drops of HNO_3 and water, filter again, and conc. to 5 cc. Add 5 cc. molybdate reagent, as commonly employed. A yellow ppt. indicates P_2O_5 . A colorimetric method for the quant. detn. of the P_2O_5 is also given. A. LEDERER.

The Blacher potassium palmitate method for the determination of hardness in water. W. PFLANZ. *Intern. Z. Wasser-Versorgung* 1, 253-4(1914).—This method consists in titrating the sample of H_2O with 0.1 N K palmitate soln. with phenolphthalein as an indicator. To adapt Blacher's method to the needs of men who are not chemists, P. makes a slight change by substituting methyl orange for dimethylaminoazobenzene. Results are given in terms of German degrees which show that the total hardness as detd. by this method varies from the theoretical by 0.1-0.3°.

FRED W. TANNER.

New methods of bacterial water analysis. E. HESSE. Berlin. *Intern. Z. Wasser-Versorgung* 1, 69-73(1914).—H. reviews the literature covering many different methods proposed recently.

FRED W. TANNER.

Detection of specific bacteria in water. A. MÜLLER. *Arb. kais. Gesundh.* 47, 513-26(1914).—M. uses Omelianski's gypsum blocks to det. the permeability of soil to bacteria with *B. prodigiosus* as the indicator (cf. *Centr. Bakt. Parasitenk., Abt. II* 5, 652(1899)). Gypsum blocks were prepd. by making a thin mixt. of extra quality sifted gypsum. One g. of sifted $MgCO_3$ and 100 cc. of hot, boiled, distd. H_2O are added and thoroughly mixed in a casserole. Then 0.8 cc. of a 5% cabinet-makers' "binder" are added and the mixt. put into a special circular mold. The size and thickness of the plates will vary with the amt. of H_2O to be examd. A plate 8 cm. in diam. and about 1.2 cm. thick will take up 20-25 cc. H_2O . The plates set rapidly and may be dried after removing from the mold. They may be used in Petri dishes. To use the plates, the water is poured evenly over the surface and sufficient amt. of conc. peptone bouillon added to give a mixt. of bouillon and H_2O equal to a normal bouillon. After 60 to 70 hrs., the prodigious colonies are apparent from their red pigment. By pouring agar over the plate, the other bacteria in the water may be detected. To enumerate *B. coli* in H_2O , lactose and fuchsin are added to the conc. bouillon mentioned above. After incubation, *B. coli* colonies appear as red spots similar to those on Endo's medium. In cases where it is necessary to filter large quantities of H_2O , M. has made use of the Büchner funnel. Gypsum plates of the proper size are fitted by a rubber ring to the top of a Büchner funnel. Suction is applied.

FRED W. TANNER.

Special water standard. W. F. MONFORT. *J. Am. W. W. Assoc.* 2, 65-73(1915).—The Treasury Department has adopted a bacteriological standard for drinking waters supplied by common carriers in Interstate Commerce limiting the agar count to 100 per cc. for 24 hrs. at 37° and recommending that not more than one out of five 10 cc. portions of any sample examd. show the presence of the *B. coli* group. The report (*Reprint* No. 232, Public Health Reports) is printed in full.

D. K. FRENCH.

The decrease in the typhoid death rate in the United States by filtration of drinking water. E. IMBRAUX. *Intern. Z. Wasser-Versorgung* 1, 117-8(1914).—I. proves by statistics that filtration has caused a decrease of from 50 to 75% in the typhoid death-rate in representative American cities. Attention is called to the fact that ozone is being used by about 20 German cities to sterilize their water, while none in the U. S. are using this process.

FRED W. TANNER.

Do fish as bacillus carriers affect the quality of water courses? P. T. MÜLLER. *Intern. Z. Wasser-Versorgung* 1, 148-51(1914).—The presence of fish in a water course is of epidemiological interest only when they come from infected water. They may then introduce pathogenic bacteria which may give rise to sickness among the consumers.

FRED W. TANNER.

The hot spring near Krozingen (Baden). G. RUPP. Karlsruhe. *Z. Nahr.-Genussm.* 28, 425-6(1914).—A hot spring was found near Krozingen which yields daily 7,000,000 l. of water containing in soln. about 2500 kg. CO_2 . The water has a

temp. of 40.3° , sp. gr. (15°) 1.00426, solids dried at 180° 4.0158 g. per kg. The gas consists of 94.6% CO_2 and 5.4% of N. Analyses of the water are given. H. L. L.

Studies on the self-purification of streams. E. B. PHELPS. *Public Health Repts.* 29, 2128-32(1914).—The reactions involved are biochem., 3 factors being necessary: org. matter, O and oxidizing bacteria. Org. matter and oxidizing bacteria are always present. As O_2 is used up re-aeration occurs, the intensity being a direct function of the lowering of O content. Re-aeration is increased by agitation, a fact of greatest importance in self-purification of rivers. Opposed to re-aeration is the using up of O_2 by org. matter. The latter is well known to be a monomol. reaction from which the conc. of pollution may be detd. Re-aeration is being studied in order to work out with more assurance the general principles which underlie the self-purification of streams.

FRED W. TANNER.

Examination of water on railway trains. E. BARTOW. *J. Am. W. W. Assoc.* 2, 74-82(1915).—100 samples of water were analyzed from cars coming from all parts of the country. Bacteriological and chem. exams. were made and the methods used are given in full or with reference. 53% of the waters examd. would not pass government specifications. The better water was found on sleeping cars and parlor cars, the poorer on coaches and smoking cars.

D. K. FRENCH.

Dry feed of chemicals in water purification. W. F. MONFORT. *J. Am. W. W. Assoc.* 2, 200-5(1915).—Dry feed for alum, lime and Fe sulfate offers many advantages in reduction of pipes and fittings exposed to corrosion, economy of space, economy of attendance and ready control of chemicals. Some difficulty has attended the use of this system for Ca hypochlorite. Many devices for feeding are described.

D. K. FRENCH.

Hypochlorite treatment of water supplies. H. A. WHITTAKER. *Pub. Health Repts.* 30, 608-18(1915).—A description accompanied with drawings, of a portable plant together with full equipment necessary for its proper administration. W. F. L.

The disinfection of water by hypochlorite. K. IMHOFF. *Intern. Z. Wasserversorgung* 1, 207-8, 222-4(1914).—A brief history of the use of hypochlorite in water treatment and a general discussion of the prep. and application of hypochlorite to water. The addition of hypochlorite in excess of $1\frac{1}{2}$ p. p. m. of available Cl will cause tastes.

F. W. TANNER.

Hypochlorite treatment at Ludington, Mich. GEORGE W. CLARK. *Munic. J.* 38, 394(1915).—An automatic device actuated by the water works pumps feeds 7 lb. per mil. gal. dry $\text{Ca}(\text{OCl})_2$. Cost of app. was \$257. Typhoid was markedly reduced.

LANGDON PEARSE.

Liquid chlorine sterilization of the water supply of St. Catherines, Ontario. A. MILNE. *Eng. Contr.* 43, 188-90(1915); *Can. Eng.* 28, 389-90(1915).—The water supply derived from the Welland Canal is treated with liquid Cl, the av. being 1.65 lb. with max. 3 lb. Cl per mil. imp. gal. The dosing is automatically controlled by a Venturi meter.

LANGDON PEARSE.

Use of ozone as a sterilizing agent for water purification. S. T. POWELL. *J. N. Eng. Water Works Assoc.* 29, 87-93(1915); cf. *C. A.* 8, 3336; 9, 341.—The ozonizers of the Baltimore County Electric Co. have been so modified that efficient results have been obtained. Organic colors, either in soln. or in colloidal condition, and odors have been eliminated; bacteria have been satisfactorily removed without the addition of objectionable chemicals and without leaving any detrimental after-effects from the treatment. The cost of the operation is estd. at \$2.50 to \$4 per mil. gals. The process should be found efficient and economical provided due consideration is given to the adaptability of the method for each particular supply.

E. BARTOW.

Rapid filter plant at Evanston, Illinois. L. PEARSE. *J. Am. W. W. Assoc.* 2, 160-80(1915); cf. *C. A.* 8, 1318.—Many of the bolts used to hold the strainer plates in place broke. These were replaced by monel metal bolts. During the summer the filter runs were exceedingly short, due to the presence of diatoms (*Asterionella*); in November the difficulty disappeared. Bacterial removal has been satisfactory but it has been deemed desirable to use about 3 lbs. of $\text{Ca}(\text{OCl})_2$ as a finishing agent.

E. BARTOW.

Baltimore water filtration plant. *Munic. J.* 38, 537-41(1915).—An engineering description of a rapid filter handling 120 mil. gal. per day, costing about \$1,750,000.

LANGDON PEARSE.

Surprising results disclosed by sanitary survey of Vincennes, Ind. J. C. DIGGS. *Ind. San. and Water Supply Assoc.* 1915; *Eng. Contr.* 43, 268(1915); *Eng. News* 73, 631(1915).—Of 3000 shallow wells, 722 were condemned, on account of privy pollution. The city contained 3989 residences, 3229 privies and 187 cesspools.

L. P.

Ontario water supply and sewerage legislation. F. A. DALLYN. *Can. Eng.* 28, 357-9(1915).—D. reviews the history of health supervision by the province of Ontario with central control.

LANGDON PEARSE.

Omaha water chemist increases efficiency of (filter) alum. ANDREW JACOBSON. *Eng. Record* 71, 394(1915).—The process depends on the reaction between a soln. of $\text{Al}_2(\text{SO}_4)_3$ and scrap iron. A basic Al sulfate and FeSO_4 are formed. Consistent results have been obtained on the Omaha water supply when $\frac{1}{2}$ the former amts. of chemical are used.

FRANK BACHMANN.

Temporary water aerator at the Kensico reservoir. W. F. SMITH. *Eng. News* 73, 768(1915).

LANGDON PEARSE.

Data on coppering a reservoir at Hartford, Conn. 60th Report Bd. Water Commrs., Hartford, Conn.; *Eng. Contr.* 43, 277(1915).—In 1913 heavy algae growths were treated with 1 part CuSO_4 to 3.36 million parts H_2O , with a reduction of microscopic organisms of 99.6% in 5 days, and 30% in 2 days in two different reservoirs.

L. PEARSE.

European water purification and sewage disposal plants. E. BARTOW. *J. Am. W. W. Assoc.* 2, 13-24(1915).—Hamburg, probably the only continental city using a coagulant, uses alum prior to sedimentation for water purification and disposes sewage by diln. Bergedorf with no water available for diln. uses Imhoff tanks and sprinkling filters followed by fish ponds. This method is also used at Strassburg where satisfactory results with a diln. of 2 to 3 parts pure water are claimed. Methods of Fe removal at Berlin are described. Special attention is called to Reinsch screens and also the disposal of sewage on sewage farms with comment on the types of crops obtained from such farms. The Lab. of Water Hygiene is given attention. At Dresden the Mn content has caused considerable trouble and 2 Mn removal plants, one using Mn-removing algae, the other Mn permutit, are proving satisfactory. The first method is considered the more economical and satisfactory. At Coethen 92% suspended matter is sepd. by sedimentation; the sludge is removed before putrefaction starts and the effluent passes to sprinkling filters. Magdeburg has the only large plant using Puech-Chabal filters. The method is satisfactory but expensive. At Munich, diln. in the Isar River is sufficient. England: Softening by lime, soda and permutit at Bradford is described; also the largest municipal permutit water softening plant at Hooten near Liverpool. Expts. in aeration with the use of activated sludge in process at Manchester, which work is also being carried out by the Water Survey Sta. at the Univ. of Illinois, are referred to.

D. K. FRENCH.

Magdeburg tap water. O. WENDEL. *Z. angew. Chem.* 28, I, 91-2(1915).—The sanitary analyses and plankton content of the tap water for 1914 with comparative

figures also for 1912 and 1913 are given. The K content in 1914 was somewhat lower, on account of the restriction of the potash industry during the war. The quality of the water is good.

ARTHUR LEDERER.

Paris solves war-time water supply problems. F. M. WELDON. *Eng. Record* 71, 279(1915).—Burial of dead on a watershed forced suspension of Dhuis supply. Seine river water was filtered and sterilized in emergency.

FRANK BACHMANN.

Sewage treatment experiments with aeration and activated sludge. EDWARD BARTOW AND F. W. MOHLMAN. *J. Ind. Eng. Chem.* 7, 318-20(1915); *Eng. News* 73, 647-8(1915); *Munic. J.* 38, 504-5, 509(1915); *Eng. Contr.* 43, 310-1(1915); *Eng. Record* 71, 421-2(1915).—On fresh sewage of domestic origin, nitrate was formed in 15 days by blowing 4830 cu. ft. air. By syphoning off supernatant liquid and refilling, sludge was accumulated. On the 31st treatment, 3 cu. ft. air per gal. sewage were required in 5 hr. Nitrification is complete. One hr. aeration seemed practically sufficient. Worm life was active (*Aeolosoma hemprichi*). The sludge contained (% on dry basis) 6.3 N, 4 fat, 1.44 P, and 75 % volatile matter.

LANGDON PEARSE.

Coöperation sought in conducting activated sludge experiments at Baltimore. LESLIE C. FRANK AND CALVIN W. HENDRICK. *Eng. Record* 71, 521-2(1915).—Discussion of design and operation of continuous flow aero tanks is accompanied by request for suggestions and criticisms.

FRANK BACHMANN.

Sewage aeration at Lawrence and Manchester compared. H. W. CLARK. *Eng. Record* 71, 367-8(1915).—C. states that the heavy, brownish gray, gelatinous and other growths upon the slate beds at Lawrence which clarify the circulating sewage are probably the same bodies as those developed by Fowler and Ardern and Lockett in the Manchester tank and called "activated sludge."

FRANK BACHMANN.

Sewage disinfection for vessels and railway coaches. L. C. FRANK. *Public Health Reports* 30, 9-15(1915).—The app. consists of a tight insulated tank having influent and siphon effluent pipes for the sewage and influent live steam pipe. The steam pipe is fitted with a valve operated by a float which turns on steam when tank is nearly full. Steam pressure after the contents of the box are heated forces the material through the outlet siphon. Bacterially the efficiency is 100%. The app. will cost about \$15-20 per coach. The cost of operation per tank per coach per day is about 11½ cents.

J. GAUB.

Chemical disinfection of excreta. WILLIAM DREYFUS. *Am. J. Public Health* 5, 59-63(1915).—Excreta collected in a tank containing 3 inches of water to which is added 2% of a germicide especially adapted to the purpose and having a phenol coefficient of 9 to 10, was satisfactorily disinfected. Good results were obtained whether the material was mixed or allowed to remain quiescent. The fluid contents of the tank could have been disposed of at any time in any manner esthetically acceptable and would not possibly become a menace to health. Similar expts. using 1% and 2% solns. of formalin did not give satisfactory results.

E. BARTOW.

Ninth report Royal Commission on Sewage Disposal. ANON. *Can. Eng.* 28, 484, 491(1915); *Eng. News* 73, 785(1915).—A concise summary of earlier reports, dealing also with the discharge of manufacturing wastes which may not be taken into sewers, and with the disposal of domestic sewage and refuse in rural areas. Standards are prescribed for industrial wastes based (1) on the max. allowable suspended matter, and (2) on the dissolved O absorbed. The wastes are classified by content of suspended matter, dissolved impurities, and by practicability of treatment. Certain waste liquors can be partly purified by clarification. Evapn. may be necessary. Additional standards of hardness, causticity, acidity, arsenic, oil films, etc., are suggested.

L. P.

Maintenance of sewers and disposal works demands treatment of injurious trade wastes. W. L. STEVENSON. *Eng. Record* 71, 256-60(1915).—Damages to sewerage system justify the exclusion of harmful liquids produced by industrial plants. A digest of American and European regulations and a table showing substances excluded from sewer systems in American and Canadian cities are given. FRANK BACHMANN.

Detecting gasoline in sewers. A. D. LITTLE. *Munic. J.* 38, 476(1915); *Eng. Record* 71, 457-8(1915).—The app. consists of a long rubber sampling tube and aspirator, connected to the inlet cock of a priming spark plug, over which is slipped a collapsed rubber balloon. The balloon is inflated, and a spark made at the plug terminals. If gasoline vapor is present, from 1.1% up, an explosion occurs. LANGDON PEARSE.

Multiple-flow chambers in Imhoff tanks. JOHN H. GREGORY. *Eng. Record* 71, 433-4(1915).—An engineering discussion. FRANK BACHMANN.

Factors in design of Imhoff tanks at Fitchburg (Mass.). DAVID A. HARTWELL. *Eng. Record* 71, 332-3(1915).—There are five Imhoff tanks/ rectangular in plan, each measuring 30 X 90 ft., with a bottom in the form of 3 V-shaped depressions. The depth of the sewage in the tanks is 24 ft. 5 in. The tanks were designed to treat the sewage flow in 1930. The sludge digestion compartment of each tank was designed to store the sludge for a period of 6 mos. on the basis of a production of 7 cu. ft. of sludge per day for each 1000 persons. The sedimentation compartment provides for a detention period of from 7.3 hrs. for 3 mil. gal. to 1.6 hrs. for 14 mil. gal. The velocity of flow through the tank would be 16.3 ft. per hr. with a rate of 4 mil. gal. and 57 ft. per hr. with 14 mil. gal. FRANK BACHMANN.

Imhoff sewage tank at Manchester, England. O. J. WILKINSON. *Eng. News* 73, 770-1(1915).—A plant to handle 900,000 gal. per 24 hrs. of domestic sewage is described. LANGDON PEARSE.

Three districts for disposal of Cleveland's sewage. R. W. PRATT. *Eng. Record* 71, 422-3(1915); cf. *C. A.* 9, 113.—It is the intention to have three sewage districts: the southerly, westerly and easterly. The westerly district will have treatment works consisting of grit chambers, fine mesh screens, disinfection app. and the discharge of the sewage through submerged outlet into the lake. The sewage from the easterly district will be treated in grit chambers and sedimentation tanks and disinfected. The southerly district's treatment involves grit chambers, sedimentation tanks and sprinkling filters. FRANK BACHMANN.

Design, cost and operation of new sewage treatment plant at state hospital, Warren, Pa. P. E. MEBUS AND F. R. BERLIN. *Eng. Contr.* 43, 265-8(1915).—Electrically driven pumps force the sewage to the plant, which contains Imhoff tank, dosing chamber, sprinkling filter (0.22 acre, 7.5 ft. deep), chemical house, secondary tank and sludge beds. The effluent of the filter is disinfected with $\text{Ca}(\text{OCl})_2$, reducing the bact. content to 9 to 72 per cc. The cost was \$37,855.90 for sewerage and treatment works to care for a population of 1800 with a flow of 150 gal. per capita. LANGDON PEARSE.

Low river flow exacting for Columbus sewage works. C. B. HOOVER. *Annual Report* 1914; *Eng. Record* 71, 492(1915).—Tank treatment reduced the suspended matter 60% and the dissolved O demand 25%. The purifying agencies in the filter beds were more active than in previous years. The present septic tanks are to be converted into Imhoff tanks. A table giving the analytical summary of the Columbus sewage treatment works is given. FRANK BACHMANN.

Schenectady's sewage disposal plant. *Munic. J.* 38, 499-504(1915).—An engineering description of a plant handling 8 mil. gal. daily with grit chamber, Imhoff tank and sprinkling filters, with sludge bed. LANGDON PEARSE.

Decatur (Illinois) installs plant for sewage tests. LANGDON PEARSE AND S. A. GREKLEY. *Eng. Record* 71, 495-6(1915).—A small expt. station was built to investigate possibilities of treating sewage containing corn products and gas works waste. It consists of coarse bar screens and grit chambers, an Imhoff tank, a sprinkling filter and secondary settling basin.
FRANK BACHMANN.

Processes available for the treatment of industrial wastes. LANGDON PEARSE. *Proc. Ind. Water Supply and San. Assoc.* 1915; *Eng. Contr.* 43, 363-5(1915).—A review of the status of the treatment of industrial wastes. The wastes are classified, and the procedure for taking up a problem indicated. The methods available are discussed: screening, settling, chem. pptn., septic tanks, filtration and evapn., with their application to packing houses, tanneries, etc. The sludge problem is important, as sludge may run as high as 100 cu. yds. to the mil. gal., with no assumed value. The O demand may be high, 900 to 1300 p. p. m. on mixed packing-house waste, with 20% consumed in first 24 hrs.; 400 to 1000 p. p. m. on tanneries, with 7% demand in first 24 hrs. Domestic sewage at 39th St. had O demand 100 to 125 p. p. m. with 25 to 30% in first 24 hrs., all at 20°. Care in design of works is recommended to produce efficient results at low operating cost. The treatment of sep. or mixed wastes is one of expediency, mixed wastes frequently being easier to handle.

LANGDON PEARSE.

All steel refuse incinerator, Roanoke, Va. J. C. WOODMAN. *Eng. News* 73, 678-89(1915).—This incinerator has a 50 ton capacity for a town having a population of 45,000. The furnace holds 16 cu. yds. refuse. The cost of the plant was \$41,350. The cost of operation ran from 30.6 to 44.3 cents on 3 test runs, the av. being 39 cents per ton over 16 days. Record of test is given.

LANGDON PEARSE.

Third report of the committee on standard methods for the examination of air. *Am. J. Pub. Health* 5, 250-4(1915).—The principal detns. are (1) temp. and humidity, (2) dust, (3) CO₂, (4) bacteria, (5) poisonous gases and metals. A recording psychrometer, in which the expansion of an inert gas in wet and dry bulbs is transmitted through tubes to a recording clock dial of the usual type, is satisfactory. The sugar filtration method for the detn. of dust is reasonably satisfactory. The modified Petterson-Palmquist is an entirely satisfactory method for CO₂ detns. The detn. of mouth streptococci is important. Tests for CO, CH₃OH, SO₂, CH₃(CH₂)₃CH₂OH, CH₃CO₂C₂H₅ and other poisonous fumes should be standardized.

J. GAUB.

Cyanide fumigation of ships. N. ROBERTS. *Pub. Health Reports* 29, 3321-5 (1914).—Two methods are described, both depending on the reaction $\text{KCN} + \text{H}_2\text{SO}_4 = \text{HCN} + \text{KHSO}_4$ for the HCN. Usually 1 oz. is used for 100 cu. ft. with 1 1/2 oz. H₂SO₄ and 3 fluid oz. of H₂O. HCN vapor when mixed with air in proportion of about 0.4% kills rats, vermin, etc., and some bacteria. It is efficient in plague prevention. Compared with SO₂ and CO, HCN is more advantageous in that no fire and no elaborate app. are required.

J. GAUB.

Electrolytic action on water mains (YERBURY) 4. Estimation of volume of solid matter in muds (COLEMAN) 7. Utilization of nitrogen and organic matter in sludges (LIPMAN) 15.

LEFFMAN, H.: *Examination of Water for Sanitary and Technical Purposes.* Seventh edition. Philadelphia: Blakiston. \$1.25.

METCALF, L. AND EDDY, H. P.: *American Sewerage Practice.* Vol. II. *Construction of Sewers.* New York: McGraw-Hill Book Co. 564 pp. \$4.00.

U. S., 1,135,390, Apr. 13. A. B. OGDEN. Apparatus for drying solids or sludge recovered from sewage.

U. S., 1,135,684, Apr. 13. T. R. GREENHORNE. Removing boiler scale. See Brit., 17,462, 1913 (C. A. 9, 345).

U. S., 1,135,753, Apr. 13. A. H. BALDWIN. Apparatus for filtering water.

Brit., 28,537, Dec. 10, 1913. O. SÖDERLUND and T. BOBERG and TECHNO-CHEMICAL LABORATORIES, LTD. In distilling water from sea-water and other dil. solns. in film evaporators heated by the steam evolved from the soln., the steam being only slightly compressed, as described in 12,462, 1911 (C. A. 6, 3039), the evapn. is interrupted before undue rise in b. p. or scaling has occurred, and the residual liquid and the distillate are used for preheating the sea-water, etc. For this purpose, there may be used 2 evaporators or sections of an evaporator and 2 preheaters, 1 heating the feed for 1 evaporator by means of the residual liquid from both evaporators, and the other feeding the other evaporator with liquid preheated by the condensate from both evaporators.

15. SOILS AND FERTILIZERS.

M. X. SULLIVAN.

Osmosis in soils. C. J. LYNDE and J. V. DUPRÉ. Macdonald Coll., Que. *Trans. Roy. Soc. Can.* 8, Sect. III, 133-8(1914); cf. C. A. 8, 3477, 3610.—Using a conc. soil soln. as soln. and a column of soil approx. 2.5 inches deep as semi-permeable membrane an osmotic pressure was obtained equal to the pressure exerted by a column of H₂O 11.5 ft. high. The pressures observed are not due to the swelling of the soil column, but to osmosis; the semi-permeable membrane employed resembles ordinary semi-permeable membranes, since it is probably colloidal, and it absorbs H₂O more readily than it does a soil soln.

A. T. CAMERON.

Statistics of trade in artificial fertilizer materials in Austria Hungary. F. W. DAFERT and R. MIKLAUZ. *Z. Landw. Versuchsw.* 18, 1-10(1915).—Statistics for 6 yrs. (1907-12) on the production, consumption, export and import of superphosphate, Thomas-slag meal, Chile saltpeter, (NH₄)₂SO₄, and potash.

C. F. MILLER.

Availability of the nitrogen in Pacific Coast kelps. G. R. STEWART. *J. Agr. Res.* 4, 21-38(1915).—In prepg. dried and ground kelp as a fertilizer the availability or readiness with which the N in it changed to NH₃ and nitrates in fresh field soil was found to vary with different species and with the manner of prepn. The N of *Nereocystis luetkeana* is relatively very available while that of *Pelagophycus porra* is less readily changed. These 2 varieties are of minor commercial importance. *Macrocystis pyrifera*, the commercial variety, is very slowly changed in the soil. The availability of the N of *M. pyrifera* is greatest when the kelp is added in a fresh or only partially dried condition. When fully dried the availability of the N decreases materially. Removing a large portion of the salts from either fresh or dry *Macrocystis* by leaching does not cause it to decomp. more readily. To grind readily *Macrocystis* must be dried until crisp, but should not be heated more than necessary and should not be scorched or overheated. The addition of moderate quantities of *Nereocystis* to a sample of fresh soil in the lab. did not interfere with either ammonification or nitrification of readily available organic matter such as dried blood. Similar expts. with *Macrocystis* showed at first a decrease in the rate of transformation especially in nitrification. Later the ammonification and nitrification became practically normal. When kelp is used in field practice, it is probable that neither ammonification nor nitrification would be interfered with by kelp or the salts in it.

M. X. S.

Organic constituents of Pacific Coast kelps. D. R. HOAGLAND. *J. Agr. Res.* 4, 39-58(1915).—After a brief résumé of the literature the general comp. of the principal species of Pacific Coast kelps is discussed. An extended series of analyses is presented with exptl. data concerning the nature of algin and other carbohydrate compds. present. The forms of N in the kelp are considered. Much of the N is in a non-protein form. Expts. are reported on the form of the I; only a small proportion of it is believed to be organically combined. The high content of organic S in the kelp is noted and a table of analyses is given. The economic phases are discussed with reference to feeding value and utilization of organic by-products. The results indicate only slight possibility of commercial value in these directions. Comparative lab. expts. on the destructive distn. of kelp, oak sawdust, and Douglas fir shavings were made and the conclusion is reached that kelp distillates are of no practical importance. M. X. S.

Influence of manganese upon the nitrifying bacteria of leguminous plants. M. D. OLARU. *Compt. rend.* 160, 280-3(1915); *J. Soc. Chem. Ind.* 34, 294.—Nitrifying bacteria from the root nodules of leguminous plants were cultivated in a sterilized broth prep'd. from haricot beans with the addition of 2% sucrose. To 100 cc. of this medium 0.01-1.0 mg. $MnSO_4$ was added and after keeping at 19° for 48 hrs. the gain of N was det'd. The max. increase (75.5%) was obtained when 0.5 mg. Mn was added, the control showing a gain of 3.5%. Other expts. with a slightly weaker broth, containing less initial N and extending over 50 and 114 days showed that the optimum quantity of Mn was 2.0 mg. in each case and the % gain of N 38.4 and 31.2, resp. The controls gave 8.8 and 5.6% gain in N. M. X. S.

Fertilizer value of sodium chloride. II. H. G. SÖDERBAUM. *Kgl. Landbruks Akad. Handlingar Tidskrift* 54, 19-29(1915); cf. *Ibid* 1912, 21-9; *C. A.* 8, 1183.—The conclusion that this salt under certain circumstances assumes the role of KCl in fertilizing rests upon the assumption that the latter does not, as has been hitherto considered, function through its K content but by some other property in common with the NaCl. The property in common may lie in the Cl or in a "general salt influence." The "general salt influence" may be defined as the power to dissociate into a certain amount of positive and negative ions which, without serving as direct nutrients, nevertheless satisfy certain other physiological needs which are as yet unexplained. The effect on the yield of grain varied from -3 to +13% after the addition of NaCl. When added to $NaNO_3$ the total crop increased 16%; to NH_4Cl , 3%; and to $(NH_4)_2SO_4$, 29%. S. does not recommend as yet the substitution of KCl by NaCl in general practice. A. R. ROSE.

The utilization of the nitrogen and organic matter in septic and Imhoff tank sludges. C. B. LIPMAN AND P. S. BURGESS. Univ. Calif. Agr. Expt. Sta., *Bull.* 251(1915).—Septic and Imhoff tank sludges contain from 1.23 to 2.66% of N and from 0.77 to 1.82% of P_2O_5 . The com. value would not exceed \$10 per ton of dry material. The actual value would depend upon the available N present. A new method is suggested for detg. available N. It is transformed from organic N to nitrate N by means of the soil itself. Not only do the different sludges behave differently in any one soil but different soils have a different action on the various sludges and also on common com. N carriers. Sludge should furnish valuable fertilizers but should be used either alone or in combination with superphosphates or K salts in accordance with the needs of the various soils. E. BARTOW.

Road sweepings as manure. *J. Board Agr.* 21, 733(1914); *Exp. Sta. Rec.* 32, 219.—A chem. analysis of road sweepings is given; it shows that they contain about the same constituents as an ordinary soil. J. J. S.

Review of recent work on anticryptogams and insecticides. G. TOMMASI. Rome. *Ann. chim. applicata* 3, 111-46(1915).—Topics reviewed are: Cu salts, $FeSO_4$, HCHO,

S, polysulfides, lime-S mixts., CS_2 , soap, petroleum, "carbolineum" phenols, nicotine, As preps. and HCN. S. LEVY.

Radioactive content of Minnesota soils (SANDERSON) 3. Electro-culture (LÖB) 11A.

FORTI, C.: *I concimi e le concimazioni*. 2e ediz. Torino. 414 pp. 10.50 Lire.

MARESCALCHI, A.: *Guida pratica per la concimazioni*. Casalmoferrato: 137 pp. 2 Lire.

U. S., 1,135,387, Apr. 13. A. MESSERSCHMITT. Making a fertilizer by decomp. silicious rocks containing K by heating with lime and treating the resulting product with nitrous gases and H_2O in sufficient amt. to convert part of the basic compds. formed into nitrate. Cf. C. A. 8, 980.

U. S., 1,135,639, Apr. 13. F. S. WASHBURN. Fertilizer made by mixing lime-nitrogen with partly dried tankage products to complete the fixation of the residual moisture of the tankage and increase the N content of the product. Cf. C. A. 8, 2773.

U. S., 1,136,723, Apr. 20. A. SCHMIDT. A non-explosive fungicide is prepd. by mixing waste sulfite-cellulose liquor with the Na or other salts of dinitrophenol, dinitroresol or similar nitro compds.

Ger., 280,182, Aug. 8, 1913. MELASSESCHLEMPER G. M. B. H. Obtaining a permanent, dry and easily scattered fertilizer from molasses slops and superphosphate. Cf. C. A. 9, 349.

16. FERMENTED AND DISTILLED LIQUORS.

ROBERT WAHL.

Acidic energy of wines. C. MENSIO AND E. GARINO. *Ann. R. accad. agricoltura Torino* 56, 138(1914); through *Ann. chim. applicata* 3, 148.—The values obtained by inversion of sucrose at $+76^\circ$, are not always comparable to those given by catalysis with ethyl diazoacetate, but the causes for these differences are unknown. Using the values obtained by inversion of sucrose as being more const., it has been found that the acidic energy of the wines examd. varies between very wide limits, about equal to the energy possessed by 1/1000 and 1/3000 N HCl. The energy of Barbera wines and of common table wines is about that of 1/1000 N HCl. That of dry white wines is about that of 1/1700 N HCl, and that of Muscat wines, 1/3000 N HCl. That of vinegar examined is very much less, as AcOH is only slightly dissociated. In fermentation, different treatments produce quite remarkable changes in the acidic energy. Gypsum (150–300 g. per hectoliter) increased it considerably. Greater increase still was brought about by H_2SO_4 (50–100 g. per hectoliter). CaHPO_4 (150–300 g. per hectoliter) had no effect. H_3PO_4 was about equal in its effect to gypsum, but less than H_2SO_4 . S. LEVY.

Determination of arsenic in wine made from grapes that had been subjected to cuproarsenical treatment. E. GARINO. *Ann. R. accad. agricoltura Torino* 56, 78 (1914); through *Ann. chim. applicata* 3, 148.—In fermentation, As begins to have some action in quantities of 1% As_2O_3 , while Cu does not influence the decomp. of the sugar when added in doses of from 0.05–1.00%, since it becomes insol. The amts. of As met with in analysis of wines from grapes subjected to cuproarsenical treatment are very small, being less than the minimum therapeutic dose of 5 mg. and therefore need cause no alarm. S. LEVY.

Palm wine (laghbi) of the Tripoli oasis. DANTE BACHILLI. Tripoli. *Ann. chim. applicata* 3, 101-10(1915).—Three wines were analyzed, both unfermented and fermented. The fermentation took place at 12-15°, in 7-9 days, and the resulting wines were very light and sparkling and resembled cider. The fresh wines were slightly, the fermented wines distinctly acid. Wine (1) was from the palm *muftile*, wines (2) and (3) from the palm *tabuni*. Analyses, based on 1000 cc. liquid (1st value refers to fresh, 2nd value to fermented wine); sp. gr. (1) 1.0542, 1.0153; (2) 1.0679, 1.0285; (3) 1.0718, 1.0220; total acidity, as malic acid, (1) 0.31, 4.42; (2) 0.36, 5.89; (3) 0.06, 6.20; dry ext., (1) 143.89, 57.16; (2) 188.19, 97.24; (3) 182.43, 80.15; ash, (1) 1.81, 1.85; (2) 1.51, 2.04; (3) 2.17, 2.57; alkalinity of ash (in K_2CO_3 as % of ash), (1) 2.94, 2.54; (2) 2.79, 2.40; (3) 3.67, 3.41; succinic acid, (1) 0.35, (2) 0.33, (3) 0.45; reducing sugars as glucose, (1) 12.82, (2) 16.12, (3) 8.32; non-reducing sugars as saccharose, (1) 100.87; (2) 113.08, (3) 117.70; gum, (1) 9.12, (2) 10.84, (3) 17.04; mannite, (1) 4.98, (2) 5.10, (3) 4.12; glycerine, (1) 0.96, (2) 1.86, (3) 1.25; N, (1) 0.18, (2) 0.27, (3) 0.37; albuminous substances, (1) 1.12, (2) 1.69, (3) 2.31; peptic and mucilaginous substances, and those not detd., (1) 11.86, (2) 37.66, (3) 30.07; alc. by wt., (1) —, 45.10; (2) —, 46.30; (3) —, 45.70; volatile acidity as $AcOH$, (1) —, 1.02; (2) —, 1.14; (3) —, 0.72; residual sugar as glucose, (1) —, 10.40; (2) —, 12.36; (3) —, 10.96. The % comp. of the ash of (1) fresh wine was K_2O , 46.10; Na_2O , 10.40; MgO , 5.02; CaO , 3.20; Al_2O_3 , 3.54; Fe_2O_3 , 0.38; Cl , 13.91; P_2O_5 , 11.40; SO_3 , 5.30; SiO_2 , 0.72. S. LEVY.

The steaming of corn and its influence on the time of refining. R. KUSSEW. *Mitt. Brenneri Presshefe-Fabr.* 1913, No. 48; *Chem. Tech. Rept.* 38, 24(1914).—K. recommends a gradual increase of pressure in the steaming of corn. A final pressure of 2.5 atms. is most suitable. $CaSO_4$ aids in the opening of the grain, $Ca(HCO_3)_2$ retards the action; hence the water used should be treated with gypsum and Ca phosphate. Double conical boilers are recommended as especially advantageous.

J. S. G.

The scientific basis in the production of beer. E. WEINWURM. *Naturwissenschaft.* 3, 165-70(1915).—A review. C. G. F.

U. S., 1,136,559, Apr. 20. V. SLAVICK. In the continuous distillation and rectification of alcoholic liquids, the raw alc. vapor is divided into 2 portions. The non-cooled phlegms of one portion of the head products are purified and introduced at the beginning of the rectification into the alc. raw vapor of the second portion, this portion having been previously deprived of head products, leaving the tail products. The phlegms thus vaporized are impregnated with tail products and prevented from becoming satd. with alc.

17. PHARMACEUTICAL CHEMISTRY.

M. I. WILBERT.

Animal charcoal. HANS HELCH. *Pharm. Post* 47, 949-50(1914).—Tests of purity: (a) 0.1 g. finely sifted and dried (at 120°) charcoal should completely decolorize at least 20 cc. of a 1% soln. of methylene blue-HCl within 1 min. when shaken with it in a closed flask. (b) If 2.3 g. charcoal is shaken with 65 cc. of a 1% methylene blue-HCl soln., on drinking the mixt. no color should appear in the urine in 24 hrs. The lighter and more voluminous the charcoal the greater is its power of adsorption; for this reason blood charcoal is superior to bone charcoal. C. O. EWING.

The physiological assay of digitalis preparations. RAPP. Munich. *Pharm. Zentralhalle* 55, 961-4, 978-82(1914); cf. *C. A.* 9, 508; 8, 2778.—In the assay of digitalis

with frogs, concordant results were obtained by the 1 hr. method of Hale, which is described. Good results were also obtained on com. preps. of digitalis. Since there are seasonal and yearly variations in the frogs, each lot should be tested with the standard digitoxin of Killiani to det. its resistivity. The digitoxin to be tested should be taken up in 25% alc. and dilns. should also be made with 25% alc. The activity of com. preps. is preferably expressed in digitoxin units. C. O. EWING.

The qualitative separation and identification of some hydroxymethylantraquinones. E. M. BAILEY. *Am. J. Pharm.* **87**, 145-54(1915).—Expts. to find some color reactions which would serve to differentiate between the common cathartic drugs, senna, rhubarb, aloes and the various species of buckthorn—all characterized by a group of color principles known as hydroxymethylantraquinones—led to some interesting differences among the hydroxymethylantraquinones themselves, more especially between the dihydroxymethyl and trihydroxymethyl derivatives, chrysophanic acid and emodin, resp. The mixed color principles were obtained by hot extn. with benzene, as recommended by De la Rue and Müller (*J. Chem. Soc.* **10**, 298). This benzene soln. was then washed, first with portions of 5% $(\text{NH}_4)_2\text{CO}_3$ soln., then with 5% Na_2CO_3 and finally with 5% NaOH , thus removing unidentified anthraquinone derivs., emodin and chrysophanic acid in the order named. The 3 aq. solns. were then separately acidified and shaken out with ether, and the ether residues examd. directly or after recrystn. from alc. The differentiation of the several residues was made chiefly on the basis of their m. ps. and color reactions. The m. ps. are regarded rather as broadly differentiating between the substances sepd. than as precise observations intending to indicate states of purity. The color reactions were obtained by treating with concd. H_2SO_4 , concd. HNO_3 , and H_2O successively. The distinguishing features are that emodin gives an intense pink color immediately on addition of concd. H_2SO_4 , and a pink soln., or one with a decided pink tinge, on final diln. with H_2O ; chrysophanic acid gives an orange-red color with H_2SO_4 , and on final diln., a yellow soln. and a yellow ppt. The Na_2CO_3 -sol. color fraction derived from aloes is an exception to the behavior of emodin as derived from buckthorn, rhubarb, and senna. The unidentified hydroxymethylantraquinone, or mixt., obtained in the $(\text{NH}_4)_2\text{CO}_3$ fraction is characterized by an intense purple or violet color with concd. H_2SO_4 . These reactions may be summarized as follows: (1) Emodin, as derived from buckthorn, rhubarb and senna: with concd. H_2SO_4 = pink; + HNO_3 = yellow; + H_2O = pink soln. (2) Emodin, from aloes, $(\text{NH}_4)_2\text{CO}_3$ -sol.: with concd. H_2SO_4 = red, brownish; + HNO_3 = yellow; + H_2O = yellow soln. (3) Chrysophanic acid, as derived from all sources: with concd. H_2SO_4 = orange red; + HNO_3 = yellow; + H_2O = yellow soln. and ppt. (4) Unidentified hydroxymethylantraquinones, $(\text{NH}_4)_2\text{CO}_3$ -sol.: with concd. H_2SO_4 = purple or violet; + HNO_3 = yellow; + H_2O = yellow soln.

W. G. GAESSLER.

Finnish pharmacopeia last edition. Issued Jan. 1, 1915.—Revision occupied the comm. 6 yrs. The question of nomenclature was one of chief concern of the comm. The Latin won over the German.

A. R. ROSE.

Folium digitalis. J. W. HAMMER. *Svensk Farm. Tid.* **19**, 69-74(1915).—Exam. of a large number of samples gave a wide range of values varying with the source and time of storage. A loss of from 20.9 to 72.0% of original pharm. strength occurred in 8 months. Each lot should be tested separately before allowed to go into any prescription.

A. R. ROSE.

Strychnine and brucine content of nux vomica. JOHN E. ERICSON. *Svensk Farm. Tidskrift.* **19**, 74-7(1915).—A study of the prep. of nux vomica as given in the Swedish Pharm. This authority differs from the Eng. and Am. Pharms. in that the alkaloid is calcd. in the former as strychnine and brucine while in the latter it is valued on the basis of the strychnine alone. E. tested the methods of analysis in the Eng. Pharm.

and found them to accord with the theoretical values within 1%. In 12 samples of *nux vomica* ext. the total alkaloid was 13.1–27.5%; of this 34–88.6% was strychnine and 14–66% brucine. In 6 samples of powder and 6 of tincture, the variation of the total alkaloid was very great; the strychnine varied from 45 to 56% of the total alkaloid.

A. R. ROSE.

Detection of vanillin in quinine wines. A. C. CHAUVIN. *Ann. fals.* 7, 420–2 (1914); *J. Soc. Chem. Ind.* 34, 247.—Lecomte proposed the following test: Mix an ethereal ext. of the wine with dil. HCl and add an alc. soln. of phloroglucinol. In the presence of vanillin a red zone appears at the junction of the two liquids in about 10 min. C. states that this test is also given by furfural and its derivatives which are frequently present in quinine wines and therefore this reaction is not characteristic of vanillin.

H. R. SMITH.

Determination of iodine in pharmaceutical preparations. C. LORMAND. *Ann. fals.* 7, 432–41 (1914); *J. Soc. Chem. Ind.* 34, 248.—L. criticizes the methods given in the French Codex and establishes the following methods as being the best: In tincture of I a 5 g. sample is treated with 6 drops NaHSO₃ soln., dild. with H₂O and the excess bisulfite converted into the sulfite by 2 drops NaOH soln. This soln. is then treated with 5 drops HNO₃, boiled, and the I pptd. as AgI after the addition of more HNO₃. In the analysis of iodine-iodide ointment a portion of the free I may be absorbed by the fatty constituent. For iodo-tannin-phosphated wine treat 50 g. with milk of lime prepd. from 10 g. of lime, dil. to 250 cc., filter, and titrate the I in an aliquot part by the thiocyanate method.

H. R. SMITH.

Papain. H. F. MACMILLAN. *Chem. and Druggist* 1915, 133–6; *J. Soc. Chem. Ind.* 34, 246–7; cf. F. W. Heyl, *et al.*, *C. A.* 9, 235.—The papaw tree (*Carica papaya*) is largely grown in Ceylon, the Hawaiian Islands and the West Indies for its edible fruits and for the prepn. of papain. Papain is prepd. by scarifying the nearly mature green fruits, while still on the tree, with a bone or ivory knife, and collecting the milky, viscid exudate in porcelain, glass, or earthenware vessels. The juice rapidly coagulates and must be dried promptly to prevent decomp.; a trace of formalin may be added to the juice as a preservative. The coagulum is sometimes dried in the sun but preferably by artificial means. In Montserrat driers, 3 ft. by 3 ft. by 6 ft. in length, are used, having sides and ends of brick and open at the top. About 1 ft. below the top is an Fe sheet on which is a layer of sand 1–2 in. deep. The coagulum is spread upon brown linen held in frames which fit the top of the drier, or upon sheets of glass. Drying is effected at a low temp., sometimes below 38°. The dried material, when ground, yields a white or cream-colored powder, which is packed in tightly closed bottles. The exports of papain from Ceylon for the years 1911, 1912 and 1913 were: 6,611, 12,920 and 18,548 lbs. Considerable difference of opinion exists as to whether Ceylon or West Indian papain is the better, this being largely due to the general practice of adulterating papain, particularly Ceylon papain, with starch, rice, etc. Genuine papain has a slightly salt and somewhat acrid flavor, and a peculiar, characteristic smell. It should be crisp and not sticky.

F. W. SMITHER.

Antipyrine methylarsonate. L. BARTHE. *Bull. soc. pharm. Bordeaux* 1914, 348; *Pharm. J.* 94, 99 (1915).—The comp. of this compd. is O:As(OH)₂CH₃.2(C₁₁H₁₁N₂O)₄H₂O. For its prepn., add to a warm H₂O alc. soln. of methylarsonic acid 1 mol., antipyrine 2 mols., in concd. EtOH soln., boil the mixt., filter, allow to cryst. over H₂SO₄. The compd. is sol. in H₂O (28.5:100), sol. in EtOH, optically inactive. Towards KOH, NaOH, NH₄OH, CuSO₄, HNO₃, FeCl₃, I soln., alkaloidal reagents and NaClO soln., the compd. behaves like antipyrine dimethyl arsinat (see following abst.).

HNO_3 produces a beautiful currant red color. HgNO_3 causes a blackish ppt., not yellow as with antipyrine. S. WALDBOTT.

Antipyrine dimethylarsinate. L. BARTHE. *Bull. soc. pharm. Bordeaux* 1914, 353; *Pharm. J.* 94, 99(1915).—The comp. of this compd. is $\text{O:As(OH)(CH}_3)_2 \cdot (\text{C}_{11}\text{H}_{12}\text{N}_2\text{O})_2 \cdot 2\text{H}_2\text{O}$. For its prep., add to a concd. H_2O alc. soln. of O:As(OH)Me_2 1 mol., antipyrine 1 mol., dissolved in dil. EtOH, boil the mixt. and allow to cryst. over H_2SO_4 . The prepn. is sol. in H_2O (24.5:100), sol. in EtOH and m. below 100° . KOH or NaOH, but not NH_4OH form an emulsion-like white ppt. insol. in excess. CuSO_4 causes slight fluorescence but no ppt. $\text{NaNO}_3 + \text{AcOH}$ produces a fine blue color and FeCl_3 a blood red. 1 soln. and the usual alkaloidal reagents give ppts. NaClO soln. added to an aq. soln. of the prep. develops the odor of bitter almonds in a short time. S. W.

Absorptive power of magnesium carbonate for volatile products. J. MARANNE. *L'union pharm.* Dec. 1914, 517; *Pharm. J.* 94, 67(1915).—A cube of Mg carbonate sepd. from camphor only by stout paper (3 layers) acquired, after 2 months or less, a barely perceptible odor of camphor. On triturating it with H_2O , the odor became more distinct, but still was feeble; but when dissolved by citric acid, almost as strong an odor as that of spirit of camphor was developed. Hence the necessity of keeping Mg carbonate sepd. from volatile substances to avoid disagreeable flavor in certain preps., e. g., the limonade purgative of the French Pharm. S. WALDBOTT.

Bacterial versus vegetable toxins. J. S. WHITE. *Pharm. J.* 94, 156(1915).—The prep. of ricin and antiricin is described and their importance in the development of bacterial serum therapy is emphasized. S. WALDBOTT.

***o*-Acetoxybenzoic acid.** HENRY L. SMITH. London. *Pharm. J.* 94, 200-1, 311(1915).—Expts. on 6 samples, 1 being aspirin, show the pure compd. to be obtainable in trade. The color test for free salicylic acid detects the impure sample. Other tests applied are m. p. (the pure compd. m. 135° , *p*-acetoxybenzoic acid m. 185°), and the number of mg. required for complete sapon. of 1 g. of compd. (622.2 mg. for the pure compd.). In further tests, the number of cc. of 0.1 N Ba(OH)_2 required to neutralize 0.5 g. of sample was detd. at the end of $\frac{1}{2}$, 1, 2 and 3 hrs. in 200 cc. soln. of (a) H_2O , (b) 0.2% HCl, at 37° . This measures the relative hydrolysis of the samples under conditions prevailing in the stomach. The amts. of salicylic acid set free within 3 hrs. were detd. by color test, using a standard containing Fe alum and known equivs. of AcOH and salicylic acid. Intestinal hydrolysis was simulated with 200 cc. of 1% Na_2CO_3 acting on 0.5 g. of each sample at 37° , and the amt. of salicylic acid formed after 10, 20, 40, 60 and 80 min. was detd. by color test. All results are tabulated. In 1 impure sample, salicylic acid was detd. by the Br method. It gave 77.16%, aspirin gave 76.02%, theory 76.67%. The impurity recrystd. m. $159-61^\circ$ and was neutralized by 555 mg. KOH per 1 g. This indicates *o*-acetoxybenzoxybenzoic acid, due to faulty prepn. Crystn. of *o*-acetoxybenzoic acid from benzene (needles), or from Ac_2O or CCl_4 (plates), may account for difference in appearance of com. samples. S. W.

Discoloration of sodium salicylate solution by alkalis. H. G. GREENISH AND A. E. BRESLEY. *Pharm. J.* 94, 201-2(1915).—A soln. of Na salicylate to which NaHCO_3 has been added, gradually turns brownish, then dark brown or nearly black, eventually forming a black ppt. As a result of a series of expts., this seems to be due to the O of the air acting on the salicylate in the presence of Na sesquicarbonate. Why this salt should act so much more rapidly than either NaHCO_3 , Na_2CO_3 or NaOH, is yet unknown. Addition of about 1 grain of Na_2SO_3 or NaHSO_3 to the regular 8 oz. mixt. has a marked preservative effect. S. WALDBOTT.

The discovery of medicinal substances. A. HEFFTER. *Schweiz. Apoth. Ztg.* 53, 8-11(1915). S. WALDBOTT.

Common salt, and its use as medicine. F. BERGER. *Schweiz. Apoth. Ztg.* 53, 57-60, 73-6, 89-92, 103-6, 121-5, 132-5(1915).—A descriptive historical account of the occurrence, manuf. and uses of salt.
S. WALDBOTT.

The iodine absorption of pure oil of anise. E. MORIN. *Ann. chim. anal.* 20, 49-52(1915).—The I no. of oil of anise may be used as a basis for detg. the oil content of spirit of anise. The results of expts. based on the accepted I no. of oil of anise (1.391), were high and varied with the amt. of oil in soln. The I index of pure oil of anise as indicated by the results obtained is in the neighborhood of that detd. by Barentin (1.640).
M. I. W.

Analysis of cosmetics. FRANZ ADAM. *Arch. Chem. Mikros.* 7, 201-8(1914).—Pilocarpine and jaborandi leaves have acquired some reputation as hair tonics. A. reports a number of expts. to det. quantitatively the amt. of pilocarpine present in preps. of this type, either alone or in presence of other alkaloids. In extg. pilocarpine an excess of strong alkali or ammonia must be avoided. NaHCO_3 does not attack the lactone ring of pilocarpine and permits of a quantitative extn. by means of CHCl_3 . Ether is not so desirable as a solvent. A mixt. of CHCl_3 and alc. has no advantage over CHCl_3 alone. The quant. sepn. of pilocarpine from other alkaloids, particularly veratrine is difficult.
M. I. W.

The war and drug importations. HARRY B. FRENCH. *J. Am. Pharm. Assoc.* 4, 239-42(1915).—An account of some of the difficulties encountered in the importation of drugs and a table showing some of the variations in the prices of widely used articles.
M. I. W.

The chemistry of cold creams. H. S. GROAT. *J. Am. Pharm. Assoc.* 4, 169-71(1915).—Formulas for various cold creams.
M. I. W.

Artificial perfumes. H. S. GROAT. *J. Am. Pharm. Assoc.* 4, 175-8(1915).—Short description of several of the more common synthetic products used in the making of perfumes.
M. I. W.

Deterioration of galenicals. E. KIMMICH. *J. Am. Pharm. Assoc.* 4, 178-80(1915).—A discussion of some of the changes observed in a number of pharmaceutical preps.
M. I. W.

A new antidote for corrosive sublimate poisoning. WILLIAM A. HALL. *J. Am. Pharm. Assoc.* 4, 183-6(1915).—H. suggests the use of the principles involved in Mayer's reagent as an antidote for corrosive sublimate. A mixt. of KI and quinine hydrochloride is proposed.
M. I. W.

The pharmacognosy of the medicinal rhamnus barks. E. N. GATHERCOAL. *J. Am. Pharm. Assoc.* 4, 65-75, 193-207, 360-71(1915).—A didactic review of the several rhamnus barks used in medicine, the plant character, a discussion of the histology of the drugs with illustrations and a comprehensive list of the literature to date. M. I. W.

Norwegian pharmacopeia. M. I. WILBERT. *J. Am. Pharm. Assoc.* 4, 273-6(1915).—Some of the characteristic features of the Norwegian Pharmacopeia are given.
M. I. W.

A needed change in ointment of zinc oxide, U. S. P. ERNEST R. JONES. *J. Am. Pharm. Assoc.* 4, 283-6(1915).—J. suggests the use of a mixt. of white petrolatum (65) and white wax (15) as a vehicle for ointment of zinc oxide.
M. I. W.

Morphine nitrate and morphine acetate. H. ENGELHARDT AND O. E. WINTERS. *J. Am. Pharm. Assoc.* 4, 288-91(1915).—A comparison of several methods for estg. the purity of morphine salts. From the expts. reported it is evident that the purity of morphine nitrate rarely is above 90% and that the purity of morphine acetate is far below 100% despite the fact that all of the samples examd. exhibited a strong odor of acetic acid.
M. I. W.

The composition and assay of heroine hydrochloride and diacetylmorphine hydrochloride. R. T. HARRIS AND A. M. GLOVER. *J. Am. Pharm. Assoc.* 4, 291-3(1915).—Commercial preps. were found to assay about 5% less alkaloid than was supposed to be present. Samples of heroine-HCl and of diacetylmorphine-HCl were found to vary in the amt. of water which they contained. For the estn. of the alkaloid and its salts the following method is recommended: Treat an amt. of the prepn. representing at least 0.1 g. of the alkaloid and contained in 10 cc. of soln. with 20 cc. CHCl₃ and sufficient 10% NH₄OH to render it slightly alk. After shaking vigorously, draw off the CHCl₃ into a container suitable for titrating. Repeat the extn. with CHCl₃ 3 times; then evap. the combined CHCl₃ ext. Add 5 cc. of 0.1 N HCl or sufficient to completely dissolve the alkaloidal residue; then add a few drops of cochineal soln. and titrate the excess of acid with 0.02 N NaOH. The results obtained are very close to the theoretical.

M. I. W.

Assaying galenicals. JEANNOT HOSTMANN. *J. Am. Pharm. Assoc.* 4, 324-6 (1915).—A discussion of the need for systematic exam. of galenicals with a table showing the cost of the equipment needed to perform the necessary tests.

M. I. W.

British pharmacopeia, 1914. M. I. WILBERT. *J. Am. Pharm. Assoc.* 4, 334-9 (1915).—A review of some of the features of the new Brit. Pharm.

M. I. W.

Preliminary note on a new pharmacodynamic assay method. PAUL S. PITTENGER AND CHAS. E. VANDERKLEED. *J. Am. Pharm. Assoc.* 4, 427-32(1915).—The authors propose the use of *Carassius auratus* (gold fish) as test animals for the digitalis series. Their expts. seem to indicate that the fish die in direct proportion to the strength of the soln. (1:75-1:3800) in which they are placed. Alc. to the extent of that contained in the U. S. P. tincture did not appear to affect the results. The work is to be continued. The authors conclude: (1) Gold fish are sensitive to variations of 2¹/₂% in the strength of the dilns. of digitalis in which they are placed. (2) Variations due to differences in the rate of absorption appear to be practically eliminated by the use of these animals. (3) Decreasing the strength of the diln. increases the sensitiveness of the test. (4) The wt. of the fish may be disregarded when making tests by this method. (5) Variations in the temp. markedly influence the resistance of gold fish to digitalis poisoning. (6) The individual variation in the susceptibility of gold fish is much less than that found in guinea pigs and frogs. (7) The gold fish method is unquestionably the simplest so far proposed and can easily be carried out by those not especially skilled in the pharmacodynamic art. (8) The inexpensiveness of the assay is decidedly in its favor. Gold fish of the proper size can be purchased wholesale for from 45 to 60 cents per dozen. (9) A sufficient number of animals can be procured at all seasons of the year.

M. I. W.

Examination of *Calycanthus floridus* for alkaloids. E. R. MILLER AND H. W. BROOKS. *J. Am. Pharm. Assoc.* 4, 433-4(1915).—A preliminary report. It is highly probable that the plant contains alkaloids, especially in the leaves, the ext. from which produced the most abundant pptn. with the alkaloidal reagents. The subject is to be further investigated.

M. I. W.

Estimation of calomel. R. I. GRANTHAM. *J. Am. Pharm. Assoc.* 4, 441-3(1915).—The iodometric method for the estn. of calomel is considered the most expeditious and convenient. It is not applicable to the analysis of calomel tablets or similar preps. which contain various other ingredients. The following method gave satisfactory results: 0.3 g. of calomel or an equivalent amt. of the powdered tablets is transferred to a 4-ounce Erlenmeyer flask, mixed with 0.5 g. of KClO₃ and 15 to 20 cc. of 10% HCl. The mixt. is digested on a steam bath for 15 min. and then filtered into a large beaker, the filter washed well with water and the filtrate made alk. with NH₄OH. After

the addition of a large excess of acetic acid and 1 to 3 g. of Na- or K-oxalate to the filtrate, the mixt. is boiled, stirring constantly in order to prevent bumping. After allowing the mixt. to settle it is filtered. The ppt. is washed 3 times with hot water by decantation, transferred to a filter and washed with hot water until free from chlorides, using for this purpose about 150 cc. of water in all. The filtrate and wash-water are then heated to about 80° and the Hg is pptd. with H_2S and estd. as HgS in the usual way.

M. I. W.

Some factors in drug absorption in frogs. W. F. BAKER. *J. Am. Pharm. Assoc.* 4, 443-5 (1915).—Among the objections that have been urged against the frog heart assay method for the digitalis bodies are the factors of absorption and the time-limit. The former is undoubtedly the most important, the latter being dependent upon the rate of absorption. While poor absorption may be met with during any time in the year it is especially likely to occur during the spring and late fall. German digitalin, digitoxin and prepn. containing acetic acid or glycerol are very prone to meet with poor absorption. From reported expts. it would appear that absorption may take place from the outer or inner surface of the skin or from the surface of the muscle. The mechanism of absorption or prevention of absorption is not under control of the central nervous system. Frogs kept in the light appear to absorb better than those kept in the dark. The matter of absorption is thought to be largely due to the health of the frogs and the condition under which they are kept, and if proper attention is paid to the handling, cleansing and storing of the frogs, but little difficulty will be experienced with poor absorption. Uniform and reliable results are obtained by the one-hour frog heart method.

M. I. W.

Stillingia sylvatica. E. R. MILLER, R. I. BROOKS AND C. P. RUTLEDGE. *J. Am. Pharm. Assoc.* 4, 445-8 (1915).—A review of the literature relating to the drug and report of expts. which indicate the presence of a small amt. of alkaloid. The amt. of residue obtained was not sufficient for further exam.

M. I. W.

Cannabis sativa. H. C. HAMILTON. *J. Am. Pharm. Assoc.* 4, 448-51 (1915).—The available evidence is contrary to the opinion that the medicinal value of *Cannabis sativa* is found only in the Indian-grown drug. The variable results, both clinical and pharmacological, which are obtainable even with active material, are due to the fact that not all test animals respond uniformly. Many of them must be rejected as not being sufficiently susceptible and even susceptible ones are not uniformly so. The activity of the drug appears to reside in the leaves and the flowering tops of the pistillate plants. With the exercise of caution in selecting the drug and insistence on certain qualities essential to a drug of good quality, American producers can supply material of value practically equal to that imported.

M. I. W.

Estimation of yellow phosphorus. H. ENGLHARDT AND O. E. WINTERS. *J. Am. Pharm. Assoc.* 4, 451-61 (1915).—For the estn. of P in soln. in CHCl_3 or any other suitable solvent, the $\text{Cu}(\text{NO}_3)_2$ method is to be preferred, because the mixt. of Cu phosphide, $\text{Cu}(\text{NO}_3)_2$, water, CHCl_3 , etc., can be treated directly with H_2O_2 soln. Straub's Cu method with Katz's modification was used as follows: The P is dissolved in CHCl_3 free from air and 10 cc. of the soln. corresponding to about 0.3656 g. of P is mixed in a bottle with 15 cc. of 10% $\text{Cu}(\text{NO}_3)_2$ soln. from which the air previously had been expelled by heating. The air in the bottle is replaced by CO_2 and the mixt. shaken for about $\frac{1}{4}$ hr. H_2O_2 is then added and the mixt. shaken again until the black color of the Cu phosphide has disappeared. The aq. soln. is sepd. from the CHCl_3 soln., the latter washed out twice with about 15 cc. of water and the combined aq. solns. and wash-water after the addition of HNO_3 are evapd. to about 5 cc., testing from time to time for unoxidized H_3PO_3 . When oxidation is complete the H_3PO_4 was estd. in the aq. liquid as Mg pyrophosphate. Should any Cu salt sep. together with

MgNH₄PO₄, the latter is re-dissolved and re-precipitated. In this way is obtained Mg pyrophosphate corresponding to 101.5% of the P taken for the estn. M. I. W.

The percentage of moisture lost in the preparation of some official and unofficial drugs. EDWIN L. NEWCOMB. *J. Am. Pharm. Assoc.* 4, 527-30(1915).—A report in tabular form of the average amt. of moisture lost in the drying of vegetable drugs collected during September and October of 1913 and 1914. M. I. W.

A criticism of the United States pharmacopeia descriptions of vegetable drugs. CHALMERS J. ZUFALL. *J. Am. Pharm. Assoc.* 4, 530-40(1915).—Critical suggestions, with illustrations of transverse sections of the several drugs discussed. M. I. W.

MARTINDALE, W. H. AND WESTCOTT, W. W.: *The Extra Pharmacopeia*. 16th ed. Vol. II. London: H. K. Lewis. 469 pp. 7s.

U. S., 1,136,630, Apr. 20. A. J. VAN PESKI. Making acetic anhydride by heating 175 parts of Na acetylsulfate with 269 parts of a mixt. of HOAc, Ac₂O and NaOAc (formed from 242 parts of 42% Ac₂O, 92 parts fuming H₂SO₄ containing 70% SO₃ and 210 parts NaOAc) and distg. off the anhydride from the reaction mixt. A yield of 47.85% (theoretical max. 51%) is obtained.

Brit., 28,928, Dec. 15, 1913. W. K. FREEMAN. Ethyl alcohol is prepared by first bringing H into contact with C at a high temp. to yield ethylene, and then bringing the ethylene into contact with a substance which will supply the elements of H₂O, for example, H₂SO₄; the quantity of ethylene produced controls the supply of H₂SO₄, etc.

Brit., 28,972, Dec. 16, 1913. M. ABRAHAMSON. An ointment is composed of arachis oil, cottonseed oil, ZnO, HOAc, Hg, beeswax, H₂O, and scent.

18. ACIDS, ALKALIES, SALTS AND SUNDRIES.

T. LYNTON BRIGGS.

An industrial method of preparation of copper sulfate. PIETRO FALCIOLA. Napoli. *Ann. chim. applicata* 3, 89-95(1915).—The exptl. app. consisted of a vertical glass tower 0.05 m. diam. and 1.4 m. high; it contained a m. height of Cu spherules resting on broken glass supported on a perforated porcelain plate at a constriction of the tower near its base. About 15 cm. of glass beads rested upon the Cu, and the tower was provided at the top with a separatory funnel, for introduction of acid, and a glass exit tube. The tower was loosely surrounded with an asbestos sleeve, so that the air between the sleeve and the tower at the bottom could be heated. The tower was placed in a porcelain dish so as to make a hydraulic seal with the various liquids used. SO₂ gas from burning S in a crucible was aspirated into the app., and entered at the porcelain plate by a glass tube passing through the hydraulic seal. The current of gas passing upward met a descending stream of properly regulated acids. In different expts. the acids were (1) a 1:1 mixt. of H₂SO₄ (d. 1.4) and conc. HNO₃; (2) dil. (1:3) HNO₃; (3) conc. H₂SO₄. In each case the soln. in the dish at the bottom contained CuSO₄ free of nitrate. The Cu is equally well attacked whether the entering gas is rich or poor in SO₂. F. suggests substituting the Glover tower used in mfg. chamber H₂SO₄ by his Cu tower. S. LEVY.

Colloidal graphite lubrication. W. W. ACHESON, JR. *Chem. Eng.* 21, 127-9 (1915).—A brief review and discussion of the prepn., properties, and uses of Acheson colloidal graphite. F. W. SMITHER.

KOLLER, TH.: **Utilization of Waste Products.** 2nd. rev. Trans. from 2nd rev. German ed. London: 340 pp. 7s., 6d.

U. S., 1,135,167, Apr. 13. L. DOYEN. Coloring wood. See Ger., 256,880 (C. A. 7, 2489).

U. S., 1,135,232, Apr. 13. G. WEINTRAUB. Making pure, stable boron nitride by heating borax or B_2O_3 with 1-2 times its wt. of NaCN or KCN, rapidly, to about 2000°, until fumes are no longer given off.

U. S., 1,135,303, Apr. 13. A. LEHMANN. Bleaching solution formed of chloride of lime and kromocoon or similar malt preparation. The latter increases the rapidity of the bleaching effect of the Cl.

U. S., 1,135,340, Apr. 13. F. G. WIECHMANN. Plastic composition formed of infusible phenol- CH_2O condensation product and vegetable ivory.

U. S., 1,135,785, Apr. 13. H. A. FRASCH. Precipitating heavy, granular hydrated nickel oxide from $Ni(NH_4)_4Cl_2$ or $Ni(NH_4)_4SO_4$ by boiling the soln. with NH_4Cl or $(NH_4)_2SO_4$ and NH_4OH , concg. the NH_3 vaporized, by dephlegmation and returning sufficient of the concentrated soln. to the still to keep the b. soln. alk. Fe, Pb, Cu or Co may be similarly pptd.

U. S., 1,135,962, Apr. 13. J. W. AYLSWORTH. Molding hollow articles from phenol-formaldehyde condensation products on a core of material, *e. g.*, alloys of Sn, Pb, Bi and Cd, which has a m. p. between the final reaction temp. of the ingredients of the condensation product and the temp. at which the latter would be injured or deformed, hardening the article by heating and then raising the temp. to m. out of the core.

U. S., 1,135,981, Apr. 20. W. ASEF. Obtaining pure zinc oxide from waste liquors from wet copper extraction, etc., containing salts of Zn, Na and Fe. The liquor is treated with alkali or alk. earth carbonate or hydroxide to ppt. Zn and Fe, then oxidized with air and dild. with more of the original liquor to convert the pptd. Fe to the ferric state and dissolve the pptd. Zn. The soln., is then treated with an alkali to ppt. Zn and the remaining soln. containing Na salts is filtered off and evaporated. Before pptg. the Zn, Mn, Co and Ni are pptd. with hypochlorite.

U. S., 1,136,370, Apr. 20. J. A. SCHARWATH. Rendering paper, wood or cloth fire-proof and water-proof by dipping in a bath formed of MgO 10, Na silicate 150, fire clay 125, "red Mn oxide" 10, "Mn oxide" 50, and H_2O 300 parts, baking at a temp. of 150-260° and then dipping in a bath formed of MgO, $MgCl_2$ and H_2O .

U. S., 1,136,390, Apr. 20. A. G. ARTZ. Obtaining inorganic and organic values from kelp. Fresh kelp is pressed and algin pptd. from the sepd. expressed liquor by adding H_2SO_4 . The algin is filtered out and the filtrate neutralized with $CaCO_3$. Na_2CO_3 (5-15 lbs. per 100 gals.) is then added and the solids of the kelp, after macerating to a pulp, are treated with this soln. and boiled for about 6 hrs. to ext. more algin and sol. salts from the pulp. The algin is pptd. from the soln. with H_2SO_4 , $CaCO_3$ added to neutralize the soln. and the latter is evaporated to recover the salts contained in it.

U. S., 1,136,549, Apr. 20. C. H. MACDOWELL. Obtaining potash from alunite by calcining it to drive off SO_3 and SO_2 and then heating it to a higher temp. with 20-30% of coal, coke or lamp black to fume off the potash, which may be condensed in the solid form. The volatilization is assisted by a current of air, N or combustion gases and takes place at 800-1600°.

Brit., 28,334, Dec. 9, 1913. G. BERGEN. Fine crystals of common salt. See Ger., 269,427 (C. A. 8, 2041).

Brit., 28,390, Dec. 9, 1913. **BERLIN-ANHALTISCHE MASCHINENBAU AKT.-GES. Hydrogen.** See Fr., 465,575 (C. A. 8, 3491).

Brit., 28,469, Dec. 10, 1913. J. W. STUBBS and J. HOLLINS. A salt-evaporator, having externally heated tubes through which the brine circulates, is fitted with external downcomers shaped to fit the casing of the app. and decreasing in cross-sectional area from top to bottom. When the tubes are heated by furnace gases, they are arranged in a fire-brick casing, and the tube-plates are protected by false tube-plates. The space between the tube-plates may be cooled by a current of air or steam. A central passage is formed between the tubes for cleaning purposes; a damper baffles the furnace gases. The evaporators are arranged in series on the flue, and a by-pass flue together with the requisite dampers is provided for cutting out any desired evaporator. Baffles aid in the deposition of the salt in the lower chamber.

Brit., 28,737, Dec. 12, 1913. FARW. V. M. L. & B. The process of 3,662, 1913 (C. A. 8, 2607) for producing nitrogen oxides and nitrogen, is modified by adding an indifferent gas, such as N, to the mixt. of NH_3 of high concn. and air to be burnt catalytically, so as to give a resultant mixt. of N and N oxides containing no O. The addition is to avoid the considerable rise of temp. that takes place at the reaction surfaces.

Brit., 28,743, Dec. 12, 1913. R. BITHELL and J. A. BECK. A specially constructed tower to be used in place of the Glover and Gay-Lussac towers, in the manuf. of sulfuric acid. Cf. C. A. 9, 1229.

Brit., 29,053, Dec. 16, 1913. G. W. MALCOLM. Salt is made into blocks, cubes, or other bodies, each block containing a quantity such as a predetd. number of cupfuls, spoonfuls, or the like suitable for culinary recipes.

Fr., 466,478, Dec. 22, 1913. BADISCHE. Chromium salts tech. free from Fe are obtained from chromite or like Cr ores by heating to redness such ores (100 kg.) with reducing agents, such as coke, CO, coal (200 kg.) in the presence of Cl or HCl. The more volatile FeCl_3 (resulting from action of HCl) or Fe_2Cl_6 (from Cl) sublimes, while the CrCl_3 remains in the residue or is deposited in the less highly heated portions of the app. The ignited ore may be treated directly with a mixt. of CO and Cl.

Ger., 279,930, Jan. 27, 1914. DÜRENER FABRIK PRÄPARIERTER PAPIERE. Oil tracing paper or tracing linen is given a rough surface, during its impregnation or afterwards, by stamping, or other mechanical treatment.

Ger., 280,208, May 24, 1913. F. D. BELKNAP. A duplicating film is obtained by satg. paper with a bath consisting of H_2O 60, glycerol 15, gelatin 2, carrageen 2, and soft soap 2 parts by wt. The soft soap is preferably composed of K, Na, or NH_4 ricinoleates, with the anhydrides of ricinoleic and sulfuricinoleic acids. Cf. C. A. 8, 2925.

Ger., 280,500, Jan. 25, 1912. J. A. WHEELER. Mfg. products from artificial wood by compressing a plastic mass composed of a filler, a small amt. of a fire-proofing binder, and H_2O . Perforated sheets are run between the hot rolls and the material, to permit the escape of the moisture.

Ger., 280,738, Dec. 25, 1913. A. HAMBLOCH and S. GELLER. Magnesium carbonate is obtained from calcareous MgCO_3 and Mg silicates. The Mg is sepd. from the reaction mixt., together with the alkali carbonate used in the process, in the form of a salt sol. at the temp. used, while the Ca remains at the temp. as a residue. The native or calcined minerals are comminuted and mixed with alkali carbonates or bicarbonates, dissolved in H_2O , satd. with CO_2 , and then heated to 60–70°. The soln., containing the Mg as the double alkali salt, is sepd. from the pptd. CaCO_3 and the other solid residues, and decompd. by heating to 100° into insol. MgCO_3 and alkali carbonate which remains in soln. The latter can be used in working more calcareous

Mg minerals, as can also the CO_2 if this is collected. The residues contain, besides CaCO_3 , the Fe of the mineral and the SiO_2 and Al_2O_3 sepd. by the CO_2 . The alkali carbonate accelerates catalytically the absorption and the action or passage of the CO_2 , and also effects the sepn. of the Fe with the CaCO_3 , leaving a pure MgCO_3 . Cf. C. A. 9, 1377.

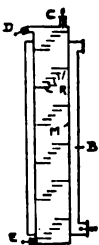
Ger., 280,915, Aug. 30, 1913. Addition to 271,246 (C. A. 8, 2465). G. SAUER-BREY, MASCHINENFABRIK A.-G. Removing crystals deposited from hot satd. solns., according to the principal process, by directing against the crystal mass a stream of the mother liquor at a pressure of 5-6 atm.

Ger., 280,922, Dec. 24, 1913. GENTHNER CARTONPAPIERFABRIK. In mfg. color- or bronze-foils, the material is applied to a thin paper, or the like, which is destroyed in order that the foil need not be removed. This is accomplished by applying to the paper, before or after applying the material, a dil. (10%) H_2SO_4 , heating to destroy the paper.

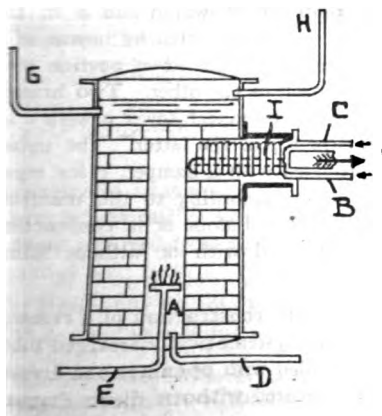
Ger., 280,960, July 14, 1912. BAYER & Co. Sulfur trioxide. See Brit., 15,165, 1913 (C. A. 9, 131).

Ger., 280,964, Aug. 14, 1913. H. DICKE. Fe scrap is ignited in retorts, shafts, or the like, and steam is continuously conducted over it, to produce hydrogen. The Fe_2O_3 produced is charged into the blast furnace, or made into steel in the Martin furnace. The H is 97-98% pure. Cf. C. A. 9, 1099.

Ger., 280,965, Aug. 30, 1913. R. SCHALL and STICKSTOFFWERKE AKT.-GES. Mfg. highly concentrated nitric acid by heating a mixt. of dil. HNO_3 and a drying agent. The mixt. is led through a heated chamber provided with heating members extending inwardly from the heated surfaces, thereby increasing the length of the passage to be traversed by the mixt. A suitable arrangement is shown. The drum *M* is provided with heating mantle *B*. Ledges *R* are arranged internally, and upon these the aq. HNO_3 flows, entering at the inlet *C*. The highly conc. acid is withdrawn at *D*, while the drying agent passes out at *E*. The tubes and ledges are made of acid-proof alloys of Fe with Si or Cr.



Ger., 280,966, Feb. 16, 1913. O. BENDER. Obtaining active oxygen and nitrogen by continuously supplying H_2O , which has been treated under pressure with N and O, to the porous walls of a hermetically closed, heated generator. If H_2O , satd. with air, be brought into contact with the porous walls of the heated generator, the H_2O which has been forced into the walls of the furnace is gradually vaporized, and the steam is



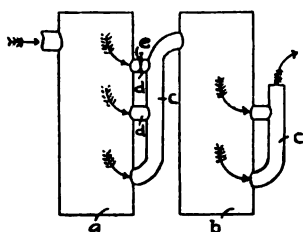
forced through the pores into the interior. This vapor, containing O-N, is drawn off with the flue gases, and remains as an active mixt. in the gaseous state, free from its soln. in H_2O on account of the reduction of pressure. By sudden cooling of the flue gases the steam is condensed and the active gas mixt. can be withdrawn for use. If, e. g., this mixt. is brought into contact with H_2O , NH_4NO_3 is formed. This mixt. can also be used for converting SO_2 into SO_3 or H_2SO_4 , as NO is formed and this acts in the known manner on the SO_2 vapors. Also this mixt. can be employed for the sterilization of potable water, river H_2O , and the like, small amts. of the mixt. serving to

sterilize large amts. of H_2O . A suitable generator is shown. *A* is the burner, *B* and *C* are inlet and outlet tubes for the cooling H_2O , *F* is the cooling device, *F* is the gas outlet, *G* and *H* are the H_2O and air inlets, while air is fed through tube *D*, and gas is supplied through *E*. After the burner *A* has heated the generator walls to a sufficiently high temp., the resistance at *F* is regulated to produce the desired pressure within the generator. At the same time, H_2O and air are introduced through *G* and *H*, the air being absorbed by the H_2O in proportion to the pressure. This H_2O then passes through the top of the generator and mixes with the combustion gases as steam. As a result of passage through the porous masonry, the *N* and *O* are rendered active, and combine with the elements of H_2O . If the generator be heated with coal, the excess of air must be such that 9–12% free *O* is present to 10–12% of CO_2 .

Ger., 280,967, Jan. 27, 1914. **ÖSTERREICHISCHER VEREIN FÜR CHEM. UND METALLURGISCHE PRODUKTION.** When NH_4NO_3 is substituted for $NaNO_3$ in the production of nitric acid, a considerable amt. of HNO_3 is lost on account of the high temp. used, since, according to Berthelot, NH_4NO_3 m. 152° and begins to decomp. when in *Fe* vessels. The salt decomp. completely at 185° with liberation of N_2O . To avoid this decompn., the amt. of H_2SO_4 used is controlled so that the expulsion of the HNO_3 is complete below 152 or 185° . This is effected readily by apportioning the salt and acid so that at least 1 mol. H_2SO_4 is present to each mol. NH_4NO_3 . As a result, the reaction product is completely fused, and the HNO_3 expelled, at not much above 120° , without decompn. of the NH_4NO_3 . Pure acid can be obtained in this manner from low grade impure acid such as is obtained by the air-*N* processes. The excess H_2SO_4 can be converted into com. $(NH_4)_2SO_4$ by neutralization with NH_4OH .

Ger., 280,969, Apr. 17, 1914. **M. MELAMID and L. GRÖTZINGER.** Purifying technical phosphoric acid, which contains impurities such as *Fe*, *As*, *Ca* salts, etc. by dilg. it and heating it with tar or tar oils or tar derivs. for a long time. The heating is effected while stirring, in the presence of indifferent gases or vapors such as *N*, *H*, *O*, or air. *E. g.*, 100 kg. tech. H_3PO_4 of 55° Bé. are dild. with H_2O to 25° Bé. From 5 to 10 times its wt. of tar oil is added, and the mixt. is heated in the presence of *N* with continued stirring. After 2–4 hrs. the mass is allowed to settle and the acid is poured off and filtered. The product is pure. If filtered again through bone-black the product is crystal clear.

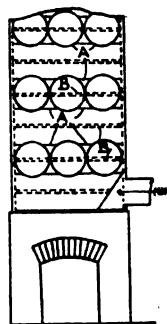
Ger., 281,005, Jan. 18, 1914. **Z. LITTMANN.** App. for mfg. sulfuric acid, with a view to its intensive production and the economy of space. The course of the gases through the *Pb* towers is detd. by the contraction due to the localized chem. reactions.



Two towers of a group are shown, *a* and *b* in the drawing. These towers are connected by means of a tube, *c*, which extends from the lower portion of 1 tower to the upper portion of the other. Two branch tubes *d, d* are provided to connect tower *a* with *c* at the middle and near the top of the latter. The upper branch tube *d* is provided with a damper, *e*, for regulating the flow of gases according to the reaction. These tower may be employed alone or in conjunction with the usual *Pb* chambers. They may also be employed with or without filling and with or without the use of a trickling liquid.

Ger., 281,135, Dec. 24, 1912. **E. HOEFLING.** In the construction of a reaction tower system for the manuf. of sulfuric acid, a filling of systematically arranged tubes is used. The towers are furnished with tubes *A*, provided with openings and division plates, so that a large number of reaction towers is secured without direct channels.

The tubes are laid cross-wise over one another, fitting together with corresponding recesses, and communicating with each other through a plurality of openings. Plates *B* are fitted in each layer of tubes, thereby dividing it into 2 chambers, each of which constitutes a reaction tower. The tubes, and also the plates, can be provided with double conical openings so that the acid can enter readily from above, and the gases can pass up readily from below. To aid the reaction, these openings may be provided with grooves, similar to rifling.



19. GLASS AND CERAMICS.

G. E. BARTON, A. V. BLEININGER.

The conduct of sulfur, selenium and tellurium in sodium calcium silicate glasses, with special reference to color. P. FENAROLI. *Mailand. Kolloid-Z.* 16, 53-9 (1915).—In extremely alkaline glasses, and under reducing conditions, polysulfides, polytellurides and polyselenides give colors to the glass about the same as they give to a water soln., and the glasses are optically empty. In a borax, or more acid glass, submicrons appear in the glass, and the color of the S glass changes to blue, the Se glass becomes red or rose colored and the Te glass blue. A glass of high viscosity shows greater tendency to give the color characteristic of submicrons of the free element than that of the polysulfide, -selenide or -telluride.

H. I. MATTILL.

Fireclay goods and their use in gas works. T. HOLGATE. *J. Gas Lighting* 128, 292-4, 363-4, 480-1, 536-7, 599-600, 661.—Results were obtained on the effect of pressure on the m. p. with both English and American fireclays over a range from atmospheric up to 125 lbs. per sq. in. additional pressure; the depression of the m. p. is about 2.5-4° per lb. pressure. A typical china clay of first class quality, normally m. 1770°, m. 1410° under a load of 112 lbs. per sq. in. whereas another clay melted under corresponding condition at 1750° and 1580°, resp. Uniformity of testing and treatment of specimens is urged. H. suggests that the high temp. at which the clays are burned may also influence the nature of the finished product and he illustrates the importance of the amt. of combined water by reference to some recent tests on fireclays in the Glenboig district. Stress is laid on the necessity of keeping fuel ash, often highly ferruginous, from contact with brickwork. The injurious effects of Fe oxides on firebrick increases in order Fe_2O_3 , Fe_3O_4 , FeO ; consequently reduction of Fe_2O_3 by furnace gases must be prevented. All magnetic Fe compds. and pyrites should be removed from the clays. The electro-osmotic process of purifying clay is referred to. Cf. Ormandy, *C. A.* 8, 800, 2043.

C. A. COLE.

Examination of litharge (BECK) 7.

U. S., 1,135,973, Apr. 13. E. MILLER. Glass furnace with a rotating stirrer to prevent congealing or undue cooling of the molten glass where a gathering of glass is being removed from the furnace.

U. S., 1,136,290, Apr. 20. S. H. STUPAKOFF. Drawing glass from a molten mass of glass while heating the surface portion of the bath with an elec. heater to prevent cooling and thickening of the surface.

U. S., 1,136,362, Apr. 20. R. S. PEASE. Sheet glass is made by drawing a tubular mass from a bath of molten glass and compressing it into sheet form as it is drawn.

U. S., 1,136,504, Apr. 20. H. M. BROOKFIELD. **Making a non-crystalline tough glass mixture for insulators, etc.**, by mixing pulverized glass or cullet with about 30% its wt. of clay with or without CaO and fusing the mixt. to a homogeneous mass.

U. S., 1,136,816, Apr. 20. L. J. KREBS. **Apparatus for drawing sheet glass.**

U. S., 1,136,832, Apr. 20. C. PAQUET. **Glass-furnace and pot.**

Brit., 28,326, Dec. 9, 1913. J. F. DAVY, P. H. MELLOR, A. A. LINES and H. J. YATES. **Radiants for gas-fires** are constructed with a metal reinforcement. A skeleton of metal wire, strips, or perforated sheets is dipped into a slip or thick fluid of refractory material consisting, for example, of clay, sawdust, burnt clay, sand, emery, carborundum, steatite, or the like, with or without Na silicate or pearl ash, the whole being mixed with H₂O. The slip adheres to the skeleton, and the radiant is then baked.

Brit., 28,398, Dec. 9, 1913. L. HONIGMANN. **Enamelling metals.** See Fr., 465,574 (C. A. 8, 3495).

Brit., 29,082, Dec. 17, 1913. K. A. MANKAU. A refractory substance consists of limestone to which have been added small quantities of oxides of the type RO, and R₂O, so as to produce on burning polyacid and polybasic spinels in the mass, as described in 23,725, 1912 (C. A. 8, 1336). The foundation material may consist of limestone to which has been added 4-12% of magnesite or chrome Fe ore, in which case the other oxides added are correspondingly modified to produce about 6% of a polybasic and polyacid spinels.

Ger., 280,940, Nov. 22, 1913. F. SCHÖNBACH and M. TISCHER. **Decorating aluminium** by burning in fusion colors. The pigments are applied to the previously well cleaned surface (without the aid of a glass flux), by means of a brush, stamp, stencil, or compressed air, and they are then burned in a muffle at a temp. of 500-550°. The luster colors, gold (soln. of Au₂S in oils), glass color, and enamel, are used. These are the same colors used for decorating glass, porcelain, stone-ware, and enamelled wares. The decoration is said to be very permanent and resistant.

20. CEMENT AND OTHER BUILDING MATERIALS.

C. N. WILEY:

The hydration of calcium sulfate hemihydrate. PAUL ROHLAND. Stuttgart. *Z. Anorg. Chem.* 89, 352-4(1914).—The acceleration of the setting of CaSO₄·0.5H₂O by electrolytes accompanies an increase in the solubility and *vice versa*; in some cases in which the effect of the added salt on the solubility of CaSO₄·0.5H₂O changes sign the effect of added electrolyte in the rate of setting shows a similar effect. G. W. M.

The compound 8CaO·Al₂O₃·2SiO₂, the chief component (alite) of Portland cement clinker. ERNST JÄNECKE. Hannover. *Z. anorg. Chem.* 89, 355-69(1914); cf. C. A. 6, 1828-9.—J. detd. cooling curves in mixts. at and near to the above comp. in the system CaO-Al₂O₃-SiO₂, on the basis of which he asserts that there is a max. in the fusion surface at the above comp. and 1385°. This conclusion is at variance with the results of Rankin (C. A. 9, 702), probably because of the well-known undercooling which takes place with silicate mixts.

GEORGE W. MOREY.

Device tests adhesiveness of California road oils. ANON. *Eng. Record* 71, 329(1915).—The methods and app. for testing viscosity and adhesion are described. Comparative results of these tests on different qualities of oil are given. F. B.

Retardation of the oxidation of iron (ROHLAND) 9.

U. S., 1,135,176, Apr. 13. E. GOSSETT. Artificial building stone formed of rock salt 16, Fe oxide 6, volcanic ash 10, sand 20, ground asbestos 4, powdered rock 10, and FeSO_4 1 part.

U. S., 1,136,204-5, Apr. 20. J. H. BLEDSOE. Apparatus and method for mixing heated asphalt with aggregate.

U. S., 1,136,724, Apr. 20. A. SCHMIDT. A fungicidal composition for preserving wood is made by mixing Na dinitrophenolate or similar nitro compd. with about 1-1.5 times its wt. of ZnCl_2 or other fire-proofing salt. The latter renders the nitro compd. non-explosive.

Ger., 281,006, Mar. 5, 1914. DR. RUDOLF VAN DER LEEDEN. Obtaining an aluminium silicate, serving as a crude product for the manuf. of cement, and also the alkalis, from natural double silicates.

21. FUELS, GAS, TAR AND COKE.

J. D. PENNOCK.

Chlorides in coal. A. DE WAELE. *Colliery Guardian* 109, 600(1915).—The cause of an abnormal corrosion of a boiler was traced to the presence of 0.22% of Cl in the coal used.

H. I. OLIN.

The composition of and decomposition products of the bituminous rocks of Estland (Baltic Russia). FOKIN. *Gorny J. (Russ-Bergjournal)* 1913, 117; *Chem. Tech. Rept.* 38, 391(1914).—The org. substances are of light yellow color and cannot be extrd. with org. solvents. They can only be obtained in a pure state by the soln. of the mineral constituents of the rocks. Analyses show 8.31-9.02 H, 72.37-72.82 C, 0.56-0.68 N, 14.1-16.24 O, 1.6-1.92% S, and a sp. gr. of 1.14. The mass is slightly hygroscopic. The presence of S and N indicate an animal origin. Dry distn. gives 20% of C and 80% of oil and gas. The oily distillate amounts to about 60% and is very sol. in C_6H_6 , but difficultly sol. in benzine. The oil has a sp. gr. of 0.920-0.945, coeff. of expansion of 0.00057 and viscosity 7.15. Analyses give 80.1-81.85 C, 8.71-10.50 H, 7.25-8.71 O and 0.29-0.40% S. Re-distn. gives 7.6% benzine (at 150°) and not much petroleum. The residues are suitable for fuel only. Paraffin, anthracene and naphthalene could not be found. The oil might find use as an antiseptic.

J. S. G.

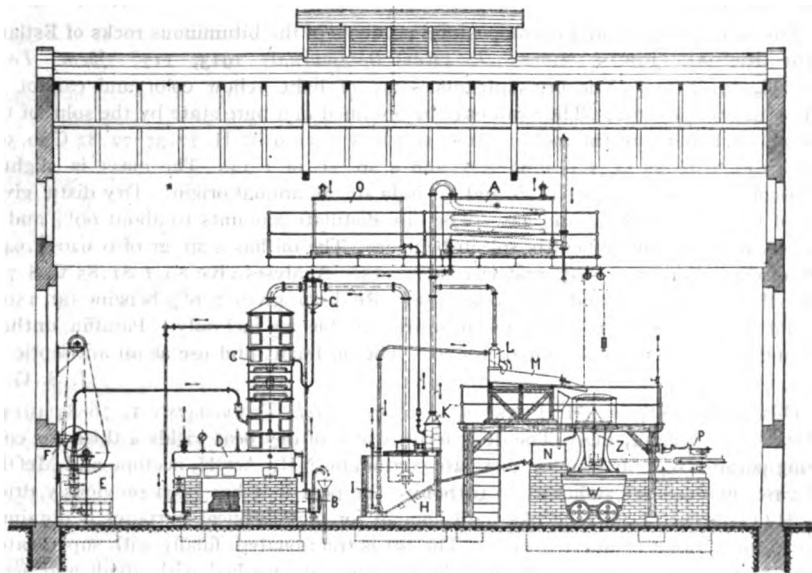
Oils from peat. F. M. PERKIN. *J. Inst. Petrol. Technologists* 1, 76-84(1914); *J. Soc. Chem. Ind.* 34, 132.—The destructive distn. of dry peat yields a thick tar containing paraffin wax, and an aq. distillate containing NH_3 , AcOH, acetone and MeOH. The gases evolved are sufficient to carbonize the peat if it has been previously dried to a H_2O content of 20%. Coke hard enough for metallurgical purposes is obtained from suitably dried briquetted peat. The tar is fractionated, finally with superheated steam, to prevent carbonization, and the fractions are washed with alkali and acid. The oils are largely paraffinoid. The yield from a briquetted Yorkshire peat was 38 gals. per ton, giving on fractionation 1.35% of oil of d. 0.867 below 150°, 29.90% of d. 0.953 below 250°, 50.00% of d. 0.941 above 250°, and a residue of hard pitch. The last fraction contained 6% of paraffin wax. From 11 to 22 lbs. of $(\text{NH}_4)_2\text{SO}_4$ per ton were also obtained. The cost of dried peat should not exceed \$1.10 per ton, and on this basis the production of oil and C should be remunerative. Details of a plant to treat 50 tons of wet peat per day show that the capital required is about \$15,000. Cf. C. A. 8, 2239.

F. W. SMITHER.

Determination of hydrogen sulfide in coal gas. A. B. WAY. *J. Gas Lighting* 128, 660-1(1915).—A thermometer passes through one hole of a rubber stopper inserted to

a marked depth in a wide-mouth 2000 cc. bottle a glass inlet and an outlet tube provided with rubber connections and pinchcocks through the other 2 holes. The pressure in the bottle is brought to the normal, when the sample has cooled, by opening one of the pinchcocks while the loose end of the rubber tube is immersed $\frac{1}{4}$ in. in water. The cock is closed, the tube connected with a leveling bottle and the other tube with a buret containing a soln. of CdCl_2 (20 g. CdCl_2 to 125 cc. H_2O + 50 cc. strong NH_4OH , filtered and dild. to 1 l. with 300 cc. NH_4OH and the balance H_2O). 30 cc. of this soln. are introduced into the gas bottle and the buret and leveling bottle are disconnected. After shaking, the pressure is released by slowly opening the pinchcock and the contents of the bottle are put on a dry filter and washed with H_2O . Transfer the filter and contents to bottle, run in an excess of 0.05 N I soln., 3 cc. starch soln. and about 200 cc. of H_2O and 50 cc. HCl . The stopper is inserted, the bottle shaken for a minute or two and the excess of I titrated with 0.05 N $\text{Na}_2\text{S}_2\text{O}_3$ soln. Using 0.05 N I soln. and a bottle holding 2000 cc., 1 cc. of I soln. represents 18.62 grains of H_2S per 100 cu. ft. of gas. C. A. COLE.

Factory plan for production of ammonium sulfate from gas-water, with continuous removal of the salt. G. BARNICK. Leipzig. *Chem. App.* 2, 61-3(1915).—The gas water, gently warmed in *A*, flows to the pre-heater *B*, thence to the tower *C*, where it is mixed with milk of lime from *E*. Steam is blown into *D* and passes through



C to the trap *G*, from which the NH_3 , CO_2 and H_2S pass to the saturator *H*, the CO_2 and H_2S passing through *K* and the coil in *A* to the air. Common 60° Bé. H_2SO_4 , as free as possible of *As*, dild. to about 42° (55% H_2SO_4) with mother liquor from the centrifugal is run from *O* to the saturator *H*. The crystal deposited in *H* is sent by the injector *I* through *L* and *M* to the centrifugal *Z*, driven by engine *P*. J. H. MOORE.

Improving quality of ammonium sulfate. R. J. MILBOURNE. *Chem. Trade J.* 56, 285(1915).—M. urges that the mfrs. of $(\text{NH}_4)_2\text{SO}_4$ have some standard for production and for controlling the product of their plants. He advises greater care in controlling the free acid and also that part of the operation that effects the color of the salt or its appearance when shipped. C. A. COLE.

Manufacture of ammonium sulfate. ANON. *Gas World* 62, *By-products and coking section*, 13(1915).—It was originally believed that a low temp. was essential for the production of a white sulfate, but it has been found practical to ext. the tar without cooling the gas. The most desirable factor is absolute regularity of working conditions. It is generally accepted that 5% of free acid in the saturator liquor gives the best results. To have a proper idea of conditions it is necessary to know the free acid and the Twaddel. The most suitable strength for the mother liquor is 58° Tw.

M. L. TROWBRIDGE.

Coke. V. B. LEWIS. *J. Gas Lighting* 129, 201-4(1915); *J. Soc. Chem. Ind.* 34, 163.—L. advocates carbonizing coal at about 1050° and dilg. the rich gas so made by passing "blue" water-gas into the foul main. In this way it is claimed that the max. quantity of gas of about 560 B. t. u. per cu. ft. will be obtained together with a fair quantity of tar of good quality, the highest yield of NH_3 and a good coke containing 5.6% volatile matter. The coke will stand transport, will ignite and burn easily and should be very suitable for domestic use.

C. A. COLE.

Effect of salt in coke ovens. J. W. BROADHEAD. *Colliery Guardian* 109, 546 (1915).—Common salt present in certain British coals above 0.33% causes trouble in the coke oven by decomposing at 700° into Na and Cl. The latter unites with NH_3 to form NH_4Cl , which condenses and stops the main. The free Na attacks and pits the silicious fire brick of the oven at a temp. of about 1100°. Magnesite bricks resist corrosion.

H. L. OLIN.

Electrolytic action on gas mains (YERBURY) 4. Use of fire clay goods in gas works (HOLGATE) 19. Estimation of volume of solid matter in muds (COLEMAN) 7.

Gas Works Directory and Statistics, 1914-15. London: Hazell, Watson & Viney. 548 pp. \$3.00.

JONES, E.: *The Anthracite Coal Combination in the United States; with some Account of the Anthracite Industry.* Cambridge, Mass.: Harvard University. 261 pp. \$1.50.

U. S., 1,135,471, Apr. 13. F. TSCHUDY. Acid-spray catcher for removing acid from the gases passing from acid gas-scrubbing app., such as used for forming $(\text{NH}_4)_2\text{SO}_4$.

U. S., 1,135,594, Apr. 13. W. K. LIGGETT. Apparatus for pulverizing and for grading fuel, etc., by air currents.

U. S., 1,136,359-60, Apr. 20. S. W. PARR. Calorimeters for combustion determinations of the calorific value of coal, etc.

U. S., 1,136,361, Apr. 20. S. W. PARR. Combustion chamber for calorimeters.

U. S., 1,136,884, Apr. 20. C. E. LUCKE. Calorimeter for measuring the heating value of gases.

Brit., 28,245, Dec. 8, 1913. Addition to 28,072, 1912 (C. A. 8, 1867). C. STILL. In the process of obtaining ammonium sulfate from coal-gas described in the principal patent, in which the crude gas is cooled and then reheated by a circulating liquor and is further cooled between these 2 operations, the reheated gas being passed into a saturator, a part of the cooled gas issuing from the saturator is led back to the main gas current between the 1st cooler and the reheater, and this additional gas may be 1st heated by the hot crude gas and may be 1st preheated by the hot gas issuing from the saturator.

Brit., 28,285, Dec. 8, 1913. J. I. ROBIN. **Fabric for incandescent mantles** is knitted or woven from 2 or more threads, filaments, etc., 1 or more being previously impregnated and the rest unimpregnated. Incineration of the mantle destroys the unimpregnated threads, leaving an open and evenly spaced fabric. The impregnated and unimpregnated threads may be of different colors, and a thread may be used which has been made wavy by being knitted into a fabric and then pulled out.

Brit., 28,389, Dec. 9, 1913. BERLIN-ANHALTISCHE MASCHINENBAU AKT.-GES. **Purifying generator gas**, water-gas, or the like, by passing it, while hot, through heated Fe turnings in a retort-like vessel having porous walls. The gases enter by a pipe, the porous walls keep back the soot in the gases, and the Fe turnings heated by the hot gases in the annular space remove the S compds., the purified gas leaving by a suitable outlet. Cf. C. A. 8, 2478.

Brit., 28,682, Dec. 12, 1913. J. M. WALLWIN and F. S. SINNATT. For the purpose of preventing the clogging up of the mass of material for **purifying producer and like gas**, cork is mixed with such material and the mixt. is placed on or between the grids of the purifier. Suitable proportions are 1 part by vol. of cork to 3 parts of purifying material.

Brit., 29,009, Dec. 16, 1913. H. J. PHILLIPS and A. PHILLIPS. Coal-dust is made into **briquets** by (1) grinding with 45-60% H_2O to a pulp, (2) briquetting at once without allowing settling in molds from which the H_2O can escape, under a pressure of 3 to 5 tons to the sq. in.; (3) drying the briquets by passing them through a tunnel kiln, the initial temp. of which may be 80° and is below b. p. to avoid cracking, and the final temp. somewhat below that at which the coal begins to decompose, ranging from 250° for semi-bituminous coal up to 500° for anthracite, and (4) further compressing them while yet soft under 5 to 15 tons to the sq. in. in molds heated by superheated steam. A binder that will stand the temp. employed may be added, but is not necessary.

Brit., 29,069, Dec. 16, 1913. G. HINSELMANN. In a **coke oven** heated by vertical flues in the side walls, the heating is equalized either by starting some of the flues at different levels from the others or by constricting their lower portions to prevent immediate full development of the flame.

Brit., 29,088, Dec. 17, 1913. T. R. WOLLASTON. The steam-generator or vaporizer of a **gas producer** is fitted with Perkins' tubes depending within the fuel-chamber. The steam may pass through an injection nozzle, or the air may be supplied by a fan or blower and mixed with steam before or after traversing a jacket.

Brit., 29,089, Dec. 17, 1913. T. R. WOLLASTON. In a **gas producer**, a rotary or oscillatory boiler is mounted on rollers on the top of the shell and has depending hollow members projecting into the fuel bed. These members act as stirrers and distributors of fuel as well as transmitters of heat from the fuel bed to the boiler. The steam from the boiler, supplied by H_2O , serves to draw in air by a nozzle, the mixt. being superheated in a jacket surrounding the producer before being delivered by a pipe to any desired height in the fuel bed.

Brit., 28,742, June 12, 1914. A. W. DIXON, W. H. PEARSON and BROWN & Co. Construction of a **producer grate**.

Ger., 280,746, Sept. 4, 1913. J. BUEB. In mfg. **gas** in vertical retorts or chambers, steam is introduced until the excessive pressure, resulting from rich coal during the 1st period of distn., is no longer produced. The effect of the steam is to immediately reduce such excessive pressure.

Ger., 280,846, Aug. 14, 1912. W. DEEG. **Air-gas generator** with motor-driven air compressor and wet gas meter arranged before the carbureter.

22. PETROLEUM, ASPHALT AND WOOD PRODUCTS.

F. M. ROGERS.

Petroleum industry in 1912 and 1913. RICHARD KISSLING. *Chem. Ztg.* 38, 1273-6, 1284-6, 1290-3(1914). E. J. C.

The question of the optical activity of petroleum. J. MARCUSSEN. *Chem. Ztg.* 39, 1243(1915); through *Chem. Zentr.* 1915, I, 69.—M. states that the facts published by v. Trautenberg (cf. *C. A.* 9, 372) had been previously reported by him (*Mitt. Techn. Vers.-A. Berlin* 22, 96-110(1904).—The behavior of cholesterol favors the assumption that the optical activity of mineral oils is due to satd. hydrocarbons formed from cholesterol compds. F. W. SMITHER.

Determination of percentage of toluene in commercial solvent naphtha. H. G. COLMAN. *J. Gas Lighting* 129, 314-5(1915).—100 cc. of the sample is distd. at the rate of one drop per second from a round-bottomed flask provided with a Young 12-bulb or other efficient fractionating column, and the distillate is collected up to 138°. If this does not amount to 35 cc., another 100 cc. is fractionated and the distillates combined. If the combined distillates do not amount to 35 cc. the sample is considered practically free from toluene. To 35 cc. of the distillate add 50 cc. toluene and 15 cc. C_6H_6 and distil as in detn. of toluene in com. toluene (*C. A.* 9, 962). If the sample contains hydrocarbons with a b. p. near that of toluene correct as follows: For each 0.001 that the sp. gr. of the fraction 105-17° is below 0.868 deduct 0.75 from the % of toluene found by the table in the previous article. This gives cc. of toluene in the mixt., from which, after subtracting the 50 cc. added, can be calcd. the number of cc. in the sample of naphtha. C. A. COLE.

Optical investigation of South Bolivian and Argentine naphthas. II. M. A. RAKUZIN. *J. Russ. Phys. Chem. Soc.* 47, 58-62(1915).—An optical exam. of naphtha from Cuazazutti, Bolivia, both in the original state, in its soln. in C_6H_6 , and after sepn. into fractions by distn., showed that it was optically semi-transparent, its carbonization const. being nearly 1. Tables are given showing the color, sp. gr., rotation and behavior with CCl_4 , CO_2H of the different fractions. An exam. was also made of 2 samples of naphtha from Augua Caliente and Ijira, Argentine Republic. Their carbonizations const. were greater than 1, and their sp. grs. rather high. This is ascribed to these naphthas having collected on the surface of the soil. In filtering upwards they lost many of their carburetted compds. while exposure to the air deprived them of the more volatile lighter components. H. M. GORDIN.

Investigations of natural and artificial asphalts. J. MARCUSSEN. *Mitt. K. Materialprüfungsamt.* 32, 419-31(1914); see *C. A.* 9, 146. F. W. SMITHER.

Rock asphalts of Oklahoma and their use in paving. L. C. SNIDER. *Petroleum* 9, 974-6(1914).—The amt. of these deposits is estimated at from 2 to 13 million tons. The bitumen is incorporated in sandstone, sand, and limestone. It is more viscous and softer than that from Trinidad and Bermudez asphalt. A sample from Ardmore contained 9.97% sol. in CS_2 ; this bitumen possessed a sp. gr. of 1.032, 5.4 mm. penetration at 25° (100 g., 5 secs.); loss when heated at 163° for 5 hrs. 4.11%; 22.44% insol. in 86° Bé. naphtha; and 1.78% mineral matter. O. E. BRANSKY.

Colloidal graphite lubrication (ACHESON) 18. Oils from peat (PERKIN) 21. Bituminous rocks of Estland (FOKIN) 21. Device tests adhesiveness of California roads oils 20.

U. S., 1,135,506, Apr. 13. J. A. DUBBS. Distilling asphaltic petroleum by mixing it with 1-5% of H_2O and heating under 50-300 lbs. pressure per sq. in. so that the steam generated promotes vaporization.

23. CELLULOSE AND PAPER.

A. D. LITTLE.

Recent progress in the analysis of cellulose and cellulose derivatives. J. F. BRIGGS. *Analyst* 40, 107-20(1915).—A review. P. B. DUNBAR.

Durability tests of parchment paper, imitation parchment paper and pergamin paper. C. BARTSCH. *Mitt. Kgl. Materialprüfungsamt* 32, 510-8(1914); *Papier Ztg.* 40, 378(1915); *Papier-Fabrikant* 13, 149-52, 165-9(1915).—Tests of these 3 varieties of paper over a period of 7 yrs. showed a marked decrease in stretch and folding strength especially when the papers have been stored in a dry room. The decrease is greatest in the case of true parchment papers. Tearing strength suffers but little decrease in all cases. Loss in strength of true parchment papers is directly proportional to their acid content. The best conditions for storage are in a slightly moist atmosphere with fairly const. humidity. Loss in strength on heating at 60° for 3 days is in fairly close agreement with the loss on storing 7 yrs., but a series of papers which differ but slightly cannot be accurately graded by this method. V. NUNEZ.

Determination of the air content of paper. G. LUDWIG. *Papier-Fabrikant* 13, 137-40, 153-4, 169-70, 181-5(1915).—Three methods are given: (1) For use with paper which is readily permeable: an app. is described which permits the accurate measurement of the vol. of air contained by the paper, depending on the difference in level of petroleum contained in a vessel with a calibrated tubulature before and after the introduction of a known vol. of the paper. (2) In case of papers not readily permeable, a known wt. and vol. is disintegrated by boiling with water and its sp. gr. detd. by weighing in a pycnometer bottle, due regard being given to the effect of the buoyancy of air in the original weighing. (3) If the comp. of a paper and the sp. gr. of its several components are known, the air content of a known vol. may be calc. directly. V. NUNEZ.

U. S., 1,136,248, Apr. 30. W. G. LINDSAY. Making a plastic mixture of acetylcellulose, for making films, etc., by working up acetone-sol. acetylcellulose with about 25-40% its wt. of tetrachloroethyl acetanilide or trichloromethyl acetanilide and about 40-50% its wt. of MeOH. Cf. C. A. 9, 1114, 1282.

Brit., 28,929, Dec. 15, 1913. W. K. FREEMAN. In the manuf. of fiber for spinning or paper-making purposes from wood and other vegetable substances, especially pinaceous or resinous wood, and the extn. of such substances as oil of turpentine and resin therefrom, the materials, such as wood chips, are subjected to 3 digesting operations in a digester in an atm. of H_2S . Sulfite, sulfate, soda, or other usual reagents may be used. A weak soln. is used for the 1st digestion, and oils and other volatile materials that are vaporized are condensed in a condenser and collected in a separator, from which the oil, etc., can be drawn off into a receptacle. At the same time, the gums, oleoresins, starches, acids, and much of the coloring-matter are extd. The soln. is then circulated through the app. by a pump and eventually returned to one of a series of selectors. A stronger soln. from a pipe is then introduced, and the pectose and intercellular matter extd. The liquid is again passed through the condenser and separator to another selector. The fibers in the digester are then treated with a soln. of intermediate strength, which, after the removal of gums, resin, etc., effects the cleansing

and bleaching expeditiously. The liquid is returned to the selector to be used for another operation. H is supplied from a holder which may be attached to the system. H is stated to exert a direct chem. action on certain constituents of vegetable substances; it also eliminates O and prevents discoloration. The digester may be heated by means of a steam-jacket, or by a steam-coil, and 1 or more digesters may be used. A H_2O -seal prevents ignition of the H. A 2nd condenser may be provided. By proper arrangement of the valves, the app. may be worked in a closed circuit, the liquid being circulated by a reversible pump.

24. EXPLOSIVES AND EXPLOSIONS.

C. E. MUNROE.

Primer on explosives for metal miners and quarrymen. C. E. MUNROE AND C. HALL. Bureau of Mines *Bull.* 80, 125 pp.(1915).—While a popular exposition there is assembled here and reduced to application results of researches of the Bureau appearing in prior publications, information from remote sources, and results of some tests and investigations not before published. Special emphasis is given to the production of poisonous gases and the menace from them even in work in the open.

CHARLES E. MUNROE.

Piercing versus explosive shells. *Proc. U. S. Nav. Inst. Prof. Notes* 41, 560-1 (1915).—Various foreign nations have tested and rejected externally applied explosive shells of the Isham type. Large orders are now being shipped to belligerents, but all are of the armor-piercing type. This is an important commentary in the controversy as to the relative efficiencies of these explosive containers. CHARLES E. MUNROE.

Coal dust explosions. J. D. MORGAN. *Colliery Guardian* 109, 593-4(1915); *Iron Coal Trades Rev.* 90, 398-9(1915); cf. *C. A.* 8, 3629.—M. questions the validity of the Home Office Committee's report on coal dust explosions. He shows that explosions in a smooth gallery, such as was used by the committee, are less violent than those in constricted mine passages. Furthermore, it is impossible to establish a standard of inflammability that is independent of the source of ignition. H. L. OLIN.

Explosion at factory of Schultze Co. C. A. DESBOROUGH. *Home Office Rept.* No. 212, 4 pp.(1915).—The explosion was caused by accidental ignition of nitro-lignin residue in an abandoned iron boiler formerly used for the purification of the nitro-lignin by boiling. The boilers were being dismantled for removal and the workman inside had a steel bar and nails in his boots either of which may have struck sparks. The coroner's jury held that the boilers should have been thoroughly wetted down before wrecking operations began. CHARLES E. MUNROE.

MARSHALL, A.: *Explosives, their Manufacture, Properties, Tests and History.* London: J. & A. Churchill. 624 pp. 24s.

U. S., 1,135,026, Apr. 13. F. KNIFFEN. Pyroxylin varnish is made by the use of a volatile solvent formed of equal amts. of $EtOAc$ and C_6H_6 . The varnish may contain up to 24 oz. of pyroxylin per gal.

U. S., 1,135,356, Apr. 13. R. G. CLYNE. Treating paper shot-shell cartridge tubes to render them resistant to moisture and fire. The tubes are first impregnated with gasoline or other volatile liquid and are then immersed in a H_2O - and fire-proofing mixt. containing paraffin which displaces the volatile liquid.

U. S., 1,135,792, Apr. 13. C. HARTMANN. Hexanitrodiphenyl sulfide. See *Brit.* 18,353, 1913 (*C. A.* 8, 2603).

Brit., 28,634, Dec. 11, 1913. BICKFORD, SMITH & Co. and W. N. B. SMITH. In mfg. electric blasting fuses, arranging the firing-wire in a hole passing transversely through the axis of the fuse, the hole being then surrounded by waterproofing comp., preferably enclosed in an outer casing. The hole aforesaid is preferably filled with suitable priming comp. before being closed.

25. DYES AND TEXTILE CHEMISTRY.

L. A. OLNEY.

Progress in the preparation and use of vat-dyes during 1914. FRANZ ERBAN. Vienna. *Färber-Ztg.* 26, 3-6, 17-21, 32-5(1915).—A review. W. F. FARAGHER.

Production of azo dyes on the fiber by means of naphthol AS. G. ULRICH. *Brünner Monatsschrift Textil-Ind.* 21; through *Chem. Zentr.* 1915, I, 406.—The use of naphthol AS, a substitute for β -naphthol introduced by Chem. Fabrik Griesheim-Elektron, is discussed fully. The product is designated as an arylide of β -hydroxynaphthoic acid. W. F. FARAGHER.

Production of white and red printed effects on indigo-bottomed goods. G. TAGLIANI AND G. AROSIO. Mailand. *Färber-Ztg.* 26, 1-3(1915).—Eighteen methods which have been used in practice for producing white and red illumination effects together on indigo grounds are tabulated. Four employ reserves and 14 red and white discharges. W. F. FARAGHER.

A new after-chrome process. E. GROSSMANN. *Färber-Ztg.* 26, 17(1915).—In the usual after-chrome process, over-oxidation results readily as is shown by inferior shades and by the presence of detectable decomp. products. By using AcOH alone in the dye-vat, and Na_2CrO_4 instead of $\text{Na}_2\text{Cr}_2\text{O}_7$, good results are obtained with dyes which are easily over-oxidized. In the case of carbonized wool, since the presence of H_2SO_4 which is not wholly removed by washing causes over-oxidation, an addition of $\text{NaC}_2\text{H}_3\text{O}_2$ is made. Wools dyed by this process spin well and the material is not injured appreciably. The process may be used with dyes such as Eriochromblack T. W. F. FARAGHER.

National (British) dye scheme. ANON. *Board of Trade Announcement* Jan. 29, 1915; *J. Soc. Chem. Ind.* 34, 133.—The proposal is to form a company for the manuf. of dyes and by-products, with government aid and additional grants from the government, not exceeding £100,000 for the promotion of research work. It is planned that the company shall remain British, and that a coöperative agreement be adopted between the producers and users of dyestuffs. L. W. RIGGS.

Importance of a consideration of the fiber proteins in the process of bleaching cotton. B. S. LEVINE. Providence. Brown Univ. *Science* 41, 543-5(1915).—Analyses were made of Texas cotton, the 12 samples representing the cotton at different stages of maturity, ranging from 14 to 38 days after flowering. N factors were detd. by the Kjeldahl-Gunning method, while the wax and fat factors were obtained by extrn. first with alc. and then with ether. These latter figures were not detd. before the 24th day after flowering on account of the large amount of tannin present. The % of N showed a general decrease from 2.23% in the 14-16 day stage to 0.182% in the 36-38 day stage. The % of combined waxes and fats remained nearly const. after the 26-28 day stage; shows that there was an even distribution over the fiber, that their increase is proportional to the growth of the fiber, and that these constituents are not phosphatides taking part in the growth. The N figures favor the assumption that the early and constant deposit of protein remains in the lumen in the form of insol. albuminoids and in the form of the alc.-sol. proteins. Some of this protein is utilized by the growing fiber, the

increase of the fiber accounting for the decrease in the % of protein. The lowest % (2.20) for waxes and fats from fiber taken directly from the field was much higher than the figure obtained by Hebden (1.41) (cf. *C. A.* 8, 3632) for fibers which had been manufd. into cloth. The mechanical removal of waxes and fats by the processes of cloth making shows that these constituents are deposited on the outside of the fiber and therefore have but slight influence in bleaching as compared to the remaining proteins.

L. W. RIGGS.

Inspection of raw silk before boiling-off and weighting. KARL HOMOLKA. *Limbach. Färber Ztg.* 26, 32(1915).—Lots of silk accepted for weighting should be examd. for the presence of soap and oils which have been added to soften the fibers preparatory to weaving, since the loss in boiling-off will consist not only of the normal loss (22.25%) but also that of the soap and oil (20% approx.). This can be controlled by an experimental boiling-off, or by a fibroin detn.

W. F. FARAGHER.

BEACALL, T., CHALLENGER, F., MARTIN, G., AND SAND, H. J. S.: **Dyestuffs and Coal-Tar Products: Their Manufacture, Properties, Tests, and History.** London: J. & A. Churchill. 624 pp. 24s.

BEACALL, T., CHALLENGER, F., MARTIN, G., AND SAND, H. J. S.: **Dyestuffs and Coal-Tar Products: Their Chemistry, Manufacture, and Application.** London: C. Lockwood & Son. 156 pp. 7s., 6d.

U. S., 1,135,043, Apr. 13. O. NEUBERGER. **Printing designs on textile fabrics by the lithographic process.** A reduction dye is finely ground with oil or varnish, printed in the fabric after preliminary treatment of the latter with starch paste containing Na_2CO_3 and hydrosulfite, and developed by steaming and also by use of additional reducing agent if necessary.

Brit., 28,250, Dec. 8, 1913. J. MATTER. **Purifying mercerization lyes by treatment with insol. natural or artificial silicates, without heating.** Suitable substances are kaolin, China-clay, pumice, talc., white bole, and silicate residues from chem. manufactures. These substances may be used together with gypsum or gypsum and lime. The powdered materials are stirred with the lye, which is then allowed to settle.

Brit., 28,294, Dec. 8, 1913. H. HEYMANN. **In treating wool cheeses, cops, etc., preparatory to warping, the yarn, which has been formed from wool dyes before spinning, is degreased in this condition by means of a volatile solvent and then warped or wound into the desired form for weaving as usual.** The volatile solvent is caused to percolate through or into the cop or cheese, etc., or it is forced into or through the cop, etc., and subsequently expelled centrifugally. The solvent may be further expelled by evapn. The app. is specified in 19,522, 1913 (*C. A.* 9, 529).

Brit., 28,500, Dec. 10, 1913. F. L. BERTLETT. **A cleansing composition for fibers, fabrics, or other goods of cotton, linen, or wool consists of a mixt. of Na_2CO_3 and glycerol.** Any suitable disinfecting, lathering, or bleaching agent may be added to the comp. The use of the comp. is stated to nourish the fiber, keeping it pliable, firm, and durable, however often it may be washed. Any alkali may be used, K_2CO_3 , being mentioned specifically.

Brit., 28,569, Dec. 11, 1913. H. LEVINSTEIN, J. BADDILEY and LEVINSTEIN, *Ltd.* **Disazo dyes** are obtained by combining the tetraazo compd. of an aminoaryl-acyldiamine of the benzene or naphthalene series of the general formula $\text{NH}_2\text{.Ar.} \cdot \text{CO.NH.Ar'.NH}_2$, with 2 mols. of resorcinol, *m*-aminophenol, *m*-phenylenediamine,

or a deriv. thereof, or with 1 mol. of 1 of these compds. and 1 mol. of any other component. The use of aminopyrazolones as end components is excluded. The products dye cotton orange, orange-red, reddish yellow, yellow, yellow-brown, etc., shades, which are rendered fast by after-treatment with HCHO.

Brit., 28,763, Dec. 12, 1913. E. GMINDER. Treating fibrous materials with ozone. See Ger., 272,525 (C. A. 8, 2805).

Brit., 28,910, Dec. 15, 1913. CHEMICAL WORKS, formerly SANDOZ. Primary disazo, trisazo, and tetrakisazo dyes are obtained by combining resorcinol in an alk. soln. on the one hand with 1 mol. of a diazosulfonic acid of the benzene or naphthalene series or of a diazo compd. of a monoazo dye from a diazo-sulfonic acid of the benzene or naphthalene series or an *o*-diazophenol and Clève's acids, and on the other hand with 1 mol. of an *o*-diazophenol or of a diazo compd. of a monoazo dye from an *o*-diazophenol and Clève's acids. The products dye wool in acid baths various shades of brown, which may be after-chromed.

Brit., 28,911, Dec. 15, 1913. J. E. MACILWAINE. Bleaching fiber, yarn, thread, cord, woven fabric, or other material by the reaction in the fiber or material of a bicarbonate on a hypochlorite, so liberating the active bleaching agent in the body of the fiber, etc. In an example, linen cloth is prepared as usual with a lime boil, followed by an alkali boil, and is then thoroughly washed and run through a soln. of NaHCO₃, squeezed, allowed to lie a short time for the reaction to take place, washed in H₂O, soured as usual with dil. H₂SO₄ or HCl, washed, and finally given an alkali boil. The process may be repeated as often as desired. Rollers, centrifuging, steam pressure, etc., may be used to press the bicarbonate and chloride solns. into the material, and these solns. may be used in the reverse order.

Ger., 279,492, Apr. 1, 1913. O. VENTER. Dyeing yarn loose and then winding it, more or less moist, on spools for weaving.

Ger., 280,366, Nov. 7, 1913. E. C. LEHMANN. Treating cloth, especially closely woven fabric, to increase its elasticity, by subjecting it for a short time to the action of hot bisulfite solns., washing in cold H₂O, and finally drying without tension. An approx. 5% soln. of NaHSO₃ is heated to b., and the material is immersed for several mins. and kept in motion in the hot soln. In the cold H₂O the temp. of the material is lowered rapidly, and the NaHSO₃ is removed by washing. The material is dried preferably at the ordinary temp. on short perforated shelves. The cloth is shrunk by this treatment, but is rendered very elastic.

Ger., 280,369, Mar. 27, 1914. Addition to 277,497 (C. A. 9, 866). A. HEINZEL, JR. Production of polychrome effects in fabrics. The alk. bath contains no oxidizing agent; the oxidation of the Ce compds. pptd. on the artificial fibers is effected either by the action of the O of the air, or with the aid of an oxidizing agent after the fabric has been made up. The fibers, which have been subjected to the action of the Ce prepn., are after-treated with vegetable or animal fats which are applied either saponified or unsaponified, in emulsion with alkalis, preferably together with the gelatin dressing. The fabric made up from the impregnated artificial fibers is developed at the lowest possible temp., *e. g.*, 20°.

Ger., 280,488, May 19, 1914. A. DIENER. In producing designs on fabric, the fabric is moistened or placed in a 5% starch soln. containing glycerol, before the wax is applied. A color may be incorporated, if desired, in the reserve.

Ger., 280,591, Oct. 26, 1913. METALLATOM G. M. B. H. App. for the production of metallic coatings on fabric, comprizing an atomizing nozzle upon which is mounted a removable heated chamber in which the finely divided material supplied by the atomizing nozzle is volatilized and expelled in this condition.

26. PAINTS, VARNISHES AND RESINS.

A. H. SABIN.

Foundations for a theory of pigments. I. Fundamental characteristics of pigments and the size of the granules. W. OSTWALD. Grossbothen. *Kolloid-Z.* 16, 1-4 (1915).—After calling attention to the lack of scientific method in the manuf. or study of pigments, O. suggests 3 fundamental properties according to which pigments should be classified: (1) Color, including 3 factors: the color tone, or location of the color on a circle consisting of the prismatic colors with the red and blue ends united by passing through purple; brightness or fraction of light reflected as compared with the amt. reflected from pure white under the same conditions; purity (a given color is a mixt. of a pure color with grey; the % of pure color is the purity). (2) Covering ability: the number of sq. cm. of surface that can be covered by 1 g. of the pigment so that the covered surface does not show through. (3) The strength of color, or the ratio in which color and white pigment may be mixed before the color is just gone. The size of the particles of the pigment affect the color; as examples are cited Fe_2O_3 , PbCrO_4 , and smalt. Covering ability is almost nil with crystals or transparent articles, but on grinding these up it becomes fairly marked. With decreasing size of particles the covering ability increases to a max. and then decreases. Strength of color also increases with decreased size of particles.

H. I. MATTILL.

Methods for determining the oxygen absorption of drying oils. ARMAND DE WAELE. *Chem. World* 3, 300-2 (1914).—Philosophic analysis of papers on drying oils by Wilson and Heaven (*C. A.* 6, 2698), Krumhaar (*C. A.* 8, 587), Solway and Kipping, Ingle (*C. A.* 7, 3034) and Fahrion (*Chem. d. Trock. Oele*). A. H. S.

Retardation of the oxidation of iron (ROHLAND) 9. Examination of litharge (BECK) 7.

CHURCH, A. H.: *The Chemistry of Paints and Painting*. Fourth edition. London: Seeley, Service & Co. 388 pp. 7s., 6d.

INGLE, H.: *A Manual of Oils, Resins and Paints*. Vol. I. Analysis and Valuation. London: C. Griffin & Co. 138 pp. 3s., 6d.

STEVENS, G. H. AND ARMITAGE, J. W.: *Index to Patents, Technology and Bibliography of China Wool Oil*. Irvington, N. J.: G. H. Stevens. 135 pp.

U. S., 1,135,749, Apr. 13. M. R. WOOD. Lithographic printing on linoleum, etc. A design is printed with oil pigments upon a Zn or Al plate which is then successively treated with an etching soln., cleansed and treated with printing ink.

U. S., 1,136,742, Apr. 20. S. WATERS. Furniture polish composed of linseed oil 50, kerosene 23, H_2O 23, beeswax 1, banana oil 1, and paraffin oil 2%.

Brit., 28,283, Dec. 8, 1913. B. ZSCHOKKE. Rust-preventing compositions. See Ger., 276,122 (*C. A.* 9, 530).

Brit., 29,048, Dec. 16, 1913. WESTDEUTSCHE BLEIFARBENWERKE, DR. KALKOW GRS. Lead acetate and basic acetate are obtained by blowing air through a soln. of HOAc or $\text{Pb}(\text{OAc})_2$, the surface of which is below the level of a heap of Pb, so that the liquid is carried upwards and sprinkles the Pb in its descent. Cf. *C. A.* 8, 2497.

Brit., 29,161, Dec. 17, 1913. J. P. ELLIOT. An anti-rust composition, for preventing rusting or oxidation of bright metallic surfaces, consists of a mixt. of 3 to 6 oz. of oleic acid, 0.5 to 2 oz. of stearic acid, 2 drams of $(\text{HOCO})_2$, and 1 gal. of a solvent

which may be benzene, mineral naphtha, benzine, petrol, etc. The $(\text{HOCO})_2$ is dissolved in rectified spirit of wine and added to the other ingredients dissolved in the solvent.

Fr., 466,304, Dec. 6, 1913. STANDARD LACK- UND FARBWERKE ZÜRICH-ÄLTSTETTEN. An easily removable anti-rust paint is prepd. by combining aq. solns. of chromic acid, chromates, carbonates, milk of lime, etc., with hydrocarbons, fats, oils, resins, clay, chalk, to form an emulsion.

Fr., 466,368, Dec. 18, 1913. G. PATERNO and C. MANUELLI. Fluorides or fluosilicates of Al, Zn, Pb, etc., are added, up to 40-50%, to paint for ship bottoms.

Ger., 280,841, Feb. 11, 1914. A. PADBERG. A documentary ink, such as the Fe tannates, is made up in gum arabic capsules with a view to protecting the hands and at the same time providing the necessary thickening agent when taken up in soln.

27. FATS, FATTY OILS AND SOAPS.

E. SCHERUBEL.

Catalytic addition of hydrogen to unsaturated substances. Formation of metallic nickel in hardening oils with aid of nickel oxide and other nickel compounds. W. NORMAN AND W. PUNGS. *Chem. Ztg.* 39, 29-31, 41-2(1915).—One hundred g. of various unsatd. oils were hardened in 2 to 3 hrs. by H (2 l. per min.) in presence of the oxide, hydroxide, carbonate or formate of Ni (1 g.) at a temp. between 200 and 255°. The formation of the metallic Ni during the process was detd. by an elec. cond. method, a magnetic method and 2 analytical methods, depending, resp., upon the amt. of H evolved with H_2SO_4 and the production of Ni carbonyl. Although the carbonyl reaction is not quant. it gives reliable qual. results at 30, 50 and 90°, but in each case air must be excluded. Under these conditions at 225° NiO is not reduced by CO, benzaldehyde or formaldehyde. The catalyst averaged from 4 to 7% of metallic Ni. Rapid hardening can also be effected with kieselguhr contg. 4.1% Ni which has been reduced at 500°.

E. SCHERUBEL.

Nickel borate as fat hardening catalyzer. W. NORMAN. *Seifensieder Ztg.* 42, 46-7(1915).—The view of Schönfeld, that Ni borate when heated in a stream of H undergoes no change and that the salt is active catalytically, is incorrect. The salt is decomposed into metallic Ni and H_3BO_3 . S. makes the statement that as soon as hardening can be detd. metallic Ni can be found in the catalyzer.

E. SCHERUBEL.

Detection of sea animal oils. A. GRÜN AND J. JANKO. *Seifenfabr.* 35, 253-4 (1915).—The authors applied the test of Tortelli and Jaffe (cf. C. A. 8, 3723) to a number of oils and did not find it to work in all cases. Green linseed oil gave the same reaction and a number of com. fish oils did not, without being previously purified with fullers earth. Incompletely hardened fish oils and their fatty acids gave the reaction even when present in small amt. in a fat mixt. The fatty acids in soaps without having had previous purification and in presence of rosin give the test. Completely hardened sea animal oils do not respond to the test.

E. SCHERUBEL.

Factory control in the soap, fat and glycerol industry. H. STADLINGER. *Seifenfabr.* 34, 680-1, 718-21, 779-81, 809-11, 837-9, 890-2, 1138-40, 1160-2, 1184-6, 1227-9, 1248-50, 1301-2(1914).—This article deals with the av. values of the consts. found for many fats, oils, fatty acids, soaps and washing powders.

E. SCHERUBEL.

Brit., 28,261, Dec. 8, 1913. HARBURGER-EISEN- UND BRONZEWERKE AKT.-GES. and G. KÖRBER. In the treatment of oil-meal or grain residues, from which oil has

been extd. by solvents such as benzine, trichloroethylene, etc., with steam to remove the final traces of solvent and to moisten the meal, the steam is passed through 2 or more extractors, the pure steam being passed into the extractor containing only a small amt. of solvent. The steaming may be carried out in app. of the kind described in 27,014, 1913 (C. A. 7, 1402).

Brit., 29,122, Dec. 17, 1913. C. PLEINES. Perfectly neutral soaps are improved by incorporation of hydrocarbons. In an example, a mixt. of tallow, linseed oil, horse fat, palm oil, and resin is saponified, and 5% of benzine is mixed in when the temp. has fallen to below 100°. Superfatted soap with incorporated hydrocarbon, such as is described in 24,795, 1913 (C. A. 9, 1257) is disclaimed.

Ger., 280,688, June 6, 1912. H. and O. OCKELMANN. A cleaning composition, such as specified in 259,360 (C. A. 7, 3000), is converted into the form of a solid soap. The added sugar must exceed many times the amt. of alkali in the soap. E. g., a soap may be used which consists of 40 parts fatty acids, 10 caustic alkali, 25 sugar or the like, and 25 H₂O. In place of sugar, starch sugar, sirup, molasses, and the like may be employed. Cf. C. A. 8, 3632.

28. SUGAR, STARCH AND GUMS.

A. HUGH BRYAN.

Physical and chemical nature of the natural gums. H. RAZMAN. *Farben-Ztg.* 20, 639-40, 667-9(1915).—A general article. E. W. BOUGHTON.

Soudan gum. ANON. *Farben-Ztg.* 19, 2545-6(1914).—A descriptive article including production statistics. E. W. BOUGHTON.

Gum arabic. ALLAND. *Bull. des Sc. Ph.* Aug.-Sept. 1914; *Schweis. Apoth. Ztg.* 53, 31-2(1915).—An account of the origin, collection and commerce of gum arabic in Egyptian and French Soudan and on the Senegal river. S. WALDBOTT.

U. S., 1,135,216, Apr. 13. F. W. SPANUTIUS. Making a decolorizing material for treating sugar solutions, etc., by dissolving argols in NaOH to destroy the coloring matter, adding KCl, filtering off the bitartrate soln. and carbonizing the solid residue.

U. S., 1,136,613, Apr. 20. M. M. RAUB. Chewing-gum formed of chicle 1, sugar 3, pine tar 0.16 part and additional flavoring as desired, e. g., oil of peppermint.

29. LEATHER AND GLUE.

LLOYD BALDERSTON.

Contributions of the chemist to the leather industry. W. H. TRAS. *J. Ind. Eng. Chem.* 7, 283(1915). ISADOR MILLER.

The theory of leather formation. W. FAHRION. *Collegium* 1914, 707-10.—Reply to Powarnin (cf. C. A. 9, 977), whose criticisms are rejected on the ground that he does not know F.'s recent publications. L. B.

Changes in the appearance of natural and artificial leather. K. MICKSCH. *Kunststoffe* 5, 78-80(1915).—A general discussion of the subject. The changes are mainly mechanical. F. W. SMITHER.

The adulteration of leather. J. A. S. MORRISON. *Leather World* 7, 127-8(1915).—It may be safely stated that 50% of bottom stuff offered for sale is adulterated in some way. In some cases Epsom salt and glucose are added, as such, in amts. of from

4 to 10%. In other cases they are added more cleverly through exts. which are adulterated. These exts. are made solely with the object of producing leather which will just pass the I. A. L. T. C. limits (2 to 3%). M. thinks that such practices should be stopped.

J. S. ROGERS.

Addition of fat to tanning extracts. P. SINGH. *J. Soc. Chem. Ind.* 34, 208-9 (1915).—S. finds that the quality of leather is affected by addition of fat to the tannin-liquor; materials which otherwise make harsh leather may thus yield a tough and supple product.

L. B.

Tanning power of triacetin. PIETRO FALCIOLA. *Ann. chim. applicata* 3, 32-6 (1915).—The expts. were made upon skins of calf, lamb and sheep that had previously been depilated, swelled, then cleaned and washed. Triacetin alone imparts marked tanning effects after a few hrs. immersion without agitation, and does not make the skin brown. A certain amt. of tanning is caused by a simple short brushing of the triacetin upon the skin. A 10% aq. emulsion of triacetin tans in 5 hrs.; a 7% soln. tans almost completely in 5 hrs. Increased diln. of the soln. causes the skin to become parchment-like and stiff, while it becomes softer with increase of conc. H₂O-EtOH-triacetin solns. of the strengths 100:3:3, 100:6:6, 100:33:33, gave good tanning effect with skin of lamb after 4 hrs., the last strength giving the best results; very weak solns. impart a degree of stiffness to the skins. Lamb skin weighing 23 g. immersed for 24 hrs. in 100 g. H₂O contg. 2.15 g. triacetin, absorbed 0.23 g. triacetin, or 1%.

S. LEVY.

Wattle bark for tanning. ANON. *Hide and Leather* 49, 24(1915).—The av. amt. of tannin in com. wattle bark is 32%. In Germany it is chiefly used for heavy leathers, but it might well be used for light leathers as it furnishes a full soft leather with calf skin. The leather has a faint reddish tinge which darkens slightly on continued exposure to light. Wattle ext. is soon to be manufd. in Natal.

J. S. ROGERS.

Chestnut extract. L. POLLAK. *Collegium* 1914, 715-6; cf. *C. A.* 9, 979.—On extg. with NaOH and pptg. with alc., an alk. gummate is obtained, which may be decompd. with HCl, yielding from 5% to 8% of xylan.

L. B.

Chrome soap in chrome leathers. G. HUGONIN. *Collegium* 1914, 716-7.—H. found that chrome soaps are sol. in benzine. On extg. chrome leather with benzine and evapg. the soln. the ash was free from Cr. H. concludes that the fat-liquoring of chrome leather does not make Cr soaps in the leather.

L. B.

A bacteriological study of methods for the disinfection of hides infected with anthrax spores. F. W. TILLEY. *J. Agr. Res.* 4, 65-92(1915).—The Seymour-Jones method which recommends the use of HgCl₂ (0.04%) and HCOOH (1%) for the disinfection of hides infected with anthrax spores, and the Schattenfroth method which involves the use of HCl (2%) and NaCl (10%) were both found to be efficient. The treatments exert no injurious effect upon the hides or leather.

J. J. SKINNER.

Apparatus for the extraction of glue. G. BARNICK. *Leipzig. Chem. App.* 2, 75-8(1915).—The arrangement of the app. is shown in 4 cuts, and general directions for operating are given.

J. H. MOORE.

Borax and Boracic Acid in Leather Manufacture. London: Borax Consolidated, Ltd. 92 pp.

U. S., 1,135,977, Apr. 13. L. E. LEVI. **Tanning hides by immersion in a soln. of basic ferric chromate or sulfochromate.**

U. S., 1,136,456, Apr. 20. F. E. WOODWARD. **Plastic filler for use in shoe-bottoms, formed of Burgundy pitch 450, red engine oil 60 lbs. and about 25 lbs. of**

sawdust, granulated cork or leather for every 6 gals. of the pitch and oil mixt., mixed with about 10 lbs. of NaHCO_3 which serves as a fire-proofing agent.

U. S., 1,136,457. Apr. 20. F. E. WOODWARD. Plastic shoe-bottom filler formed of resin 250, vaseline 30, pine tar 20, NaHCO_3 10 lbs. and 25 lbs. of sawdust, cork or leather for every 6 gals. of the mixt.

U. S., 1,136,458, Apr. 20. F. E. WOODWARD. Plastic shoe-bottom filler formed of wax tailings 240, resin 240, petroleum oil 80, NaHCO_3 10 lbs. and 25 lbs. of sawdust, cork or leather for each 6 gals. of the mixt.

U. S., 1,136,459, Apr. 20. F. E. WOODWARD. Plastic shoe-bottom filler composed of pontianac resin 4, resin oil 4, resin 16, pine tar 1, solid petrolatum 8, and NaHCO_3 10 lbs., and 25 lbs. of cork, leather or sawdust for every 5 gals. of the adhesive mixt. Cf. C. A. 9, 394.

Brit., 28,453, Dec. 10, 1913. G. H. TATHAM, D. R. BLAIR, C. T. WESTWOOD and J. H. DUNKIN. Gelatin is obtained from fish bones and subsequently treated to obtain modifications thereof. The cleaned bones first have their outer hard covering softened by soaking in H_2O , preferably constantly renewed, and the Ca phosphate, Ca carbonate, etc., is dissolved out by adding alkali or acid, preferably K silicate or HCl , to the H_2O to make a 10% soln. Alternatively, the clean bones may be extd. with HCl and K silicate added to the product. The bones are then digested in a steam-jacketed vessel containing a very dil. soln. of KHCO_3 . The steam having been allowed to escape slowly at the completion of the digestion, the pan is opened, and the mass of viscid gelatin found at the bottom removed. By adding pure gelatin, preferably in sheets, to the mass, clear gelatin collects on the sheets and is removed, leaving a dark colored gelatin which is less sol. in H_2O . The latter gelatin is then purified in any usual way, as with fullers earth, kaolin, or China-clay. The clear gelatin is worked into any desired form and rendered insol. by treatment with HCHO vapors, or by the addition of tannic acid, which renders it sensitive to light, so that it becomes dark in color and insol. in H_2O , the product being miscible with transparent and suitably colored gelatin forming imitation tortoise shell.

Ger., 279,421, Mar. 1, 1914. A. JUNGFER. Mfg. corset stays, and the like, from leather, cut to size and impregnated with resin, varnish, or the like, to render the material impervious to moisture and to strengthen it.

Ger., 280,330, Feb. 17, 1914. A. GROTHE GEB. SODENDORF. Process of mfg. a tanning agent from sulfite cellulose back water, by means of which the organic S, as well as the gums and other carbohydrates, are sepd. from the tanning material. The free SO_2 of the back water is removed first by the addition of lime. The residual liquid is analyzed, and the S content, especially, is detd. For every 32 parts by wt. of organic S, 65 parts of KCN (or its equiv. of another cyanide) are added in conc. aq. soln. The mixt. is heated in an autoclave for 4-5 hrs. at about 150° under a pressure of about 5 atms. After cooling, the mass is drawn off into a vessel, dild. with H_2O , and allowed to stand for 24 hrs. At the end of this period the insol. constituents have settled; the clear supernatant liquid is drawn off, and the insol. residue is washed out. The residue consists essentially of neutral CaSO_3 , and can be utilized in the cellulose manuf. The liquid is acidified with HCl or H_2SO_4 , whereupon a copious brownish ppt. seps.; this consists of an organic cyanogen compd. The ppt. is sepd. from the liquid, washed with H_2O , and dried at the ordinary temp. It is rather insol. in the mother liquor which contains the gummy matter, carbohydrates, and sugars, as well as the inorganic salts and traces of CN-compds. The aq. soln. of the sepd. ppt. is a valuable tanning agent, pptg. gelatin, glue, pancreatin, etc., and being taken up completely by animal skin. The best result is secured by using a freshly prepd. aq. soln. of CaNCN

as the CN compd. Addition of CaCl_2 and NH_4Cl increases the yield of tanning materials. If the mixt. is found to contain free HCN at the ordinary temp., alkali must be added.

30. RUBBER AND ALLIED SUBSTANCES.

R. T. STOKES.

Rubber chemistry in 1914. R. DITMAR. *Kolloid-Z.* 16, 39-53(1915).—A review. W. F. ZIMMERLI.

Specifications and methods of analysis for mixtures containing thirty per cent of hevea rubber. ANON. *Caoutchouc & gutta-percha* 12, 8587-92(1915).—A continued article in which the conclusion is drawn that the analysis should include appropriate tests of elasticity and mechanical resistance to show whether the vulcanization has been done properly, and also tests of elec. resistance to insure good insulation and a homogeneous structure. EDWARD J. KELLEY.

Recommendations for the treatment of latex and the curing of rubber. RUBBER GROWERS ASSOC. *India Rubber World* 52, 374-5(1915).—An outline of the proper conditions which should obtain in the collection and coagulation of latex, and in the creping, sheeting and smoke curing of plantation rubber. Possible contaminations and deteriorating factors are pointed out, and methods of preventing these are indicated in the form of mandatory instructions to plantation employees. R. T. S.

Examination of litharge (BECK) 7.

TORREY, J. AND MANDERS, A. S.: *The Rubber Industry*. London: 516 pp. 15s., 6d.

U. S., 1,135,236, Apr. 13. O. A. WHEELER. Reclaiming vulcanized scrap rubber containing cellulose by pulverizing the scrap, allowing it to stand for 3-5 hrs. in a 20% soln. of NaOH, then adding CS_2 , agitating 1-5 hrs., adding H_2O and heating under 100 lbs. pressure per sq. in. for 15-20 hrs.

U. S., 1,136,462, Apr. 20. C. P. BARY. Purifying caoutchouc by dissolving in C_6H_6 , CS_2 , CHCl_3 or other solvent and dialyzing through a caoutchouc membrane against pure solvent. The liquids are circulated on both sides of the membrane. Solns. of acetylcellulose may be similarly purified.

Brit., 28,938, Dec. 15, 1913. J. G. WARDROP and C. C. STEPHEN. A machine for washing and masticating scrap rubber and similar substances comprizes an internally toothed U-shaped receptacle in which is eccentrically mounted a toothed rotary drum or disks, so that, as the rubber progresses around the drum, etc., it is subjected to increasing compression. The hinged lid is weighted and is perforated to allow light impurities to escape with the overflow H_2O , while heavy impurities pass through perforations in the lower portion of the receptacle. The receptacle is mounted on trunnions so that it can be tilted.

CHEMICAL ABSTRACTS

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No. 12.

I. APPARATUS.

L. C. JONES.

Quartz-glass apparatus. P. A. Z. *Elektrochem.* 21, 165(1915).—The note concerns the use of quartz stop-cocks and funnels. F. A. HARVEY.

Laboratory steam drying oven. L. E. LEVI AND A. C. ORTHMANN. *Collegium* 1914, 741-3.—A new form of steam oven is described, with diagrams. L. B.

Acid siphon. WILHELM SZIGETI. *Brasso. Chem. Ztg.* 39, 122(1915).

J. H. MOORE.

Economic operation of electric ovens. P. W. GUMAER. *Proc. Am. Inst. Elec. Eng.* 34, 1001(1915). C. G. F.

Electrically operated centrifuge. ANON. *Elec. World* 63 1131(1915).—This app. is compact, low-set, and is equipped with a weighted fly-wheel which serves to steady the action of the motor and to maintain a uniform but high speed. It is also provided with a 2-arm sedimentation attachment and a speed controller. For obtaining the count of red corpuscles in a certain amount of blood, a Daland hematocrit is used in conjunction with the centrifuge. A diagram is given. I. C. MATTHEWS.

Micro-balance. E. H. RIESENFELD AND H. F. MÖLLER. *Z. Elektrochem.* 21, 131-6(1915).—By the use of quartz torsion fibers the difficulties due to knife edges are avoided. This principle has already been used by Nernst and Riesenfeld (cf. *Ber.* 36, 2086(1903)). A very fine quartz fiber, 0.0125 mm. in diam. and 9 cm. long, is stretched horizontally between the prongs of a brass fork. Cemented with hard shellac to the center of the fiber is a glass capillary, 13 cm. long and weighing 78 mg. This glass "beam" is set at an angle of about 25° with the horizontal. It ends in a fork at the upper end and has a mirror (wt. 180 mg.) made from a quarter of a specially ground microscope cover-glass, cemented to its lower end. The beam is supported 3 cm. from the mirror. The great sensitiveness, and particular improvement, of this balance is due to the method of supporting the scale pan. Between the prongs of the fork at the end of the beam is stretched, horizontally, a piece of the fine quartz fiber. Between this fiber and the hook of the scale pan another quartz fiber, 0.04 mm. diam., is inserted. Thus the support of the scale pan depends on torsion and not on a knife edge of any kind. The scale pan weighs 17 mg. The load at the scale pan may be varied by hanging pieces of Pt on a hook just above the scale pan. The beam is arrested by clamping it near its upper end between 2 fine feathers. Deflections are detd. by telescope and scale. Details of the balance mounting and case are given. Some exptl. results are given which show the max. load to be 5×10^{-3} g. and the minimum wt. which can be detected with certainty 3.3×10^{-3} g. F. A. HARVEY.

A vacuum furnace for the measurement of small dissociation pressures. R. B. SOGMAN AND J. C. HOSTETTER. *J. Wash. Acad.* 5, 277-85(1915).—This paper describes a vacuum furnace and accessory app. adapted for the measurement of a wide range of dissociation pressures of Fe oxides and silicates. The furnace consists essentially of 2 parts: (1) the furnace tube, which serves both as the furnace wall enclosing the "inside vacuum" and as the heating element; (2) the water-cooled jacket which

surrounds the furnace tube and encloses the "outside vacuum." The furnace tube is 10 mm. inside diam. and made of an alloy of 80 parts Pt and 20 Rh. Three gages provide a possible range of pressure measurement from 0.000001 mm. Hg up to 2.5 atms. The uniformity of temp. was tested by taking a series of measurements of the O pressures produced by 0.5 g. charges of Fe oxide, heated at various levels in the furnace. These indicate a length of about 25-30 mm. within which the temp. is uniform within one degree. The furnace takes 580 amps. at 1.8 v. at 1450°, and can be held const. to one degree at this temp.

L. H. A.

Convenient apparatus for chlorination with phosphorus pentachloride. STUART P. MILLER AND FRANKLIN C. GURLEY. *J. Am. Chem. Soc.* 37, 1361(1915).—If the chlorination product is not volatile, the material to be chlorinated is placed in the bottom of a suction filter flask, the side tube connected to the pump, the PCl_5 added and the substances ground together with a heavy glass rod; all the fumes are drawn away by the pump, making the use of a hood unnecessary.

CHAS. A. ROULLIER.

Potentiometrical arrangement for electrochemical research. O. SCARPA. Napoli. *Ann. chim. applicata* 3, 157-61(1915).—Resistance boxes with units so arranged that the resistance can be varied from 1 to 10,000 ohms are used. In the figures there are shown: a battery of Pb accumulators (E), a capillary electrometer or galvanometer (G) sensitive to 0.0001 volt, a standard cell (e), a commutator (c), a resistance of about a megohm (R). This resistance is made by bending a capillary tube as in Fig. 3, each end being terminated by a wider tube which is closed tightly by a stopper carrying a Cu wire dipping into a soln. of CuSO_4 acidified with H_2SO_4 . If

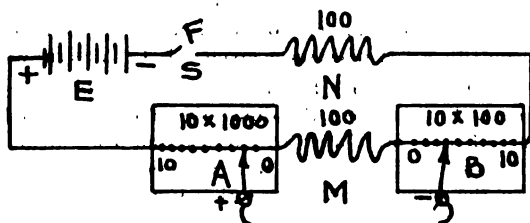


FIG. 1

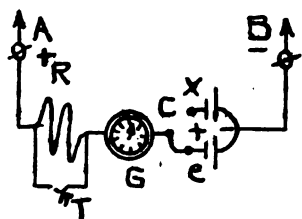


FIG. 2

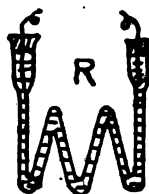


FIG. 3

ρ is the sp. resistance of the soln., l the length of the capillary tube, d its diameter, then the resistance is $4\rho l/\pi d^2$, and placing this $\approx 10^6$ ohm, it is easy to calc. the necessary concn. of the soln. This resistance remains const. for a long time (3 years in 1 case). Fig. 2 shows the arrangement of the compensated circuit; (A) and (B) are the levers of the 2 decade boxes. The e. m. f. of the battery must be greater than the p. d. to be measured. The current is sent through the system as arranged in Fig. 1, the contacts (C)

and (T) are open, and (S) closed, while the plugs in (M) are all in, and those in (N) all out, and the levers (A) and (B) are at zero. The contact (C)-(e) is made, and (A) and then (B) moved to cause the least deviation of the galvanometer; close (T) and bring the instrument to zero, taking out the proper plugs in (M) and at the same time putting in the corresponding plugs in (N) so as not to alter the total resistance of the circuit. The value γ_c of the compensating circuit based on the compensated circuit between (A) and (B) is obtained by adding the values

at the points of contact of (A) and (B) and of (M). Opening (C)-(e) and closing (C)-(x) the same operation is repeated on the unknown e. m. f. and the new resistance γ_x obtained in the same manner as before. If the standard cell is a Weston, then $x = 1.019 \gamma_x / \gamma_e$ volts. The advantage of this arrangement over the usual compensating methods is that it allows of much more rapid measurements (especially necessary in detg. e. m. fs. of polarization), and also much more exact, as the momentary variation of resistance of the compensating circuit during regulating is always very small, the current of the battery remaining thus perfectly const. The method has greater sensibility than that of Oswald as 0.0001 volt can be measured when working with e. m. f. of less than 2 volts, and also greater precision, as the battery current required is very much less. The system permits measurements of between 10 and 0.0001 volt.

S. LEVY.

A new machine to test oils and friction metals at all temperatures. ANON. *Mat. grasses* 8, 4279-86(1915).

EDWARD J. KELLEY.

U. S., 1,137,199, Apr. 27. A. T. EYTON. Apparatus for making fine lead wire.

U. S., 1,137,294, Apr. 27. A. SCHRÖDER. Apparatus for agitating thick slurry to prevent settling of the solid particles.

U. S., 1,137,755, May 4. A. L. HANSEN. Carbide holders for acetylene generators.

U. S., 1,137,852, May 4. L. FELIZAT. Furnace for making charcoal from nut shells, peach kernels, sawdust, etc. Cf. C. A. 8, 1343.

U. S., 1,137,902, May 4. W. E. RICHARDSON. Apparatus for filtering lubricating oils, etc.

U. S., 1,138,134, May 4. W. G. MOORE. Apparatus for cleaning tin plates.

U. S., 1,138,443, May 4. C. H. BIERBAUM. Apparatus for casting metals or other molten materials under pressure.

U. S., 1,138,460, May 4. W. M. DERBY. Gas scrubber.

U. S., 1,139,385, May 11. H. E. THEISEN. Apparatus for washing and cooling gases. Cf. C. A. 9, 709.

Brit., 29,392, Dec. 20, 1913. A. RÖMER. In an annealing vessel having a chambered cover containing absorbent material, vents are provided which are open to allow gases to escape from the vessel through the absorbent material during the annealing process and are closed during cooling to exclude air.

Brit., 129, Jan. 2, 1914. A. WILLIAMS and L. D. WILLIAMS. An app. for indicating the proportion of combustible gases in air comprizes a thermo-elec. circuit in which 1 junction is in proximity to a catalytic substance, such as finely divided Pt, and both hot and cold junctions are equally heated to maintain the catalytic substance in active cond. without affecting the thermoelec. current.

Brit., 250, Jan. 5, 1914. J. HARGER. An app. for estimating substances in gases or liquids consists of a small primary cell containing the liquid to be tested, and a galvanometer connected to the electrodes of the cell. The gas is passed at a regulated rate into liquid allowed to drop into the cell. Automatic means may be provided for recording the reading of the galvanometer needle. When using the app. to estimate the amt. of CO in the gases of mines, they are passed through Br water, KOH, H₂SO₄, or P₂O₅, and then over heated I₂O₅, whereby the amt. of I equiv. to the CO is sepd. This I is then converted into acid by treating with amorphous P or arsenious acid soln., and the soln. so obtained run into the cell. The tube containing the I₂O₅ is conveniently fitted into the space between the gauze and the bonnet of a miner's safety lamp, and

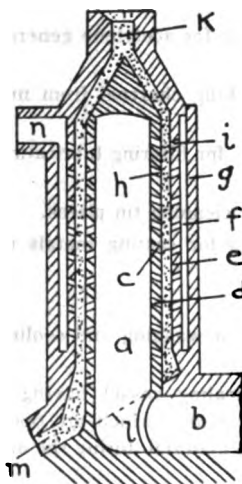
may be protected from the direct heat of the lamp by a bath of CaCl_2 soln. SO_3 , nitric fumes, and SiF_4 are estimated by passing into H_2O flowing into the cell; Cl by passing into arsenious acid soln.; fire-damp by passing through Br water, and then a heated tube to form HBr and dissolving this acid; O by passing over S or P and dissolving the acids formed in H_2O . If large quantities are to be estimated, the cell should be adjustable so that the distance between the electrodes may be varied. An audible alarm may be connected to the galvanometer.

Brit., 367, Jan. 6, 1914. J. T. BATEMAN. An app. for deodorizing vegetable, fish, and like oils and for distilling and vaporizing liquids, wherein the liquid is treated with steam or other vaporous or gaseous heating-medium, with or without a preheater for the liquid.

Ger., 279,768, Nov. 29, 1913. H. BOCK. Construction of condensers.

Ger., 279,868, Aug. 24, 1913. C. W. BAUMANN. Horizontal-tube condenser in which the cross-section of the cooling tubes increases in the direction of flow of the cooling agent.

Ger., 281,137, Feb. 7, 1913. F. A. BÜHLER. App. for effecting chemical reactions, or physical reactions. The wall d of a shaft a , to which the material to be acted upon is supplied through the channel b , is surrounded by a cylindrical chamber, c , a 2nd wall, e , a 2nd cylindrical chamber, f , and a 3rd wall, g . Perforations are formed in the walls d and e , designated by h and i , resp.; these are inclined downwardly into the cylindrical chamber c . The substance which is used to effect the reaction is charged through the throat k into the chamber c ; by force of gravity it fills this chamber and may be removed at m readily, passing down the inclined plane l . The chamber c is enlarged at the bottom, conically, as shown. The material under treatment is carried off through the exit tube n . E. g., if H_2O is to be purified, gravel is introduced at k , the H_2O enters at b , rises in the shaft a , passes through the perforations h , through the gravel, through the perforations i , into the chamber f , and out at n . The app. may be duplicated to form batteries. Gas may be purified or dried in this app., and chem. reactions may be effected.



2. GENERAL AND PHYSICAL CHEMISTRY.

WILLIAM D. HARKINS.

Assistants: E. B. MILLARD and A. B. CARTER.

Atoms and ions. J. J. THOMSON. *Engineering* 99, 329-30, 356-7(1915); cf. *C. A.* 9, 1412.—Certain salts when heated gave off positive electricity, others negative. When AlPO_4 was heated under a plate held over the heated salt and connected to an electroscope, the electroscope was discharged if its own charge was negative, but not if its charge was positive. The same kind of electricity was given off when the salt was ground in an agate mortar. To det. e/m for the carriers present, 2 plates d cm. apart were prepd., on one of which the salt was placed, and the other of which was connected to an electroscope. Between the plates and parallel to them a strong magnetic field was established. Carriers from the salt reached the other plate when there was no magnetic field, but were bent back when the field was established. An idea of the nature and size of the particles was obtained from the equation: $d = 2(X/H^2)(e/m)$,

where X is the elec. force urging the particles from one plate to the other, and H the strength of the field. For K or Na salts the carriers were nearly always atoms, as shown by the (e/m) values. Cases where the electrification arose from the salt (ZnI_2 , $ZnBr_2$, and CdI_2) were considered (cf. Kalandyk, *C. A.* 9, 11). When air was pumped through a tube and over a wire connected to the electroscope, there was a loss of charge corresponding to the production of 4 ions per cc. per sec., and this was found in air from all parts of the world, independent of temp., the nature or size of the vessel in which the cond. was measured, or the pains taken to exclude radiations by Pb walls etc. Air might have more ions than this, but in no way was it possible to reduce them below 4 per cc. per sec. Decrease of resistance of vaseline contg. Br , of C_6H_{14} , or Se cells when exposed to Röntgen radiations was also mentioned. E. B. MILLARD.

Eighth group of the periodic system. E. H. BÜCHNER. Amsterdam. *Chem. Weebblad* 12, 336-9(1915).—The conception of isotopic elements is made use of in grouping together, in one place in the periodic table, elements which show close chem. relationships. E. g., Mn , Fe , Co and Ni are grouped together as ZFe ; Ru , Rh and Pd as ZRu ; Os , Ir and Pt as ZOs ; and the trivalent and tetravalent rare earths in 2 groups, ZR^{+++} and ZR^{++++} , resp. The 8th group in B.'s table consists of the halogens and the groups of "isotopes," ZFe , ZRu , ZOs , the latter groups occupying a place in the 8th group similar to that in which Mn is usually placed. GEORGE W. MORREY.

Chemically active modification of nitrogen produced by the electric discharge. VI. R. J. STRUTT. *Proc. Roy. Soc. London (A)* 91, 303-18(1915); cf. *C. A.* 8, 1695, 2283-4, 3257.—The past controversy as to whether active N can be freely obtained from pure N or whether a trace of O must be present has been reviewed. It is shown that neither alternative is correct; perfectly pure N will not give more than a little active N , but to get a good yield it is not necessary that O or any O compd. be present. The admixt. of almost any foreign gas in small amt. will enormously increase the yield of active N . The amt. required is generally about 0.1%, but a very distinct effect was produced by the addition of 0.003% of CH_4 . The impurity possibly acts by loading the electrons and thus altering the character of their impact with the N mols. This is supported by the fact that gases carrying O , S , Cl , C and H are capable of promoting the formation of active N . These atoms are capable of attaching themselves to electrons, as shown by Thomson and Franck. A , He , and, of course, N itself, which are not able to load electrons, do not promote the formation of active N . Active N when shaken with cold Hg unites with it, forming a nitride, but no development of the Hg spectrum attends the action, as when Hg vapor unites with active N . Similar results have been obtained with other melted metals. Active N when bubbled through a soln. of indigo in H_2SO_4 slowly discharges the blue color. It acts freely on the purest C_6H_{12} and C_7H_{14} obtainable, with the formation of HCN . On CH_4 the action was less, though considerable. These expts. do not bear out the view that it is only olefin impurities in paraffins that can yield HCN . E. B. MILLARD.

Molecular attraction. XI. New relations revealed by diagraming internal pressure as a negative pressure. J. E. MILLS. *J. Phys. Chem.* 19, 257-74(1915); cf. *C. A.* 7, 7; 8, 1527.—The thermodynamic equation for the energy spent in overcoming the external pressure during change of vol. can be combined with the Clausius-Clapeyron equation to give $P(V - v) = (dP/dT)T(V - v) - 31414 L$, where P is the external pressure, V the vol. of a gram of vapor, v the vol. of a gram of liquid, and L the "internal heat of vaporization," i. e., the difference between the total heat of vaporization and the energy spent in overcoming external pressure. The data of Young on isopentane are used in the discussion. When the term $(dP/dT)T(V - v)$ is represented on a PV plane, the pressure ordinate is enormously greater than P and must be extended into the region of negative pressure or as a positive pressure far greater

than we have any evidence to support. The neg. pressures are average internal pressures during a given change in vol., except at the crit. temp. At this temp. there is no change in vol., and the "average" neg. pressure above should represent the true internal pressure at this vol. This conception is discussed. E. B. MILLARD.

Relativity theory: General dynamical principles. R. C. TOLMAN. Univ. Calif. *Phil. Mag.* 28, 572-82(1914).—Taking into account the Einstein theory of relativity, the principles of the conservation of momentum, and of the conservation of moment of momentum are derived for a system of particles, and also a principle corresponding to that of least action which applies in ordinary mechanics; this leads to generalized equations of motion in the Lagrangian and Hamiltonian (canonical) forms. It is found that the Lagrangian function is not to be taken equal to the difference between the kinetic and potential energies of the system as in the classical mechanics, and the generalized momenta used in the modified Hamiltonian equations are not to be defined as the partial differential of the kinetic energy with respect to the generalized velocities as in the older mechanics. A. T. CAMERON.

Relativity theory: The equi-partition law in a system of particles. R. C. TOLMAN. Univ. Calif. *Phil. Mag.* 28, 583-600(1914).—Gaseous systems are considered containing particles of different masses, and a law is derived for the distribution of momenta, from which it follows that the av. value of the momentum of a particle is the same for particles of all different masses. This equi-partition of momentum is true also for systems of particles which are sepd. by a partition which allows transfer of energy, and hence the equality of the av. values of this quantity becomes the relativity condition for thermal equil. The momentum is proportional to the abs. temp. measured on the thermodynamic scale, and reduced to the quantity $m_0 v^2$ (of Newtonian mechanics) when the velocities are small compared with that of light. In relativity mechanics there can be no possibility of an exact equi-partition of energy. A partial consideration is presented of the actual partition of energy attained at equilibrium. A. T. CAMERON.

Chemical reactions at low pressures. IRVING LANGMUIR. *J. Am. Chem. Soc.* 37, 1139-67(1915).—A new theory of heterogeneous reaction has been given in which the velocity of a reaction between a solid and a gas was considered to be limited, not by the rate of diffusion of the gas mols. through an adsorbed film, but by the rate at which the surface of the metal becomes exposed by the evapn. of the single mols. from an adsorbed layer one mol. deep. If m represents the number of g. of gas mols. which strike a unit surface per sec., its value is $m = \sqrt{M/2\pi RT} p$, where p is the pressure and M the mol. wt. of the gas. At atm. pressure and room temp., this corresponds to 12 liters of air per sq. cm. per sec. The clean-up of O in a W lamp and many other applications of this theory of mol. layers have been discussed. Cf *C. A.* 7, 723, 1322-3, 1677; 8, 1043, 1230; 9, 263, 985. E. B. MILLARD.

Gas equilibria and a test of the formula of van der Waals, Jr. F. E. C. SCHEFFER. Univ. Amsterdam. *Verslag. Akad. Wetenschappen* 23, 688-96, 950-65(1914).—In order to calc. the const. of gaseous equilibria it is necessary first to derive an expression for the entropy of the reacting gases. Such expressions have already been given by Keesom, by Tetrode and by Sackur, and quite recently van der Waals, Jr., has calc. equil. const. of gas reactions from an expression involving the algebraic sum of the separate entropies. The present communication shows how the above mentioned expressions may be applied to data given in the literature. The reactions considered are $I_2 \rightleftharpoons 2I$, $2HCl \rightleftharpoons H_2 + Cl_2$, $2HBr \rightleftharpoons H_2 + Br_2$ and $2HI \rightleftharpoons H_2 + I_2$. From the calcns. of the dissociation equilibria of I and of the 3 halogen acids the moments of inertia of the various mols., and hence the mean molar radii may be calc. The values so found agree with the detns. of molar radii by other means (from viscosity, from re-

fractive index and from the const. b in the equation of state). This result, already reached by Sackur, but only in a comparatively rough way, confirms the expression of van der Waals, Jr., in which the vibrations of the atoms are taken into account.

L. H. ADAMS.

The laws of Tate. A reply to Lohnstein. J. L. R. MORGAN. Columbia Univ. *Z. physik. Chem.* 89, 385-410(1915).—The exact limits have been detd. between which the laws, surface tension = const. $\times$ wt. of drop, and wt. of drop/diam. of mouth piece = const., hold, and, moreover, it has been shown that the validity of these laws can be predicted with certainty from previous observations on the form of drops. When the drop is "normal," both the foregoing laws are valid, and have actually been found to hold in the case of 131 pure liquids and 59 aq. solns. The values of the surface tension of 69 liquids detd. by this method agree within a few tenths of 1% with the values obtained by the method of capillary rise. It has been shown that the new definition of normal mol. wt. in the liquid condition (which states that a liquid is normal when, on substituting its gaseous mol. wt., along with the data for γ and density (d) at t_0 , in the equation $M/d = 2.115(t_c - t_0 - 6)$, a value is obtained for t_c that is independent of the temp. of observation) holds for the 56 liquids which are generally considered as non-associated. The validity is so satisfactory that the values obtained for t_c at different temps. only differ by a few tenths of 1% for each liquid. Further, it has been shown that, in general, neither the law of Tate nor that given by Lohnstein holds.

H. JERMAIN CREIGHTON.

Notes on the Noble gases. W. S. ANDREWS. *Gen. Elec. Rev.* 18, 408.—A review. C. G. F.

The molecular structure of solid isotropic and anisotropic binary mixtures. G. TAMMANN. *Z. anorg. Chem.* 90, 297-327(1914); see C. A. 9, 875. G. W. M.

Influence of salts on the equilibrium in the system water-acetone. W. JACOBS. *Rolduc. Chem. Weekblad* 12, 312-20(1915).—A summary of results obtained with 8 ternary and 3 quaternary systems of the type H_2O-Me_2CO -salt-(salt), in which 2 liquid layers are formed. In general, the temp. and compn. of the critical soln., together with a few isotherms, consisting of the solubility line of the solid phase and the binodal curve, are given, but no experimental details or detailed results. In the system $H_2O-Me_2CO-NaCl$, the ternary critical temp., T_k , is -3.8° ; the critical soln. L_k contains 54% Me_2CO , 6% $NaCl$, 40% H_2O ; at 25° mixts. of H_2O and Me_2CO containing less than 25% or more than 84% Me_2CO can be satd. with $NaCl$ without unmixing. In the system $H_2O-Me_2CO-NH_4Cl$, T_k is 18.5° and L_k contains $\approx 57\%$ Me_2CO , $\approx 6\%$ NH_4Cl , $\approx 37\%$ H_2O ; isotherms at 18° and 25° were detd.; at 25° addition of NH_4Cl causes unmixing in mixts. of H_2O-Me_2CO containing from 42 to 82.5% Me_2CO . The systems $H_2O-Me_2CO-NaNO_3$ and $H_2O-Me_2CO-KNO_3$ are similar; the values of T_k are, resp., 41.3° and 61.2° . In the system $H_2O-Me_2CO-(NH_4)_2SO_4$, T_k lies below -20° and was not realized; at 30° addition of $(NH_4)_2SO_4$ causes unmixing in mixts. containing between 1.3 and 76.5% Me_2CO . In the system $H_2O-Me_2CO-Li_2SO_4$, T_k lies below -20° and was not realized; at 28° the isotherm consists of the solubility line of Li_2SO_4 , which practically is a point close to the Me_2CO apex of the component triangle, the solubility line of $Li_2SO_4 \cdot H_2O$, and the binodal curve; at 28° addition of $Li_2SO_4 \cdot H_2O$ causes unmixing in mixts. containing between 9.5 and 57% Me_2CO . In the system $H_2O-Me_2CO-Na_2SO_4$, both Na_2SO_4 and $Na_2SO_4 \cdot 10H_2O$ can exist in equil. with 2 liquid layers; the transition temp. lies at 32° ; T_k is 29.6° and L_k contains $\approx 12\%$ Me_2CO , $\approx 13\%$ Na_2SO_4 , $\approx 75\%$ H_2O ; at 35° , addition of Na_2SO_4 causes unmixing in solns. containing between 2.5 and 45.5% Me_2CO ; at 31° , between 2 and 40% Me_2CO . In the system $H_2O-Me_2CO-CaCl_2$, T_k lies below -20° ; the 28° isotherm consists of the solubility lines of $CaCl_2 \cdot 6H_2O$, α - $CaCl_2 \cdot 4H_2O$, and $CaCl_2 \cdot 3Me_2CO$, and the binodal

curve, which seps. the last-named solubility curve into 2 parts. The graphic representation of the quaternary system $\text{H}_2\text{O}-\text{Me}_2\text{CO}-\text{NaCl}-\text{CuCl}_2$ at 30° consists of the solubility surfaces of NaCl , $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$ and $\text{CuCl}_2 \cdot 2\text{Me}_2\text{CO}$ and the binodal surface, which intersects the NaCl solubility surface only. On addition of CuCl_2 to the ternary complex $\text{NaCl}-\text{L}_x-\text{L}_y$ the 2 layers approach each other in compn. and become identical; the compn. of the critical soln. is 41% Me_2CO , 12% CuCl_2 , 8% NaCl , 39% H_2O ; addition of CuCl_2 to the ternary system also raises T_k . Addition of BaCl_2 to the ternary system $\text{H}_2\text{O}-\text{Me}_2\text{CO}-\text{NH}_4\text{Cl}$ lowers T_k ; at 18° the graphic representation of the system consists of the solubility surfaces of NH_4Cl , $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$, BaCl_2 , and the binodal curve; the latter lies wholly within the tetrahedron, and intersects the surfaces of both NH_4Cl and $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$; the relations at 30° are similar; T_k is 14.6° , L_k contains 58% Me_2CO , 6% NH_4Cl , 0.5% BaCl_2 , 35.5% H_2O . In the 2 quaternary systems shown, unmixing takes place only in one of the ternary systems; both of the ternary systems, that with Li_2SO_4 and that with $(\text{NH}_4)_2\text{SO}_4$, form 2 liquid layers; addition of either Li_2SO_4 to the $\text{H}_2\text{O}-\text{Me}_2\text{CO}-(\text{NH}_4)_2\text{SO}_4$ system, or *vice versa*, results in a lowering of T_k . The graphic representation of this system consists of the surfaces of Li_2SO_4 , $\text{Li}_2\text{SO}_4 \cdot \text{H}_2\text{O}$, LiNH_4SO_4 , and $(\text{NH}_4)_2\text{SO}_4$ and the binodal surface; $\text{Li}_2\text{SO}_4 \cdot \text{H}_2\text{O}$, LiNH_4SO_4 , and $(\text{NH}_4)_2\text{SO}_4$ can each exist in equil. with 2 liquid layers.

GEORGE W. MOREY.

Critical end-points and the system ethane-naphthalene. ADA PRINS. Amsterdam. *Proc. Acad. Sci. Amsterdam* 17, 1095-1111(1915).—Several systems were studied in an attempt to find one of the type ether-anthraquinone. In the system ether-alizarin, the 1st critical end-point (p) lies at 196.4° and 37.5 atm., but the 2nd critical end-point (q) could not be detd. exactly because of the very dark reddish color of the fluid and liquid phases; q lies at about 258° . In the system ether-isophthalic acid, p is at 196.1° and 36.8 atm.; q could not be detd. because of decompn. The systems ether-hexachlorobenzene and hexane-anthraquinone do not show critical end-points. The systems CO_2 -naphthalene and CO_2 -diphenyl both show a p at realizable temps. and pressures, but the 3-phase line at higher temps. in both cases rose so steeply that further study was abandoned. The system ethane-naphthalene belongs to the type in which the 2 components are not completely miscible at high temp.; p is at 39.40° and 52.89 atm. (compn. not given); for C_2H_6 , t_k is 32.32° , p_k , 48.13 atm. The point q could not be observed directly because of the small temp. change caused by a considerable pressure change, and because of the tendency to persist in metastable conditions, both because of failure of the solid phase to separate and to dissolve. By means of P - T detns. and study of the end condensations of mixts. near the critical mixt. in compn., q was found to be at 57.4° , 124.8 atm., 20-25 mol. % C_2H_6 . GEORGE W. MOREY.

Equilibrium in the system $\text{Pb}-\text{S}-\text{O}$; the roasting process. W. REINDERS. Delft. *Verslag. Akad. Wetenschappen* 23, 596-610(1914).—Preliminary consideration of the numerous possible reactions involved in the Pb roasting process indicated that the phases present are Pb , PbS , PbSO_4 , PbO and SO_2 , if the small amt. of PbS in the vapor and the slight solubility of PbS in Pb be neglected. It is convenient to refer all reactions to the 3-component system $\text{Pb}-\text{S}-\text{O}$, and tentative diagrams of this system are exhibited. It was thought at first that of the 2 pairs of phases, $\text{Pb} + \text{PbSO}_4$ and $\text{PbS} + \text{PbO}$, one must be stable and the other meta-stable, but eventually it was found that the stable-phase pair is $\text{Pb} + \text{PbO} \cdot \text{PbSO}_4$. Vapor pressure (of SO_2) measurements of numerous mixts. were made in an electrically heated porcelain tube, temps. being measured with a Pt-PtRh thermocouple. The monovariant systems were found to be (1) $\text{PbS}-\text{PbSO}_4-\text{PbO} \cdot \text{PbSO}_4$, (2) $\text{PbS}-\text{PbS}-\text{PbO} \cdot \text{PbSO}_4$, (3) $\text{PbS}-\text{PbO} \cdot \text{PbSO}_4-(\text{PbO})_2-\text{PbSO}_4$, (4) $\text{PbS}-(\text{PbO})_2 \cdot \text{PbSO}_4-(\text{PbO})_2 \cdot \text{PbSO}_4$, (5) $\text{PbS}-(\text{PbO})_2-\text{PbO}$. The subscripts attached to Pb refer to definite amts. of PbS in solid soln. with Pb . From the vapor

pressure measurements the heat of reaction of $\text{PbS} + \text{PbSO}_4 = 2\text{Pb} + 2\text{SO}_2$ was calcd. by means of the ordinary equation $\log p = -Q/(4.571T) + C$, and found to be -99543 cal., which is in good agreement with the value 92470, calc. from the known heats of formation of the compds. involved.

L. H. ADAMS.

A. Smits' "new" "theory" of allotropy. H. R. KRUYT. Utrecht. *Z. physik. Chem.* 89, 464-6(1915); cf. *C. A.* 5, 1861.—Polemical. H. JERMAIN CREIGHTON.

Metastability of metals as consequence of allotropy and its significance for chemistry, physics, and technical work. ERNST COHEN. Utrecht. *Z. physik. Chem.* 89, 489-92(1915); cf. *C. A.* 8, 2295. H. JERMAIN CREIGHTON.

Physico-chemical studies of cadmium. II. ERNST COHEN AND W. D. HELDERMAN. Utrecht. *Z. physik. Chem.* 89, 493-510(1915); cf. *C. A.* 8, 2295.—It has been shown by dilatometric and electromotive methods that Cd is a metastable structure, there being simultaneously present more than 2 allotropic modifications of the metal. The electromotive behavior of different forms of Cd has been more closely examd. A number of phenomena, hitherto not understood, have been explained by means of newly obtained results.

H. JERMAIN CREIGHTON.

New researches on metallic clouds. I. Lead clouds in lead chloride. RICHARD LORENTZ AND W. EITTEL. Frankfurt a/M. *Z. anorg. Chem.* 91, 46-56(1915); cf. *C. A.* 5, 2456.—Optically clear PbCl_2 crystals were prepd. by passing a current of $\text{Cl} + \text{HCl}$ through molten PbCl_2 ; good crystals were obtained by cooling rather rapidly and using a flat-bottomed tube; cryst. and optical details are given. Metallic clouds were obtained by heating the above optically clear PbCl_2 to $100-150^\circ$ above its m. p., and adding a small piece of clean Pb; the product so obtained is grayish but still transparent. Ultramicroscopic observations showed the presence of innumerable particles similar to those found in ruby glass or similar dispersed systems; photomicrographs are given illustrating the striking optical effects obtained because of the strong birefracton of the melt. The cloud, as previously stated by L., consists of fine metallic particles; in a molten salt decompn. probably takes place such, e. g., as $n\text{MCl}_2 = [(n-1)\text{MCl}_2 + \text{M}] + \text{Cl}_2$; such a decompn. explains the fact that commercial salts do not give an optically clear fusion, and that purified salts if kept molten too long become clouded. II. Silver clouds in silver chloride and silver bromide. *Ibid* 57-60.—Optically clear AgCl was prepd. by passing dry Cl containing a small amt. of dry HCl through the molten material and cooling in the dark; AgBr by dropping a slow stream of Br on to the surface of the molten mass and cooling in the dark. Clouded preps. were obtained by heating to 1000° , adding Ag, heating 5 min. to 1100° , cooling to $500-600^\circ$ in the furnace, and cooling in the dark; clouded preps. could be cleared by repeating the treatment with Cl or Br. In the ultramicroscope the clouded preps. showed the presence of an extraordinarily large number of colloidal particles, the analogy with An ruby glass being closer than was the case with the PbCl_2 clouds. Optically clear crystals in the ultramicroscope remained clear, i. e., no Tyndall cones could be observed, but on long illumination the crystals became more and more opaque, the color changing through violet to black with AgCl , to black without a violet stage with AgBr . III. Thallium clouds in thallous chloride and thallous bromide. *Ibid* 61-5.—Optically clear TlCl and TlBr could not be prepd.; the method previously used led to oxidation with double salt formation. Tl clouds were produced in TlCl melts by electrolysis, in TlBr melts by addition of Tl; the clouded melts showed the presence of highly dispersed Tl particles, often with a definite orientation. The decompn. in the case of Tl halides probably takes place with formation of thallic halides, which tend to form double salts with the thallous halide.

GEORGE W. MOREY.

The allotropy of potassium. I. ERNST COHEN AND S. WOLFF. Utrecht. *Proc. Acad. Sci. Amsterdam* 17, 1115-8(1915) (English).—From an exam. of the data of

Hagen (*Wied. Ann.* 19, 436(1883)) on the coeff. of expansion of K, carried out with a dilatometer, it is concluded that K can undergo transformation into a 2nd allotropic modification, and that the metal as it has hitherto been known at ordinary temp. is a metastable system in consequence of the presence of both forms together.

GEORGE W. MORBY.

Compounds of arsenious oxide. I. F. A. H. SCHREINEMAKERS AND W. C. DE BAAT. Leiden. *Proc. Acad. Sci. Amsterdam* 17, 1111-5(1915).—A detn. of the solubility isotherm at 30° in the system $\text{H}_2\text{O}-\text{As}_2\text{O}_3-\text{NH}_3$. The solid phases are As_2O_3 , whose satd. aq. soln. contains 2.26% As_2O_3 ; NH_4AsO_3 , sol. in H_2O without decompn.; its satd. soln. contains 19.2% NH_4AsO_3 ; and (probably) $\text{NH}_4\text{H}_2\text{AsO}_3$, although the region for this latter compd. could not be detd. with certainty. GEORGE W. MORBY.

The relative dimensions of molecules. A. O. RANKINE. Univ. Coll., London. *Phil. Mag.* 29, 552-5(1915).—From measurements of the viscosities, and the variations of the viscosities with temp. of the gases Cl, Br, I, A, Kr, Xe, it is shown, using Sutherland's modification of Maxwell's formula correlating the viscosity of a gas with the dimensions of the mols. (*Phil. Mag.* 36, 507 (1893)), that the dimensions of each corresponding gas in the 2 groups are in const. proportion, the radius of the mol. of a halogen gas being 1.24 times as great as that of the corresponding inert gas (on the assumption that all the mols. are spherical), whence it follows that the halogen mols. have practically twice the vol. of the corresponding inert mols., and the densities of corresponding mols. in the 2 series should be approx. equal. It is further shown that the work done in sepg. to a great distance 2 mols. of a halogen gas originally in contact is 2.3 times as great as for 2 mols. of the corresponding inert gas.

A. T. CAMERON.

The velocity of adsorption retrogression. H. FREUNDLICH AND E. HASE. Brunswick. *Z. physik. Chem.* 89, 417-63(1915).—The velocity of adsorption retrogression has been measured with HgS sol, using new fuchsin and auramine as coagulators, and with S sol, using new fuchsin alone. In all cases the process appeared to be autocatalytic. In agreement with previous expts., the process, in the case of HgS sol, may be described by the differential equation $dx/dt = 2k_1t(1 + b_1x)(1 - x)$, or by $dx/dt = 2k_2t(1 + b_2x)(1 - x)$, and in the case of S sol by the equation $dx/dt = k_1(1 + b_1x)(1 - x)$. In these equations, x represents the increase in the concn. of the dye, and k and b are consts. HgS sol and S sol differ markedly in their behavior: HgS sol remains undistributed as flakes throughout the liquid during the whole process, while S, on the other hand, collects together in little toothed balls which, towards the end of the process, crumble into partially cryst., badly wetted flakes. The dependence of the velocity of the adsorption retrogression on the concn. of the dye is strikingly great. Under certain conditions, the const. k increases about 100% for a 10% increase in the concn. This dependence may be expressed by the equation $k = \chi a^p$, where a is the quantity of dye adsorbed from the adsorbent, and χ and p are consts., the value of the latter lying between 2 and 7. The turning point of the velocity curves depends but slightly, or not at all, upon the concn. of the dye. Small concns. of protective colloids, like saponin, have been found to retard noticeably the adsorption retrogression. As is the case with HgS sol, the dependence of the velocity of adsorption retrogression on temp. is also very great in the case of S sol; A in the Arrhenius equation is about 15000, corresponding to a five-fold increase in the const. per 10°. Comparison of the velocity of coagulation and of adsorption retrogression show that they agree in many points. The results of the investigation have been used to explain a number of adsorption phenomena. In conclusion, it is pointed out that the results obtained support the surface concn. theory of adsorption, and contradict the solid soln. theory.

H. JERMAIN CREIGHTON.

Theory of emulsification. VI. W. D. BANCROFT. *J. Phys. Chem.* 19, 275-309 (1915); cf. *C. A.* 7, 2143, 2881.—Many organic liquids adsorb OH ions from an aq. alkaline soln. Tomlinson's statement that oils cause supersatd. solns. of Na_2SO_4 to crystallize was questioned. Solid particles tend to go into the water phase when shaken with H_2O and a non-miscible organic phase if they adsorb H_2O to the practical exclusion of the other liquid; into the organic phase if they adsorb it to the exclusion of H_2O and into the dineric interface in case they adsorb the 2 liquids simultaneously. The latter case probably produces a homogeneous liquid phase at the surface of the adsorbing particle. A substance in the interface was named "interfacial." Such a substance can be shaken more or less completely out of its suspension in one liquid by adding a second liquid for which the suspended substance is interfacial. Winkelblech's method for shaking out colloids is a method of testing for interfacial substances. It is effective in case a fairly stable emulsion is formed or if the interfacial substance is left, when the drops coalesce, in a form not readily peptized by either liquid.

E. B. MILLARD.

Adsorption. XI. Hysteresis of the degree of hydration of cellulose. A. V. RAKOVSKII. *J. Russ. Phys. Chem. Soc.* 47, 18-21 (1915); cf. *C. A.* 8, 2512.—An exam. of cotton, paper, flax and hemp with respect to the amt. of H_2O they are capable of retaining *in vacuo* showed that the max. of hysteresis for cellulose (1.8% H_2O) is slightly lower than for the starches as found in former investigations. Several tables and curves illustrate the results.

H. M. GORDIN.

The adsorption of dyes by colloidal clay, etc. P. ROHLAND. Stuttgart. *Kolloid-Z.* 16, 16-8 (1915).—A résumé of former articles in which R. calls attention to the fact that the adsorption of dyes by colloidal clay does not depend on the acid, basic or substantive nature of the dye, but as a rule occurs with dyes such as aniline blue, aniline red, malachite green, brilliant green, aurin and alizarin, which have little or no N, while naphthol yellow, vesuvine and safranin which contain considerable N, are very little adsorbed. The fluorescein group is an exception to this rule. H. I. MATTILL.

New method of preparation and some interesting transformations of colloidal manganese dioxide. E. J. WITZEMANN. Chicago. *J. Am. Chem. Soc.* 37, 1079-91 (1915); cf. *C. A.* 6, 3089; 8, 3295.—Colloidal MnO_2 may be obtained by the use of organic reducing agents. It is especially easily obtained by incompletely oxidizing glucose (fructose, galactose) in the cold in alk. soln. with KMnO_4 . The colloidal soln. thus obtained rapidly increases in viscosity until it gels and the rate of change and the max. viscosity are roughly inversely proportional to the amt. of alkali used. This viscous or gel stage subsequently changes into a limpid soln. The properties of the 1st stage agree well with those of a typical emulsoid, while the later stage seems more characteristically a suspensoid. The transformations of the emulsoid are typical and would be normal in every way if it were not for a slower but simultaneous transformation of the emulsoid into the suspensoid, owing to the effect of the alkali in accordance with the generalizations of Mayer *et al.* (*C. A.* 2, 618, 1626). Both transformations are markedly affected by variations in temp., concn. of reacting substances and the amt. of KOH or NaOH used. The limpid form, which is stable for months, was dark brown in color, transparent in thin layers and could be dild. with H_2O to any extent without at once pptg. MnO_2 . The expts. of Bredig and Marck (*C. A.* 5, 2470) and Deiss (*C. A.* 4, 1583) were duplicated with this colloid. E. B. MILLARD.

The effect of added substances in the preparation of colloidal gold solutions by the formaldehyde method of Zsigmondy. KARL HEIGE. Göttingen. *Z. anorg. Chem.* 91, 145-85 (1915).—A study of the effect of added substances on the spontaneous crystg. power (measured by the number of crystal nuclei formed) and the crystn. velocity of colloidal Au formed by reduction of HAuCl_4 solns. by HCHO . (Pure H_2O

which would give clear, reproducible colloidal Au solns. could not be prepd. by distn., the best which could be made containing some organic matter; these impurities, however, were eliminated by letting the water stand some time in glass bottles. On addition of gelatin, Na palmitate, Na stearate, Na oleate, or Na protalbinato to the Au soln. before reduction, the number of particles decreased to a minimum, then again increased with increasing amts. of added substance, and large amts. increased the time required for complete reduction. Gum arabic and starch gave highly dispersed solns., due probably to their reducing action; the effect with the 1st group is probably to be explained by the formation of "colloidal compds." Thoroughly aged, dialyzed SiO_2 solns. also gave a minimum in the number of particles; with fresh solns. the number of particles increased, probably due to organic matter from the parchment; SnO_2 soln. gave results similar to the aged SiO_2 soln.; addition of colloidal Fe_2O_3 resulted in a higher degree of dispersion, but it also caused pptn. because of its positive charge. Of the electrolytes used, NH_4OH , NH_4Cl , $\text{K}_3\text{Fe}(\text{CN})_6$ and $\text{K}_4\text{Fe}(\text{CN})_6$ hindered the formation of nuclei; HCNS , congo red, benzo-purpurin, $\text{K}_2\text{C}_2\text{O}_4$ and Na citrate caused an increase in the spontaneous crystg. power (often due to reduction), as did $\text{C}_6\text{H}_5\text{CO}_2\text{K}$, HCO_2K , KOAc , morphine-HCl, etc.; NaNO_3 , Na_2SO_4 , and rosaniline-HCl tended to coagulate the Au soln.; KCl , KBr and KI gave first a strong increase in the crystn. velocity, after which they caused coagulation; $\text{Sr}(\text{NO}_3)_2$, $\text{Ba}(\text{NO}_3)_2$, and HgCl_2 gave similar results, though the 1st effect was not so marked; $\text{Fe}(\text{NO}_3)_3$ and $\text{Al}(\text{NO}_3)_3$ first had a favorable effect on the formation of nuclei, followed by pptn. by the positively charged oxide formed; CuSO_4 , NiSO_4 , CoSO_4 and $\text{Cr}(\text{NO}_3)_3$ showed only the latter effect. Because of the action of $\text{K}_3\text{Fe}(\text{CN})_6$ in inhibiting the formation of nuclei, when soln. containing nuclei was added the added nuclei alone grew, resulting in particles visible with the ultramicroscope, the number of which could be counted; knowing the amt. of Au dispersed in the added soln. the dimensions of the nuclei could be calcd., assuming the d. of the Au to be 20; the diam. of the nuclei was found to be 3.15μ .

GEORGE W. MOREY.

Experiments with colloidal gold and silver. E. S. BASTIN. *J. Wash. Acad.* 5, 64-71(1915).—*With gold:* A dull brown or black condition of Au is favorable to colloidal Au formation while a lustrous yellow is not. Colloidal Au appeared to originate on the surface of the metal or the sulphide at room temp., and then slowly to undergo diffusion. B. thinks that, while the brown color of some natural Au may be due to impurities, it may also be that it is in a condition approaching the colloidal state. It is probable that in the oxidized zone of ore deposits the presence of colloidal Si takes the Au into colloidal soln. Expts. were carried out first with the aid of gelatin and then with SiO_2 . *With Ag:* In case of Ag, SiO_2 seems to act as an emulsoid. B.'s expts. are justified by the fact that rocks rich in olivine which yields colloidal Si on weathering, gives good evidence of colloidal downward transport of Au and Ag, though the transport of Au or Ag in colloidal soln. is of little importance in formation of ore deposits as compared to salts in true (electrolytic) soln. P. A.

Viscosities of binary mixtures of the associated liquids, water, formic acid and acetic acid. P. B. DAVIS AND H. C. JONES. Johns Hopkins Univ. *J. Am. Chem. Soc.* 37, 1194-8(1915); *C. A.* 7, 928; 8, 449.—Viscosities of these binary mixts. have been detd. at 15° and 25° . The curve for viscosity of HOAc in H_2O showed high maxima of viscosity for both temps. in the neighborhood of 80% HOAc; the other mixts. had only slightly curved plots. E. B. MILLARD.

Similarity of motion in relation to the surface friction of fluids. T. E. STANTON AND J. R. PANNELL. *Trans. Roy. Soc. London (A)* 214, 199-224(1914).—Expts. on the flow of H_2O in pipes of 0.36 to 2.85 cm. in diam., and 28 to 61 cm. long, at stream velocities as high as 5600 cm. per sec., and upon air in these pipes at 190 to 4000 cm.

per sec. have been made. The temp. was not const. throughout the series, but appears to have been taken at whatever temp. the fluid happened to be at the time. The ratio of mean velocity in the pipe to the velocity at the axis has been shown in curves. Using a law of resistance $R = kv^n$, where n was taken as 1.72, the observed resistance was compared with the calcd. The latter was 5% low at a velocity of 1000 cm. per sec. (for the 1.25 cm. pipe), 8.5% low at 2000 cm. per sec., and 15% at 3000 cm. per sec.

E. B. MILLARD.

The preparation of anhydrous solids. W. R. G. ATKINS. Trinity Coll., Dublin. *Nature* 95, 118(1915).—A method is suggested for the prepn. of solid compds. in the anhydrous state, or for obtaining anhydrous tissues for moisture detns. According to this method, the material to be dehydrated is placed in a suitable distg. flask with alc. and C_6H_6 in the proper proportions. When all the turbid ternary mixt. of const. b. p. has been removed by distn. from a water bath, the remaining mixt. of alc. and C_6H_6 may be rapidly distd. away, and the last traces can be removed in a vacuum desiccator. By adjusting the quantities, either alc. or C_6H_6 can be obtained as the residual liquid, and the complete removal of either of them is far more readily effected than is that of water owing to their lower boiling points and greater volatility. The method avoids all risks of oxidation in the case of the drying of plant tissues.

W. H. ROSS.

Fortuitous density changes and opalescence at the critical point of an element. L. S. ORNSTEIN AND F. ZERNIKE. Groningen. *Verslag Akad. Wetenschappen* 23, 52-95(1914).—This article consists of a mathematical treatment in considerable detail of the cause and calcn. of critical opalescence.

L. H. A.

Internal friction of salt solutions. W. HERZ. Breslau. *Z. anorg. Chem.* 89, 393-6(1914); cf. C. A. 8, 1889.—Viscosity detns. were made at 25° with solns. of the chlorides of K, Na, NH_4 , Ba, Sr, Mg, Mn and Cu, sulfates of Mg, Mn, Zn and Cu, and nitrates of Mg, Mn and Pb of various conc. Details of app. and method are not given.

GEORGE W. MOREY.

On a new form of sulfuric acid drying vessel. THE EARL OF BERKELEY AND E. G. J. HARTLEY. *Phil Mag.* 29, 609-13(1915).—New forms of P_2O_5 and H_2SO_4 drying tubes are described. Comparative expts. show that H_2SO_4 is capable of drying air as completely as P_2O_5 , at least to the extent required in measuring the vapor pressure of aq. solns. In the new form of app. it is not necessary to bubble the air through the acid, but only to lead it over the surface; thus the risks of introducing acid spray into the air stream and of uncertain changes in the vol. of the air current are avoided. The vapor pressure of H_2SO_4 itself is shown to be too small to be of importance in such work. Pure, anhydrous $CuSO_4$ is a very efficient drying agent for air, containing only traces of moisture (it will take up 0.05% of its own wt.) and has the advantage that it can be used over again after heating to 210-220° in an air stream. Its dehydrating property seems difficult to explain, since according to theory it should not absorb H_2O vapor unless the partial pressure is greater than that of the hydrate $CuSO_4 \cdot H_2O$.

A. T. CAMERON.

The hydrate problem. I. Calculation of the quantity of water involved by ions from electrolytic mobilities. HEINRICH REMY. Freiburg. *Z. physik. Chem.* 89, 467-88(1915).—It is pointed out that, if the H ion is considered as unhydrated, the water enveloping the ions in infinitely dil. solns. may be ascertained by comparison of the mobilities, with the help of Stokes' formula. It has been found that in a great number of cases the radius of the water-enveloped ion differs from the radius of the unhydrated ion by exactly the diam. of a water mol. In view of this the supposition is made that these ions are just covered with a layer of H_2O mols. The following values have been calcd. for the number of H_2O mols. which envelope certain mono-

valent ions: H⁺ 0, Cs⁺ 13, Rb⁺ 14, K⁺ 16, NH₄⁺ 17, Na⁺ 66, Li⁺ 120, Tl⁺ 16, Ag⁺ 29, OH⁻ 1, I⁻ 15, Br⁻ 15, Cl⁻ 16, ClO₄⁻ 17, ClO₃⁻ 26, NO₃⁻ 19, CNS⁻ 25. In conclusion it is pointed out that this H₂O envelope is made up of hydrate and adhesion H₂O which is in good agreement with Werner's supposition.

H. JERMAIN CREIGHTON.

Influence of temperature and solvent on the molecular weight of dissolved substances. ERNST BECKMANN AND MARIA MAXIM. Berlin-Dahlem. *Z. physik. Chem.* 89, 411-6(1915).—It has been found that the degree of association of phenol in CCl₄ is not very sensitive towards moderate lowering of the b. p. (75.4°-54.1°). During the transition from the b. p. of CCl₄ to its f. p., the degree of association is more than doubled. In freezing CHBr₃ (m. p. 8°) an intermediate association value has been obtained. In spite of the low temp., both with CCl₄ and CHBr₃, diln. causes the association to disappear completely. The influence of diln. with a solvent has been found more effective in this connection than a temp. increase of about 100°, even though the solvent were relatively indifferent.

H. JERMAIN CREIGHTON.

Freezing point-solubility law for ideal solutions. E. W. WASHBURN AND J. W. READ. Univ. Illinois. *Proc. Nat. Acad.* 1, 191-5(1915).—For "ideal" solns. (those in which the constituents are completely miscible and in which mixing takes place without heat effect or change in vol.) the equations $dT/dx_A = RT^2/L_A x_A$ and $dT/dx_A = RT^2/L_B x_B$ can be shown thermodynamically to express the change of f. p. caused by an increase in the mole-fraction of each component. The soln. is composed of the substances *A* and *B*, *T* is the abs. temp., *L* the latent heat of fusion per mole and *x* the mole-fraction, in soln., of the substance indicated by the subscript. By means of the integrals of these equations (assuming *L* to be independent of the temp. for the range covered) the eutectic has been calc. for C₆H₆-C₁₀H₈, C₆H₆-C₆H₅C₆H₅ and C₁₀H₈-C₆H₅C₆H₅. The eutectic temps. calc. were, resp., -3.48°, -5.8° and 39.4°; those obtained by careful expts. were -3.56°, -6.1° and 39.4°. This shows that the solns. are very close to ideal solns. When a substance *A* is dissolved in any solvent *B* with which it forms an ideal soln., its solubility (expressed in terms of its mole-fraction in the satd. soln.) is entirely independent of the nature of the solvent *B*, and is therefore the same for all solvents. By an application of this principle, the question as to whether racemates exist as such in the liquid state and to what extent they exist could be solved, since optical isomers are examples of substances which form ideal solns. with each other.

E. B. MILLARD.

Transformation of the trichlorides of chromium and titanium in aqueous solution. ADOLF HEYDWEILLER. Rostock. *Z. anorg. Chem.* 91, 66-74(1915).—CrCl₃·6H₂O exists

in three forms, green $\left[\begin{array}{c} \text{CrCl}_3\text{H}_2\text{O} \\ \text{CrCl}_3\text{H}_2\text{O} \\ (\text{H}_2\text{O})_4 \end{array} \right]^-$, green $\left[\begin{array}{c} \text{CrCl}_3\text{H}_2\text{O} \\ \text{Cr} \\ (\text{H}_2\text{O})_5 \end{array} \right]^{--}$ and violet $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$;

H. studied the rate of transformation in solns. by detg. the change with time of the cond. and density of solns. of various strengths at 18°. The first green form was used in making the solns. In a soln. containing 0.853 mol. per l., the sp. cond. increased from $10^3 K_0 = 71.6$ to $10^3 K_\infty = 99.8$ in 153 days, and the d. (expressed as δd_{18} of the soln. —1) increased from $10^3 \delta_0 = 10.972$ to $10^3 \delta_\infty = 11.440$; the values for *m* = 0.640 mol. per l. were, resp., 60.60, 87.50, 8.318 and 8.690 (time, 61 days); for *m* = 0.427 mol. per l., 42.87, 67.70, 5.333, 5.843 (time, 61 days). The above results can be expressed by the formulas: $\ln[(K_\infty - K_0)/(K_\infty - K_t)] = at$ and $(\sigma_\infty - \sigma_0)/(\sigma_\infty - \sigma_t) = bt$, in which the values of *a* and *b* for the above 3 dilns. are, resp., 0.0495, 0.0462, 0.0702, 0.0675; 0.1246, 0.1255. That the reaction is not monomol., as implied by the form of the above expressions, is shown by the trend of the consts. with diln. From the fact that the products $am(1-i)$ and $bm(1-i)$ are const. it is concluded that the reaction is between the non-ionized mol. and H₂O;

the rate of change of the 1st green salt into the 2nd is very great, and K_0 refers to the latter, K_∞ to the violet salt. Similar expts. with BeCl_2 , NiCl_2 , AlCl_3 , and FeCl_3 showed that no change in cond. took place in 9 months. The d. of TiCl_3 solns. remained const., but the specific cond. changed with time; m , $10^3 K_0$, $10^3 K_\infty$, and a found were: 1.228 mols. per l., 118.9, 220.0, 0.006; 0.609 mol., 96.9, 175.5, 0.047; 0.297 mol., 58.2, 105.0, 0.20. The reaction in this case is due to oxidation to oxychloride, and the increase in cond. to the liberated H^+ .

GEORGE W. MORREY.

Hydrous chromic oxide. C. F. NAGEL, JR. *J. Phys. Chem.* 19, 331-7 (1915).—Good jellies can be obtained by adding KOH to a $\text{Cr}_2(\text{SO}_4)_3$ soln.; but the alkali must be added quickly and not in great excess. Hydrous chromic oxide is peptized by caustic alkali. It can adsorb the hydrous oxides of Fe, Mn, Co, Ni, Cu and Mg to some extent without coagulation, and thus carries these oxides into colloidal soln. These hydrous oxides adsorb chromium oxide and therefore take it out of colloidal soln. in alkali. When the oxides are present in sufficient amt., they decolorize a green soln. of Cr_2O_3 peptized by alkali. In presence of glycerol hydrous Fe_2O_3 is peptized by alkali, and consequently does not tend to carry down the chromium oxide. In presence of a Cu salt, hydrous chromium oxide is peptized by NH_3 .

W. H. S.

Ammonium magnesium sulfate (cerbolite). I. Solubility, freezing curve and cryohydric point. I. C. PORLEZZA. *Univ. Pisa. Atti accad. Lincei* 23, II, 596-9 (1914).—This salt occurs as a by-product in the Tuscan boric acid industry. Industrially the NH_3 is removed with lime and the residue taken up with H_2SO_4 . Since in this way the MgO and part of the H_2BO_3 are lost, P., at the suggestion of Nasini, undertook to study the equil. relationships of this salt more closely. The f. p. of solns. of various concs. from 0.072 mol. $(\text{NH}_4)_2\text{Mg}(\text{SO}_4)_2$ to 100 mols. H_2O up to solns. of 0.648 mol. were detd. The curve was traced and the cryohydric point was found to be at the latter conc. at -2.34° . From the solubilities of $(\text{NH}_4)_2\text{Mg}(\text{SO}_4)_2$ as given by Siedell (*Solubility of inorg. and org. substances*, 1907, p. 34) and Lothian (*C. A.* 4, 1719) the solubility curve was constructed and found to intersect the f. p. curve as it should at the cryohydric point. II. P. detd. the solubility of $(\text{NH}_4)_2\text{Mg}(\text{SO}_4)_2$ in H_2O at various temps. in a thermostat with great care; the amt. of this salt dissolved in 100 g. H_2O at 0° is 11.83; at 10° 14.61; 15° 16.27; 20° 17.96; 25° 19.69; 30° 21.71; 40° 25.86; 50° 30.17; 60° 35.17; 70° 40.98; 80° 42.32; 90° 56.32; 100° 65.72, resp. The cryohydric point according to the data of S. is -1.90° , from those of L. -2.45° and from P.'s data -2.40° (detd. experimentally -2.34°). The solubility for the cryohydric temp. as detd. from the curves is 10.75 g. in 100 g. H_2O . The equation for the solubility is $S = 10.55 + 0.2215t + 0.000668t^2$, which is correct to 1%. In all expts. the comp. of the hydrate was taken as $(\text{NH}_4)_2\text{Mg}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$ and was never found to vary more than 0.5% from this value.

E. J. WITZEMANN.

Molecular complexity of acetic acid. G. M. BENNETT. *J. Chem. Soc.* 107, 351-60 (1915).—The surface tension of AcOH has been detd. in the absence of air, the capillary rise method, between 15° and 150° in an app. patterned after that of Hewitt and Winnill (*J. Chem. Soc.* 91, 441 (1907)). The values were calc. from the equation $\gamma = \frac{1}{2}(h + r/3)r(d - d')$, where h is the capillary rise, d the density of the liquid, and d' that of the vapor, the latter becoming of importance at higher temps. When observed heights of rise were plotted against temp., a smooth curve was obtained which was practically a straight line. The criterion of non-association should not be the absolute value of $k = d[\gamma(Mv)^{2/3}]/dt$, but rather its constancy for a given liquid, and the value 2.121 found by Ramsay and Shields has no general significance. Values of this function and of the total mol. surface energy, $[\gamma - t(d\gamma/dt)](Mv)^{2/3} = K$, have been calc. for the whole range of temp. K remains sensibly const. over the whole range, k decreases only from 1.275 to 1.250. There are 2 possibilities: (1) the mol.

$(C_2H_4O_2)_n$, (where n may be 1, 2, 3 etc.), is behaving as a simple mol. of considerable stability and the liquid consists exclusively of such mols., (2) there is a state of equil. such as $(C_2H_4O_2)_2 \rightleftharpoons 2C_2H_4O_2$, which is independent of the temp. In the latter case the dissociation of the complex must involve no thermal change, and this is shown to be untrue. The conclusion is that a mol. $(C_2H_4O_2)_2$ exists throughout this temp. range.

E. B. MILLARD.

Solubility of carbon dioxide in water in the presence of starch. ALEX. FINDLAY AND O. R. HOWELL. *J. Chem. Soc.* 107, 282-4(1915); cf. *C. A.* 8, 3734.—The solubility has been redetd. with greater care. Data are given at 25° for the solubility in cc. per cc. of water for pressures from 272 to 960 mm. in pure H_2O ; then the solubility in 5% starch solns. prepd. in 4 different ways. For H_2O the mean value was 0.824. The solubility in the presence of starch was not affected by such variations as arose from differences in method of prepn. of the solns. (time of boiling, rate and method of cooling, etc.). This is in marked contrast to the results of F.'s previous investigations in which the rate of evolution of CO_2 from starch solns. was influenced by these causes. Cf. *C. A.* 8, 3734.

E. B. MILLARD.

Velocity of ionization at low temperatures. A. R. NORMAND. *J. Chem. Soc.* 107, 285-90(1915).—A temp. of -98° was maintained by mixing MeOH with liquid air until a mush of solid was obtained. This equil. temp. was fairly const. EtOH was used as the bath liquid and as solvent for the KI, which served as solute. 100 g. of EtOH dissolve 1.138 g. KI at -98° , the solute being about 50% ionized at this temp. When a portion of this satd. soln. was quickly mixed with an equal amt. of EtOH, the cond. should change gradually if ionization at this temp. were a slow process. No indication was obtained that this was the case, for as soon as the temporary disturbance due to mixing had disappeared, the cond. remained const. Similar results were obtained with 1% KI in an equimol. mixt. of EtOH and MeOH at -117.6° . This mixt. behaved like a glass, having no definite m. p. When it was immersed in liquid air, the vol. decreased and the mixt. became solid at about 150° . If the velocity of ionization doubles for every 10° rise in temp., ionization would take place at room temp. in less than 0.01 sec., probably much less.

E. B. MILLARD.

Influence of sucrose and alkali chlorides on the solvent power of water. J. C. PHILIP AND A. BRAMLEY. S. Kensington. *J. Chem. Soc.* 107, 377-87(1915).—Expts. have been made on the distribution of EtOAc, PhOH and acetone between H_2O or aq. solns. of sucrose and alkali chlorides and petroleum or C_6H_6 at 20° . The lowering of the solvent power shows a distinct increase with diln. in practically every case. Whatever is the cause of the diminished solvent power of H_2O in the presence of the added substance, it is some factor which becomes relatively more important as the proportion of H_2O increases. From calcns. based on the data, the av. mol. hydration of sucrose ranged from 11 for the more dil. solns. to 6.5 for the more conc. ones. If the decrease in solvent power of NaCl solns. is due to the hydration of NaCl alone, the av. mol. hydration would lie between 9.5 for more conc. solns., (4 N) to 17.8 at 0.5 N. For KCl the expts. are not so good, but the corresponding values of hydration are 8.6 at 4 N and 16.4 at 0.5 N, somewhat less than for NaCl. Results for LiCl cannot be used to calc. the hydration, for all of the distributed substances are able to dissolve LiCl in appreciable quantities. The calcns. made showed the same hydration for LiCl as for NaCl, while other sources show that the Li salt is almost surely more hydrated.

E. B. MILLARD.

A peculiar form of caffeine-sodium salicylate. R. E. LIESEGANG. Frankfurt. *Kolloid-Z.* 16, 13-6(1915).—When a thin layer of a soln. of caffeine-sodium salicylate is allowed to dry out it forms a continuous film made up of very narrow alternate ridges and depressions. If water is poured over a very concd. soln. of caffeine-sodium

salicylate and the container slowly heated on the water bath without mixing, as many as 8 distinct layers, of different light refraction and different conc., may be formed. The same phenomenon will occur if water is poured over a concd. soln. of gelatin and the container warmed. This formation may be preserved by suddenly cooling to the point of solidification of the gelatin solns. This offers a new hypothesis for the apparent stratification of deep rocks which have suffered gradual cooling from above.

H. I. MATTILL.

Flame reactions. IV. W. D. BANCROFT AND H. B. WEISER. Cornell Univ. *J. Phys. Chem.* 19, 310-30(1915); cf. *C. A.* 8, 1903, 2103; 9, 167.—Salts of Li, K and Na gave 2 spectra in the Bunsen flame; one of these continuous, the other a line spectrum. The introduction of HCl into the Bunsen flame cuts down the intensity of the line spectra. With a flame of H burning in an atm. of Cl, the line spectra disappeared completely. The *D*-lines were obtained faintly when NaCl was introduced into a flame of Cl burning in H. The blue luminescence of Na without the yellow was obtained when Na salts were introduced into H flames burning in Cl; when Na burned slowly in O, Cl, or Br; when a Na salt was fused, when cathode rays acted on NaCl; when anode rays first acted on it; when the colored residue obtained by the action of anode or cathode rays on NaCl was heated; and when NaCl was pptd. rapidly from aq. soln. by HCl or EtOH. Yellow luminescence, accompanied by the fainter blue, was obtained when canal rays acted on NaCl or when Na was burned rapidly in O, Br or Cl. The blue luminescence of Na was due to reactions from Na ion to undissociated Na salt; the yellow was due to some stage in the reaction from Na vapor to Na ion. The diminished intensity of line spectra in the H-Cl flame or in a flame to which HCl has been added, was due to the forcing back of the dissociation of the salts. They dissociated only slightly into ions and not at all or very slightly into free metal. E. B. M.

The firing of gases by adiabatic compression. III. The ignition-points of mixtures of electrolytic gas with argon. Ratio of the specific heat for nitrogen and hydrogen. J. M. CROFTS. Manchester Univ. *J. Chem. Soc.* 107, 290-305(1915).—Various mixts. of gas were compressed till ignition occurred. The temps. of ignition were detd. by calcg. from the vols. observed and from assumed values of C_p and γ (sp. heat at const. pressure and ratio of sp. heats, resp.) These assumed values were regarded as somewhat doubtful. The results thus obtained show that the temp. of ignition rises regularly, in proportion to the inert gas added to the electrolytic mixt., whether this gas is A or H. This fact, since A is certainly inert, indicates that H is also inert, and C. also considers that both gases when added to the electrolytic mixt., alter the ignition temp. to exactly the same extent. By means of this assumption he compares the results for A (whose sp. heat is known) and H to get C_p and γ for electrolytic gas. Here he assumes that H and electrolytic gas have the same values. By means of the result for electrolytic gas he next finds values for C_p and γ for H and N. The value of C_p for H now comes 2% different from that for electrolytic gas, but C. does not revise his basic detn., where the 2 were assumed to be equal. The *uncorrected* value of C_p for electrolytic gas had agreed to 0.0004 with that given by Lewis and Randall. For H he finds that γ varies from 1.389 to 1.374, and C_p from 5.103 to 5.311 as the temp. interval changes from 15-332° to 15-689°. For N, γ varies from 1.404 to 1.398, and C_p from 4.913 to 4.989 as the interval changes from 15-532° to 15-702°. The variations are linear within the observational errors. These values agree well with those of other observers. The ignition point of electrolytic gas is 520°, raised to 674° by diln. with 4 vols. of A. W. P. WHITE.

The firing of gases by adiabatic compression. IV. The ignition points of mixtures of electrolytic gas with carbon dioxide. Ratio of the specific heats for carbon dioxide. J. M. CROFTS. Manchester Univ. *J. Chem. Soc.* 107, 306-13(1915).—CO₂ was

treated as H and N were in the paper of the preceding abstract. As a result, γ was found to vary from 1.254 to 1.251 and C_p from 7.815 to 7.909 as the temp. interval increased from 15–532° to 15–570°.

W. P. WHITE.

Actual criteria in the measurement of low temperatures. LUIGI ROLLA. Genoa. *Ann. chim. applicata* 2, 369–74(1914).—R. discusses the advantages and limits for the purpose of low temp. measurement, of the H, He and N thermometers, and the limits of application of the equation of state, $p v = A[1 + (B/v) + (C/v^2)(D/v^4) + (E/v^6) + (F/v^8)]$, and its simpler forms: $p v = A[1 + (B/v)]$ and $p v = A$; also the relationship of the Avogadro and Kelvin temp. scales. Behavior of magnetic susceptibility, of thermoelec. force and of elec. cond. at temps. near abs. zero are considered with regard to their utilization in temp. measuring instruments. R. also treats of the supercond. of Hg at near zero, and discusses low temp. thermometers based on vapor tension of O, H and other gases.

S. LEVY.

Numerical testing of some thermal relationships. W. HGRZ. Breslau. *Z. anorg. Chem.* 89, 397–400(1914).—H. tested a number of empirical relationships. The data used are themselves unsatisfactory. The relation $T\lambda = k$ (T = abs. m. p., λ = linear coeff. of expansion) held approx. for most metals tried, with k about 0.023; Bi and Sn were exceptions. The relation $L/\sqrt[3]{V}$ (L = mol. heat of evapn., V = mol. vol.) held approx. for certain compds., the values ranging from 1.53 to 1.72. The relation $Tc/M = k$ (T = abs. b. p., c = sp. heat, M = mol. wt.) did not hold even approx. The expression $T/d = n$ (T = abs. b. p., d = density, n = a const. which may be 2, 3, or $4\sqrt{2}$) expresses a fortuitous relationship true for some liquids only.

GEORGE W. MOREY.

Specific heats at constant pressure and at constant volume in liquids and vapors. STEFANO PAGLIANI. Palermo. *Nuovo cimento* 8, 157–88(1914).—P. gives (for temps. between 0° and 100°) the coeff. of expansion at const. pressure, the coeff. of increase of tension, the coeff. of isothermic compressibility, the specific heats at const. pressure (C_p) and at const. vol. (C_v) of the following liquids: H_2O , C_6H_6 , toluene, *m*-xylene, cymene, Me, Et, primary Pr, isobutyl and isoamyl alcohols, 3 hydrocarbons of petroleum, some mixed alcohols, and some other liquids, and compares them with figures obtained by Tyrer, whose conclusions are criticized. C_p increases with the temp. for most of the liquids—exceptions are CCl_4 (above 30°) and CS_2 (above 10°). Objection is made to Tyrer's statement that the variation is greater in liquids whose formula contains a larger no. of atoms. The difference between the 2 sp. heats for the liquid state and the vapor state in general is equiv. to the work of thermal expansion and is greater for the 1st state than for the 2nd. For H_2O and MeOH there is a temp. at which this difference is equal. The energy absorbed in the expansion of a liquid or vapor is used to a small extent in overcoming external work or pressure, but the greater part is used in internal work, required by the intermol. attraction, or in increasing the mol. energy. There are exceptions to Tyrer's general deduction that the difference between the 2 sp. heats increases continually with the temp. The author's work did not verify the relation of Tyrer: $(C_p - C_v)v^2/(dv/dt) = \text{const.}$ nor the general expression: $1/(dv/dt) - v(C_p - C_v) = 1$. With the extension of our knowledge relating to the physical properties of matter to a greater and greater number of compds., it is becoming more and more difficult to enunciate general laws applicable to substances varying in comp., in mol. condition, and in chem. functions. Equal conditions of temp. and pressure, and analogous variation of these magnitudes do not always bring about analogous effects in all compds., even in an equal state of aggregation; rather there is often observed difference of behavior in the variations of their characteristic physical properties with variation of the conditions of temp. and pressure, when these are within the same limit.

S. LEVY.

Heats of formation of acrolein and metacrolein. E. VOISENET. *Bull. soc. chim.* 17, 34-7(1915).—The mol. heat of combustion of acrolein (*A*) at const. vol. was found to be 393.14 Cal. (using Berthelot and Delépine's method (*Ann. chim. phys.* [7] 21, 1900)) and the heat of formation, 27.18 Cal., a value which is about 8 Cal. lower than that calcd. from the heat of formation of crotonic aldehyde (which is 41.9 Cal.). This "reserve energy," which is characteristic of the 1st member of this and other homologous aldehydic series, appears to account for the extreme reactivity of (*A*), especially in its polymerization reactions. The thermochem. equation for the prepn. of (*A*) by the dehydration of glycerol (*B*) is: (*B*) = 2H₂O + (*A*) + 3.78 Cal. When treated with HCl, (*A*) yielded CH₂ClCH₂CHO, which, when distd. with powdered KOH, gave rise to metacrolein, (CH₂:CH.CHO)₂, m. 45°, mol. heat of combustion at const. vol., 1169.19 Cal.; heat of formation, 92.65 Cal. LOUIS E. WISE.

The inapplicability of Boltzmann's equi-partition hypothesis to gases in a state of change of internal energy; and its bearing on the experimental determination of the specific heat of gases. J. G. STEWART. Univ. Birmingham. *Phil. Mag.* 28, 748-53(1914).—The matter is indicated by the title. A. T. CAMERON.

The variation of the triple-point of a substance with hydrostatic pressure. A. W. PORTER. *Phil. Mag.* 29, 143-9(1915).—It is shown, with special reference to the case of ice-water-steam, that the variation of the temp. of the triple-point with hydrostatic pressure is equal to the variation of the m. p. with hydrostatic pressure. The result is general in all triple-points and can be extended to the case of multiple-points. A. T. CAMERON.

The boiling points and critical temperatures of homologous compounds. A. FERGUSON. Univ. Coll., Bangor. *Phil. Mag.* 29, 599-608(1915).—A b. p. formula is proposed for the normal paraffins, $\log \theta = 1.929 (\log M)^{.4134}$, which covers the range of *n* from 4 to 17, where *n* is the number of C atoms, θ is the abs. b. p., and *M* the mol. wt., with an av. error of 0.64°. An equation, $\theta_c/\theta n^{.120} = 1.841$, where θ_c is the critical temp., holds for the normal paraffins between ethane and decane with an av. error of 0.33%. Eliminating θ between this second formula and any of the various b. p. formulas, empirical equations are obtained for the critical temps. of the normal paraffins. In particular, the equation $\log \theta_c = 0.2650 + 1.929 (\log M)^{.4134} - 0.120 \log n$ is in very close agreement with the observed facts. The b. ps. of the primary alkyl bromides are connected with those of the corresponding paraffins by the equation $\theta_B = \theta_P + 187.5/n^{.428}$, the mean error over the range of *n* from 3 to 8 being 0.73°. The similar formula for the primary alcs. $\theta_A = \theta_P + 331.1/n^{.744}$ gives their b. ps. over the range *n* = 3 to *n* = 10 with an av. error of 2.04°. A. T. CAMERON.

The van der Waals formula (and the latent heat of vaporization). T. C. SUTTON. Univ. Melbourne. *Phil. Mag.* 29, 593-9(1915).—It is shown that the formula for the latent heat of vaporization put forward by Applebey and Chapman (*C. A.* 8, 2296) is calcd. in essentially the same way as that of Mills and Young (*Sci. Proc. R. Dublin Soc.* 1910, 412), the former using a form of the van der Waals equation, the latter Biot's formula. A second modification of the van der Waals formula, $(p + a/v^2)(v - b - \gamma M) = RT$, where $\gamma = db/dt = \text{const.}$, is shown to give results equally in close agreement with the known data of latent heats, and to be preferable on theoretical grounds. This formula, and the derived expression for the latent heat, hold good for all the non-associated liquids examd. (using Young's figures), and for none of the associated liquids, affording a delicate test of association in a liquid. A. T. CAMERON.

The dielectric constant of liquid hydrogen iodide. HERMAN SCHLUNDT AND JULIUS UNDERWOOD. Univ. Missouri. *J. Phys. Chem.* 19, 338(1915).—New detns., using the Drude-Schmidt app. and colorless HI redistd. *in vacuo*, give 2.65 at 19°,

3.61 at -50° and 3.05 at -70° for the solid instead of 2.90 at 22° , 2.88 at -50° and 3.95 at -70° for the solid as previously reported by Schaefer and Schlundt (*C. A.* 4, 531). The accuracy of the value for the solid state is still somewhat in doubt.

O. A. RANDOLPH.

The dielectric constant of some organic solvents at their melting or boiling point. J. D. CAUWOOD AND W. E. S. TURNER. Univ. College, Wales. *J. Chem. Soc.* 107, 276-82(1915).—In order to det. the values at the b. p., measurements were made at a series of temps. and the values required were extrapolated while for the m. p. most of the values were obtained by a direct measurement at or within 1° of the m. p. Nernst's app. was used for the detns. with C_6H_6 at 17° as the standard in the most cases. All of the substances used were purified. The results are as follows: C_6H_6 , m. 5.5° , b. 80° , $k_{m.p.}$ 2.275, $k_{b.p.}$ 2.170; $C_{10}H_8$, m. 80.5° , $k_{m.p.}$ 3.22; cyclohexane, m. 4.5° , $k_{m.p.}$ 2.075; *o*- $ClC_6H_4NO_2$, m. 33° , $k_{m.p.}$ 17.8; *p*- $ClC_6H_4NO_2$, m. 83.5° , $k_{m.p.}$ 12.7; *p*- $Cl_2C_6H_4$, m. 52.1° , $k_{53.0^{\circ}}$ 2.82; *p*- ClC_6H_4Me , m. 7.4° , $k_{m.p.}$ 6.35; *p*- BrC_6H_4Me , m. 28° , $k_{m.p.}$ 5.07; *p*- IC_6H_4Me , m. 35° , $k_{m.p.}$ 4.40; *p*- $O_2NC_6H_4Me$, m. 52° , $k_{m.p.}$ 18.44; $CHCl_3$, b_{716} 60.9 , $k_{61.2^{\circ}}$ 4.13; $CHBr_3$, m. 7.5° , k_8° 4.58; *p*- $MeC_6H_4NH_2$, m. 43.7° , $k_{44^{\circ}}$ 5.40; Ph_2NH , m. 52° , $k_{m.p.}$ 3.30; C_6H_5N , b_{716} $114.0-114.2^{\circ}$, $k_{b.p.}$ 9.5; veratrole, m. 22.5° , $k_{m.p.}$ 4.47; benzil, $k_{98^{\circ}}$ 4.14; isoamyl alc., b_{716} $128.3-128.4^{\circ}$, $k_{b.p.}$ 5.7; Me_2EtCOH , b_{716} $101.7-102.2^{\circ}$, $k_{b.p.}$ 5.7; methyl succinate, m. 19.5° , $k_{m.p.}$ 5.12; methyl *p*-toluate, $k_{33^{\circ}}$ 4.28.

O. A. RANDOLPH.

The electron theory of metallic conduction. II. G. H. LIVENS. *Phil. Mag.* 29, 425-32(1915); cf. *C. A.* 9, 881.—A mathematical paper harmonizing the views of Drude and Thomson on the interaction of electrons and atoms with those of Lorentz.

A. T. CAMERON.

The photoelectric effect. III. O. W. RICHARDSON AND F. J. ROGERS. *Phil. Mag.* 29, 618-23(1915).—The previous results of Compton and Richardson for Pt, Al, Na and Cs (*C. A.* 8, 9) are expressed in abs. values and compared with those of Werner (*C. A.* 7, 2153) and of Pohl and Pringsheim (*C. A.* 8, 277).

A. T. C.

The contact difference of potential of distilled metals. F. SANFORD. Stanford Univ. *Phil. Mag.* 29, 623-4(1915).—An explanation is suggested for some of Hughes' results (*C. A.* 8, 3744). When a section of a glass tube is heated to 100° or less it becomes electronegative to the colder parts of the same tube; the process is slow. In Hughes' expts. the glass must have been considerably heated over the regions upon which the metallic films were condensed, probably became negatively electrified, and accordingly lessened the electropositive induction effect of the metallic films. As the glass cooled its charge diffused slowly, and the metallic films appeared to become more electropositive. Admission of a trace of air would enable the negative charge on the glass to diffuse more rapidly.

A. T. CAMERON.

On the statistical relations of radiant energy. G. H. LIVENS. Univ. Sheffield. *Phil. Mag.* 28, 648-64(1914).—A free interpretation of the simplest suitable test of convergency leads to a formula which is identical with Planck's in probably all attainable regions of the spectrum.

A. T. CAMERON.

The Corbino effect. E. P. ADAMS AND A. K. CHAPMAN. Princeton Univ. *Phil. Mag.* 28, 692-702(1914).—The Corbino effect (that when a uniform radial elec. current flows through a circular metallic disk in a magnetic field normal to the plane of the disk, there is produced a circular elec. current such that the current density is inversely proportional to the radius) has been measured for a large number of metals and compared with the Hall effect. The Corbino effect would seem to be the fundamental galvanometric effect rather than the Hall effect, since the free transverse boundaries necessary in the latter are wholly absent in the former. The 2 are closely related, and

the fundamental explanation of one will explain the other. In all the metals tested the 2 effects have the same sign, but there is a marked difference in the relative magnitudes, the Hall effect showing greater differences. The mean free path of the electron in a number of metals is given (varying from 8.9×10^{-8} in Al, to 4.6×10^{-8} in Bi).

A. T. CAMERON.

Reflective power and dielectric constants of non-conducting solid substances and some liquids. H. RUBENS. *Sitzb. kgl. preuss. Akad. Wiss.* 1915, 4-20; cf. *Ibid* 1903, 269, 410; 1910, 26, 1122; C. A. 6, 708, 1252; 7, 1838; 8, 2302.—Continuation of the earlier work. In this paper the reflection of rest-rays from CaF_2 , NaCl, KCl, KBr, KI, and TlBr, corresponding to wave lengths of 23, 33, 52, 63, 83, 94 and 117 μ , and from Hg with a wave length of 300 μ has been measured for 25 new substances, including H_2O , H_2SO_4 (3 concs.) and glycerol. The most of the substances were inorg. salts. TiCl, TlBr and TlI have large dielectric consts., 35, 42 and 30, resp.; PbCl_2 , 42. Most of the other solids had dielec. consts. below 10. Diagrams are given showing the % absorption of each substance for each wave length.

E. B. MILLARD.

Color and constitution. E. C. C. BALY. Liverpool. *J. Soc. Dyers Colourists* 31, 39-46(1915).—As a measure of color the author takes the absorption of light in the visible and invisible regions of the spectrum. He attacks the quinonoid theory, instancing the cases of diphenylvioluric acid and its salts, in which that theory breaks down. In its place B. offers a theory of color based on the same grounds as his previous theory of fluorescence (C. A. 7, 2348). Color change then is due not to a change in mol. structure but to an opening up of the fields of force of the mol. which is evidenced by the changes in the selective absorption. This opening up may be caused by solvents, light or chem. reagents. It may take place in successive stages and there is a relation between the frequency of the light waves absorbed at the different stages and those absorbed by the parent substance. No direct exptl. evidence is adduced but B. applies the theory to explain the cases of β -methoxynaphthalene, phenol, the diphenylviolurates and the aminoazo compds.

B. B. STODDARD.

Cause of the phosphorescence of fluorspar. R. FORMALS. Berlin. *Chem. Ztg.* 38, 1111(1914).—Several varieties of phosphorescent fluorspar were analyzed. Apparently the phosphorescence is due to the oxidation of traces of finely divided As sulfide. Ignited fluorspar does not show the phenomenon. The addition of a trace of As sulfide to powdered feldspar causes phosphorescence on heating.

E. J. C.

Laws of series spectra. J. W. NICHOLSON. *Proc. Roy. Soc. London (A)* 91, 255-72(1915).—Mathematical. The limit of series with many lines, for which a Hicks formula is already known, can be calcd. with extreme accuracy by a new method. The interferometer measurements of the leading lines of the He spectrum enable the best form of series to be obtained, and this form is an extension of that of Rydberg, dependent upon $m + \mu$, and not m . The value of Rydberg's const. 109670.2 given by Curtis for H is the true value for the arc spectrum of He, and is in fact a rigorous const. for arc spectra. Spark spectra are not treated. The Rydberg-Schuster law of limits is exact for He. It seems probable that μ is a simple fraction whose denominator is a multiple of 5 as Halm has suggested. It is exactly 0.7 for the Sharp series of He.

E. B. MILLARD.

Bolometric method of determining the efficiencies of radiating bodies. W. A. BONE, H. L. CALENDAR AND H. J. YATES. *Proc. Roy. Soc. London (A)* 91, 245-54 (1915).

E. B. MILLARD.

The variation with temperature of the electric furnace spectra of vanadium and chromium. A. S. KING. Mt. Wilson. *Astrophys. J.* 41, 86-115(1915).—The study of spectra by means of the tube furnace (cf. C. A. 7, 1838; 8, 3264; 9, 15) has been ex-

tended to V and Cr between the ranges λ 3150– λ 6850 and λ 3550– λ 7000, resp. The V spectrum is similar in its behavior to that of Ti and the Cr to Fe. The Cr lines which appear at the lower temp. usually strengthen slowly at the higher temps. Certain Cr lines, diffuse in the arc in air, are resolved into sharp components in a vacuum source, arc or furnace. A large number of the furnace lines are relatively weak in the arc. The extension of the spectrum into the ultraviolet increases as the temp. rises. Self-reversal is much greater with decreasing wave length. The absence of the banded spectra indicate that these are due to the oxides in the V and Cr arcs. F. A. H.

The different character of spectrum lines belonging to the same series. T. ROYDS. *Astrophys. J.* **41**, 154–61(1915).—It has been generally assumed that spectrum lines belonging to the same series are similar in character and behavior under varying exptl. conditions. The lines of the first subordinate "triplet" series of Ba, however, change. The first members of the series are all unsymmetrically widened toward the red, the second members and probably all succeeding members are unsymmetrically widened toward the violet. There seems no doubt that the series is a real one and the difference in behavior seem equally certain. There are indications that the same effect exists in the corresponding series of Ca, but the first members are in the infra-red and their character is not known. The Sr series is quite normal. Inconsistencies in published results on pressure shift in the arc are probably due to a superimposed density effect. F. A. HARVEY.

The Stark-effect for canal rays. H. duBOIS. *Verslag Akad. Wetenschappen* **23**, 828(1914).—Stark (*Ann. Physik.* **43**, 965–1045(1914); cf. *C. A.* **8**, 2103) first observed that an electrostatic field has an effect on the spectrum lines of luminescent vapors, in the case of H_2 , He, and Li lines emitted by canal rays. The max. spreading obtained was approx. 2μ . W. Wien found a spreading for H_2 lines of the order 0.5μ , which is much greater than the spreading in the ordinary Zeeman effect. The Zeeman effect and the Stark effect appear to be 2 separate, but closely related phenomena, both proportional to the field. Luminescent vapors give rise to a passage of electricity, which amounts to several milli-amps. DuB. desired to study a purely dielec. displacement. He introduced a plate of synthetic ruby, 3 mm. in thickness, ground parallel in one case, and normal in another case to the crystal axis. Such a plate shows selective absorption, and possesses a high dielec. const. To observe the occurrence of a longitudinal effect, brass plates, provided with a slit were fastened to both sides of the ruby plate, which was then connected to the electrostatic machine, and immersed in liquid air. With a p. d. of 200 kilovolts per cm. no appreciable effect was observed. A plate of the monoclinic $Nd(NO_3)_3 \cdot 6H_2O$, 1 mm. in thickness, ground normal to one of the axes was substituted for the ruby. At the temp. of -190° the absorption bands again showed no effect of the elec. field. A soln. of salt in EtOH (-118°) and in amyl alc. (-134°) also yielded negative results. P. VAN DER MEULEN.

The theories of rotational optical activity. G. H. LIVENS. *Phil. Mag.* **28**, 756–7 (1914).—Reply to Bruhat (*C. A.* **8**, 3747). L. insists on the incompleteness of Drude's theory. A. T. CAMERON.

Displacements in certain spectral lines of zinc and titanium. G. V. MORROW. *Phil. Mag.* **29**, 394–407(1915).—The results show that the wave lengths of the lines in the spectra of the metallic elements are not const., but that under certain conditions they experience displacements towards the red. The wave lengths of lines in the spark spectrum of the pure metal are in general greater than those in the arc spectrum, but the difference alters for the various metals and for the different lines of the metals. In the arc spectrum of the pure metal the lines are displaced by increasing the current, if the point at which the element vaporizes be high enough for the increase in current to produce an increase in the density of the vapor. The presence

in the arc or spark of atoms of another element appears to have no influence on the wave lengths of the lines of the substance being examd., the wave lengths obtained depending on the partial density of the substance itself. The measurements show clearly in many cases that through over-exposure of the plate errors may be produced in the results, since on increasing the time of exposure, and consequently increasing the ppt. of Ag on the plate, an apparent alteration can be found in the wave length of lines which are unsymmetrically broadened. A. T. CAMERON.

Condensation nuclei produced by the action of light on iodine vapor. H. PEALING. S. African Coll., Cape Town. *Phil. Mag.* 29, 413-9(1915).—A continuation of the expts. of Owen and Pealing on this subject (*C. A.* 5, 2027) and a reply to Ramsauer's criticism (*Phil. Mag.* 23, 849(1912)) of their theory of explanation. P. confirms the previous expts., and finds that the production of nuclei when light falls on a mixt. of moist air or O and I vapor contained in a freshly cleaned glass vessel, and the facilitation of this formation of nuclei by the passage of I-laden air into the app. through a plug of glass-wool, are as far as the exptl. facts show explicable on the assumption that the production of nuclei is due to some chem. action, and that this takes place between I and H₂O vapor and O caused by a catalytic action of the glass. A. T. C.

A direct method of determining the radiant luminous efficiency of light sources. E. KARRER. United Gas Improvement Co., Phila. *Lighting J.* 3, 27, 37-8(1915); *Phys. Rev.* 5, 189-211(1915).—K. has devised a special radiation filter, consisting of 3 quartz cells 1 cm. thick arranged in series and containing the following solns., resp.: (1) 57.519 g. CuCl₂·2H₂O in 1 l. H₂O, (2) 1.219 g. K₂Cr₂O₇ in 1 l. H₂O, (3) 9.22 g. FeCl₃·6H₂O in 1 l. H₂O. The absorption of the filter has been so adjusted that the part of the total radiation which passes through at any wave length will be proportional to the visibility or luminous effect at that particular wave length. Thus, if radiations having equal energy at every wave length were used, the curve, showing the amt. of radiation passing the filter at each wave length, would correspond very nearly with the visibility curve of an equal energy spectrum as detd. by H. E. Ives. This curve starts from 0 at 0.42 μ , reaches a max. at 0.55 μ and falls to 0 again at 0.70 μ . If the radiations from any source are measured by a total radiation pyrometer or bolometer, first without the filter, and second with the filter, the ratio of the second reading to the first will be the radiant luminous efficiency. Some values of this quantity for common light sources have been detd. as follows: Open gas burner 0.19%, standard candle 0.24%, C filament at 4 w. per c. p. 0.45%, Welsbach mantle 0.80%, Nernst glower 1.08%, W filament at 1 w. per c. p. 1.99%, W filament type C at 0.65 w. per c. p. 2.93%, Hg arc (Pfund type) 30.0%. A. B. GLADDING.

Electromagnetic radiation from the viewpoint of the electron theory. J. P. MIN-
TON. *Gen. Elec. Rev.* 18, 387-97(1915).—A general article. C. G. F.

The diffraction of short electromagnetic waves by a crystal. W. L. BRAGG. *Z. anorg. Chem.* 90, 153-68(1915); see *C. A.* 7, 3449. The reflection of Röntgen rays by crystals. I. W. H. BRAGG AND W. L. BRAGG. *Ibid* 169-81; see *C. A.* 7, 3270. The reflection of Röntgen rays by crystals. II. W. H. BRAGG. *Ibid* 182-4; see *C. A.* 7, 3569, 3920. The structure of crystals as indicated by their deflection of Röntgen rays. W. L. BRAGG. *Ibid* 185-218; see *C. A.* 7, 3920. The structure of the diamond. W. H. BRAGG AND W. L. BRAGG. *Ibid* 219-34; see *C. A.* 8, 599. The influence of the components of a crystal on the form of the spectrum in the Röntgen ray spectrometer. W. H. BRAGG. *Ibid* 91, 235-45; see *C. A.* 8, 1060. The analysis of crystals with the Röntgen ray spectrometer. W. L. BRAGG. *Ibid* 246-69; see *C. A.* 8, 1236. The Röntgen ray spectra of quartz and sulfur crystals. W. H. BRAGG. *Ibid* 270-6; see *C. A.* 8, 1699. The intensity of reflection of Röntgen rays by crystals. W. H. BRAGG.

Ibid 277-96; see *C. A.* 8, 2308.—A translation and collection of the Braggs papers on crystal structure.

GEORGE W. MOREY.

The electron theory as a basis for the electrodynamics of moving bodies. MAX BORN. *Jahrb. Radioakt. Elektronik* 11, 301-7(1914).—A polemic criticism of Ishiwara's paper on the same subject. Cf. *C. A.* 8, 3740.

G. L. WENDT.

The orbits of a charged particle round an electric and magnetic nucleus. W. M. HICKS. *Proc. Roy. Soc. London (A)* 91, 273-90(1915).—Mathematical.

O. A. RANDOLPH.

Further experiments with liquid helium. M. Preliminary determination of the specific heat and thermal conductivity of mercury at temperatures which may be obtained with liquid helium, together with some measurements of thermo-electromotive force and resistance in connection with these investigations. H. KAMERLINGH ONNES AND F. HOLST. *Verslag. Akad. Wetenschappen* 23, 703-10(1914).—Measurements of the sp. heat and thermal cond. of Hg are especially desirable on account of the discontinuity in the resistance of Hg at 4.19° K. Preliminary measurements of the thermo-e. m. f.s of Ag, Au, Pt, Pb, Fe, constantan and Au + 0.476% Ag against Cu at temps. between 2.26 and 81° K., showed that for all of these metals, the thermo-electric power (dE/dt) becomes very small at temps. below 20° K.; this is in agreement with the conclusions of Nernst and of Keesom that dE/dt becomes zero at the abs. zero of temp. Thermoelements are, therefore, not suitable for use at He temps. Resistance thermometers of constantan or of manganin, however, have been found especially suitable for temps. from 20° down to 2.26° K. The sp. heat of Hg was detd. by heating electrically a small block of the solid metal suspended in a vacuum, and measuring the resulting rise in temp. The mean sp. heat between 4.26 and 6.48° K. is 0.00142 cal. per g. per degree; between 2.93 and 3.97° K., 0.000534 cal. (accuracy 10%). It appears then that the sp. heat shows no sign of discontinuity such as is found for the elec. resistance. The thermal cond. of Hg was detd. by measuring, with 3 constantan resistance thermometers, the temp. gradient along a column of Hg contained in a small double-walled tube. The results are: at 4.5-5.1° K., $k = 0.27$ cal. per cm. per sec.; at 3.7-3.9° $k = 0.40$. Therefore, for the thermal cond. also, no discontinuity occurs at 4.19° K.

L. H. ADAMS.

The reduction of iron oxides by platinum, with a note on the magnetic susceptibility of iron-bearing platinum. R. B. SOSMAN AND J. C. HOSTETTER. *J. Wash. Acad.* 5, 293-303(1915).—Pt acts on both hematite and magnetite at 1200° under low pressures of O, absorbing Fe and giving off O. It also reacts with magnetite in the same way at 1600° and at the usual atm. pressure of O. (Hematite is not stable in air at 1600°, but goes over into magnetite.) On the other hand, it is well known to analysts that Pt crucibles in which Fe_2O_3 is ignited in air for weighing in analytical procedures take up no such amts. of iron as were found to be absorbed under the conditions just described. The reason for these differences of behavior is readily found in the phase rule and the relations of Fe and Pt in their alloys. The results explain the very common occurrence of small amts. of Fe in Pt, since Pt will exercise its reducing action on any material containing Fe oxides with which it comes in contact provided the temp. is sufficiently high. At low temps., on the other hand, and with abundant access of atmospheric O, no appreciable reduction is to be expected. The magnetic pull exerted by an electro-magnet on a sample of iron-bearing Pt gives a qual. indication of the presence of iron, but no quant. measure of the amt. present.

L. H. ADAMS.

Glasses for protecting the eyes from infra-red rays (COBLENTZ) 19. Reproducibility of the cadmium electrode (GETMAN) 4.

3. RADIOACTIVITY.

WILLIAM H. ROSS.

The industrial uses of radium. T. THORNE BAKER. *J. Roy. Soc. Arts* 68, 490-8 (1915); *Chem. Trade J.* 56, 371-3 (1915).—A discourse. W. H. ROSS.

X-Rays and crystals. W. H. BRAGG. *Engineering* 99, 369-70 (1915); cf. *C. A.* 8, 2649; 9, 167.—A discourse. W. H. ROSS.

Slow cathode and soft Röntgen rays. *Engineering* 99, 384-5 (1915); cf. *C. A.* 9, 21.—A discourse. W. H. ROSS.

X-Rays. II. W. P. DAVEY. *Gen. Elec. Rev.* 18, 353 (1915).—A review of the properties common to all X-rays. C. G. FINK.

Interference phenomena with Röntgen rays and crystal gratings. M. v. LAUE. *Univ. Zurich. Jahrb. Radioakt. Elektronik* 11, 308-45 (1914).—A review of the theory of diffraction by crystals. G. L. WENDT.

The reflection of Röntgen rays. W. L. BRAGG. *Jahrb. Radioakt. Elektronik* 11, 346-91 (1914).—A review. G. L. WENDT.

The radium content of water from the Gulf of Mexico. STEWART J. LLOYD. *Am. J. Sci.* 39, 580-2 (1915).—Two successive detns. on the same sample of sea-water from the Gulf of Mexico gave for the Ra content of the water the mean value of 1.7×10^{-12} g. per l. The corresponding values found by Eve (*C. A.* 3, 2532), Satterly (*C. A.* 6, 3057) and Joly (*C. A.* 2, 2501) were 0.9×10^{-12} , 1.0×10^{-12} and 17.0×10^{-12} g., resp. Omitting the last detn., the mean value of the others amounts to 1.2×10^{-12} g. of Ra per l. This would correspond to a total amt. of Ra in the sea of somewhat more than 1400 tons. The U which the water should contain in order to maintain this quantity of Ra amounts to from 0.003 to 0.005 mg. per l. W. H. ROSS.

Crystal structure (BRAGG) 2. Atoms and ions (THOMPSON) 2.

4. ELECTROCHEMISTRY.

COLIN G. FINK.

The smelting of dross in the electric furnace. RAYMOND S. WILE. *Trans. Am. Electrochem. Soc.* 26, 252-5 (1915); *Mining Eng. World* 42, 501-4 (1915).—A small elec. furnace with a capacity of 1 ton per day was built to smelt the finely divided Sn crystals resulting from an electrolytic Sn recovery process. It consists of a vertical cylindrical chamber 36 in. high by 9 in. diam., with 2 C electrodes near the bottom between which a fusible slag forms the conducting and heating element. To start the furnace, some broken slag is put in and heated with an arc until it is hot enough to conduct. The electrodes are drawn apart and more slag is put in and melted, until a sufficient slag bed is formed. The upper part of the furnace is then filled with moist Sn crystals mixed with a little C and SiO_2 . The Sn melts, sinks through the slag and forms a layer at the bottom, whence it is tapped out from time to time. The best comp. for the slag has been found to be 67% SiO_2 , 17% CaO , 16% Na_2O . However, it may vary several % from this comp. and still work properly. The temp. of the slag must be kept at about 1650° to prevent loss of Sn. At this temp. the loss of Sn in the slag is only about 0.5%, while at lower temps. it may reach 17%. It was found that Sn dross could be satisfactorily smelted in this type of furnace and 2 larger furnaces requiring 800-1000 amps. d. c. at 220 v. were constructed for that purpose. Although this process is more costly than the reverberatory furnace process, it has the advantage

of yielding a product which does not need to be refined again. Practically all of the Fe and Cu in the dross are dissolved and removed by the slag. If Zn is present, it is volatilized and may be recovered as ZnO. Analytical control of the charge is necessary, in order to keep the comp. of the slag correctly adjusted. For a dross containing about 50% Sn, 10% Zn, and 14% Fe, the power required will be about 700 kw. hrs. per ton of Sn. The same type of furnace can be used also for refining various Zn waste products, such as 80% Zn + 20% Fe alloy from the galvanizing process, but as yet not enough exptl. work has been done to give a definite idea of its performance with such material.

A. B. GLADDING.

Working up of the materials obtained by the electrolysis of the residual liquors from the manufacture of potash salts. DIETZ. *Z. angew. Chem.* 27, 1, 569-72(1914); *J. Soc. Chem. Ind.* 34, 26.—Besides Br and H, Cl is obtained at the anode, an incrustation of $Mg(OH)_2$ on the cathode, and a ppt. of Mg oxychloride in the cathode compartment. The incrustation is preferably treated separately from the ppt., and by washing and heating may be profitably converted into oxide or hydroxide free from Cl. The oxychloride may be treated by the Leopoldshall process with steam to produce magnesia and HCl; but preferably it is centrifuged and ignited to the anhydrous form, $MgCl_2 \cdot 6MgO$, which is used in magnesia cement. The Cl may be converted into HCl either by decomposing the chlorides of Zn or Al with steam, and then regenerating the chloride by passing Cl and H over the hydroxide thus formed (cf. Hoppe, *Fr. Pat.* 352,419, Mar. 15, 1905), by Patacky's method (*Ger. Pat.* 114,129; *Brit. Pat.* 1,831, Jan. 29, 1900), or by Nagel's method (cf. *C. A.* 6, 1211). Preference is given to the first-named process.

E. J. C.

The silver voltmeter. G. A. HULETT AND G. W. VINAL. *J. Phys. Chem.* 19, 173-92(1915); see *C. A.* 9, 412.

A. B. G.

Reproducibility of the cadmium electrode. F. H. GETMAN AND V. L. GIBBONS. Bryn Mawr, Pa. *J. Am. Chem. Soc.* 37, 953-70(1915); cf. *C. A.* 5, 3749; 8, 3261; 9, 267.—Expts. were made with cells of stick Cd and electrolytically deposited Cd, using MeOH as the solvent and CdI_2 as electrolyte, with a Lippmann electrometer and the Poggendorff compensation method, at 25°. The e. m. f. of the cell $Cd^+ | 0.13 N CdI_2 | 0.013 N CdI_2 | Cd^-$ in MeOH was much higher for deposited Cd than for the sticks. Several electrodes were measured against $Hg | Hg_2SO_4 (0.1 N CdSO_4) |$ and the gray cryst. Cd was shown to be the stable form. Polished surfaces of Cd were shown by the use of photomicrographs to change when immersed in 0.2 N CdI_2 soln. at 5°. Neither freshly cast Cd nor spongy Cd gave reproducible e. m. fs. with conc. cells in MeOH, and cast rods were not satisfactory in aq. solns. of CdI_2 . Rods which had become gray by standing in CdI_2 solns. gave const. e. m. fs. against non-polarizable electrodes. Cryst. electrolytic deposits gave a (const.) higher e. m. f. than gray ones; amalgamated electrodes were not reproducible. Attempts to inoculate the fresh Cd surface with gray Cd showed that the change was extremely slow. The change to gray was due to a deposit on the surface, not to a pitting of it.

E. B. MILLARD.

Single cell gold plating. FRANCIS L. MCALOON. *Metal Ind.* 12, 510(1914).—There are 3 important principles to be observed in single cell Au plating. (1) The energy for electrolysis is derived from the action of the NaCl soln. upon the Zn. The soln. must be hot and concd. to get the greatest action. (2) The rate of deposition is very slow as compared with that in the external energy cell. Hence it is necessary to eliminate from the plating soln. any chemicals which would tend to attack the work. (3) Since the plating soln. is always slightly alk., it is necessary to have the work free from the slightest suggestion of tarnish when it goes into the soln. Such tarnish may result from leaving the work too long in the cleaning soln. A single cell soln., which has been proven good by long experience, is made by dissolving 3 dwts. Au (in form of

fulminate) + 1 oz. $\text{K}_4\text{Fe}(\text{CN})_6$ + 0.5 oz. $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$ in 1 gal. H_2O . The use of NH_4Cl instead of NaCl in the outer compartment of the cell is not economical. The practice of lifting the Zn plates from the cell when not in use does not save enough to pay for the extra work.

A. B. GLADDING.

Nickel-plated aluminium. J. CANAC AND E. TASSILLY. *Eng. Mag.* **49**, 273-4 (1915); see *C. A.* **8**, 2529. I. C. M.

Formation of aromatic hydrocarbons by the electrolysis of salts of aromatic carboxylic acids. C. SCHALL. *Z. Elektrochem.* **21**, 69-73(1915).—Attempts to synthesize aromatic hydrocarbons by the Kolbe electrolytic process have up to the present been unsuccessful. Earlier expts. by S. and co-worker (*Z. Elektrochem.* **5**, 256; and *C. A.* **8**, 467) on the electrolysis of K *o*-nitrobenzoate in molten *o*-nitrobenzoic acid apparently yielded a trace of *o*-dinitrodiphenyl. The present communication describes the electrolytic decomp. of a hot soln. of the *p*-acid in pure acetic anhydride, which yielded a minute quantity of *p*-dinitrodiphenyl (recognized by its conversion into benzidine). Formation of this is assumed to occur through a composite electrolysis of the K nitrobenzoate and acetate in the acetic anhydride soln., the acetate being formed by a primary thermal decomp. No aromatic hydrocarbon could be obtained by application of thermal effects alone.

H. HIBBERT.

The half-watt lamp in photography. W. VÖGE. *Z. Beleuchtungsw.* **21**, 33 (1915). C. G. F.

Tungsten: its occurrence and output. ANON. *Engineering* **99**, 442-3(1915).—A review. F. W. SMITHER.

Some data on artificial daylight units. C. H. SHARP. *Trans. Illum. Eng. Soc.* **10**, 219-21(1915).—The Moore CO_2 tube has been suggested as a standard of white light. C. G. F.

The high-tension test. W. P. WOODWARD. *Gen. Elec. Rev.* **18**, 398-400(1915).—Each of the 3 testing sets consists essentially of a high-tension transformer with regulating outfit and the necessary spark-gaps, condenser resistances and reactances. During test, control is obtained by means of rheostats in both the motor and the generator fields, so that the frequency as well as the voltage is completely under the control of the operator. The burden of the testing is carried on by sphere-gaps of various sizes, yet needle-point gaps are available. An oil tank of 36,000 gal. capacity is conveniently located and the oil is under uniform temp. control for such tests as require oil immersion. In the 750,000 v. outfit the principal unit is a 500-kva., 750,000-v., 60-cycle transformer. Tests are made on varnishes, plastics, and textiles in advance of their application to various machines. Several illustrations are given. I. C. M.

Chemical reactions at low pressures (LANGMUIR) 2. Determining the radiant luminous efficiency of light sources (KARRER) 2.

U. S., 1,137,030, Apr. 27. E. C. SMITH. Dry cell electric battery (structural features).

U. S., 1,137,226, Apr. 27. A. P. MANCHESTER. Gelatinous alkaline electrolyte for primary electric batteries; formed of a NaOH or KOH soln. of 28°Bé. , which is heated to about 82° with starch, in the proportion of 273 grains for each lb. of alkali. *Cf. C. A.* **8**, 2532.

U. S., 1,137,275, Apr. 27. A. M. NICOLSON. Audion filament formed of a twisted Pt ribbon with an active coating of oxide.

U. S., 1,137,524, Apr. 27. S. PRACOCK. Producing carbonitrides of Ca and Al by heating CaO or Al_2O_3 with C in an atm. of N to about $1500\text{--}1700^\circ$ while keeping

the partial pressures of the gaseous reaction products below 500 mm. Hg. The product evolves NH_3 with H_2O and $(\text{CN})_2$ on fusion. SiO_2 at 1800° and MgO at 1600° similarly form carbonitrides.

U. S., 1,137,567, Apr. 27. F. M. BECKER. Making calcium carbide by mixing CaO with a combining proportion of coking coal containing sufficient bituminous material to form a mechanically strong aggregate suitable for furnacing, coking the mixt. in a by-product oven and recovering NH_3 and other volatilized products, and then embedding electrodes in the charge and smelting to form carbide.

U. S., 1,137,874, May 4. J. A. McCASKELL. Leaching ores and regenerating the solvent. Cl produced electrolytically from NaCl is used to agitate and chlorinate the ore, e. g., Au , Ag and Cu ores, the product filtered and the filtrate led to the cathode side of an electrolytic cell, the anode side of which contains a satd. soln. of chloride. The compartments of the cell are sepd. by a layer of Hg and the Na produced in the cell passes into the Hg and thence to the Cl formed at the anode. The anolyte is used for treating a fresh charge of ore.

U. S., 1,138,163, May 4. E. WEINTRAUB. Operating high-pressure mercury vapor arcs with a W anode *in vacuo*. Heat is dissipated near the cathode by radiation from small off-set condensing chambers, sufficiently to raise the critical point current value at which the voltage increases abruptly, and the operating current is maintained slightly below this critical point. Cf. C. A. 9, 27.

U. S., 1,138,220, May 4. R. HURLEY. Storage battery with a double shell. The outer shell is formed of Zn amalgam and constitutes a negative electrode and the outer surface of the inner shell is formed of Cu amalgam and forms the positive electrode; its inner surface is formed of Zn amalgam and constitutes another negative electrode. A Pb plate within the inner shell provides another positive electrode.

U. S., 1,138,221, May 4. R. HURLEY. Electrolyte for lead-zinc storage batteries, formed of PbSO_4 , ZnSO_4 , H_2SO_4 and H_2O , with or without a Hg salt.

U. S., 1,138,363, May 4. D. ELMERS. Primary electric battery with an electrode plate (e. g., of Zn) with cup-shaped depressions of different depths in its surface; these serve to indicate the energy expenditure of the battery by the appearance of perforations through the plate where its thickness is reduced by the depressions.

U. S., 1,138,400, May 4. K. OCHS. Apparatus for electrolysis of alkali metal chlorides, with a cathode net in the bottom of the cell, anodes in the upper part of the cell and a porous diaphragm between them with vertical partitions placed close together just above the diaphragm to prevent motion of the liquid adjacent to the diaphragm.

U. S., 1,138,519, May 4. W. WEBER. Making hydrogen peroxide by forcing oxygen into an aq. soln. of alkali or H_2SO_4 under 100 atm. pressure while simultaneously generating H by electrolysis at a cathode of Cu amalgam.

U. S., 1,138,520, May 4. W. WEBER. Making hydrogen peroxide as in the process of the preceding pat. except that a cathode of Ag amalgam is used.

U. S., 1,138,674, May 11. G. M. LITTLE and B. J. GUDGE. Arc-lamp electrodes containing a volatile binder such as glucose and oil are simultaneously rotated about their axis in a furnace and baked in a current of air which removes the carbonaceous gases formed.

U. S., 1,138,921, May 11. L. ADDICKS. Electrolytically reducing copper in a cell having a depolarizer of FeSO_4 , the solvent action of which on the Cu is counteracted by the use of about 3% of $\text{Al}_2(\text{SO}_4)_3$ in the electrolyte.

U. S., 1,139,053, May 11. T. E. MURRAY and E. B. RICKETTS. Apparatus for neutralizing fumes from storage batteries by passing them through a series of vertical perforated plates over each of which a sheet of Na_2CO_3 soln. flows continuously.

U. S., 1,139,213, May 11. W. MORRISON. Making electrodes for reversible alkaline secondary batteries by mixing solns. of sol. Zn and Ti compds., *e. g.*, ZnSO_4 and Na titanate, mixing the Zn-Ti ppt. thus formed with Hg or a Hg salt, applying the mixt. to an electrode support and electrolytically reducing it.

U. S., 1,139,214, May 11. W. MORRISON. Secondary battery with an electrolyte formed of H_2SO_4 and titanic acid and electrodes of PbO_2 and spongy Pb.

U. S., 1,139,389, May 11. E. E. WERNER. Generating chlorine electrolytically from a NaCl soln. Cold H_2O is continuously introduced into the cathode chamber at the surface of the catholyte, to dissolve by-products, and the soln. thus formed is continuously drawn off.

U. S., 1,139,410, May 11. H. GOLDSCHMIDT. Apparatus for detinning tin scrap electrolytically in a bath of alkali and for compressing the spongy Sn sepd. on the cathodes.

Brit., 29,259, Dec. 18, 1913. J. I. BRONN and W. SCHEMMANN. Protecting electrodes in elec. furnaces by maintaining a gas pressure at the points where they enter the furnace so as to prevent escape of furnace gases. Cf. C. A. 9, 1009.

Brit., 29,987, Dec. 30, 1913. R. J. McNITT. Electrolysis of metallic compds. while subjected to pressure exceeding 1 lb. per sq. in. The pressure may be produced either by gas or by a column of liquid, which may consist wholly or partly of the electrolyte.

Brit., 30,082, Dec. 31, 1913. SVENSKA ACKUMULATOR AKTIEBOLAGET JUNGNER. Electrodes for alkaline accumulators are composed of perforated receptacles arranged face to face with conductive strips or rods between them to increase the conductivity.

Brit., 72, Jan. 1, 1914. SVENSKA ACKUMULATOR AKTIEBOLAGET JUNGNER. Regenerating nickel-oxide positive electrodes of alk. accumulators by means of a reducing liquid such as sugar soln., or glycerol mixed with alc. This liquid should be thin, and may be poured while hot into a cell which has been emptied, rinsed, and preferably exhausted of air. After standing for some hrs. the cell is again emptied and rinsed, filled with electrolyte, and charged elec., the full capacity being reached after about 3 discharges.

Brit., 186, Jan. 3, 1914. AKT.-GES. BROWN, BOVERI, ET CIE. Cooling a rectifier anode by means of an exhausted metal tube partly filled with liquid and extending into the atm. or other cooling agent, so that the liquid continually distils and returns to the part heated by the anode.

6. INORGANIC CHEMISTRY.

H. I. SCHLESINGER.

Oxidation of sulfides with potassium iodate. R. S. DEAN. Rolla, Mo. *J. Am. Chem. Soc.* 37, 1134-7(1915).—For CdS, PbS and ZnS, the equation was found to be $3\text{XS} + 3\text{KIO}_3 + 12\text{HCl} = 3\text{XCl}_2 + 2\text{S} + \text{H}_2\text{SO}_4 + 3\text{KCl} + 3\text{ICl} + 5\text{H}_2\text{O}$. When a smaller conc. of HCl was present the amt. of iodate corresponded more nearly to $2\text{XS} + \text{KIO}_3 + 6\text{HCl} = 2\text{XCl}_2 + 2\text{S} + \text{KCl} + \text{ICl} + 3\text{H}_2\text{O}$, where X stands for the metals above. Expts. show the progress of the reaction in the presence of varying amts. of HCl.

E. B. MILLARD.

Cuprous salts of oxygen acids and a new method for preparing cuprous salts. Preliminary paper. L. C. DANIELS. Lexington, Ky. *J. Am. Chem. Soc.* 37, 1167-71 (1915).— Cu_2SO_3 was sprinkled little by little into a hot soln. of an excess of oxalic acid. A brown solid appeared and much SO_2 was evolved. It was found to contain 50.69% Cu, corresponding closely with the formula $\text{Cu}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$, but the reducing power with KMnO_4 was much too high for this formula. A closer agreement was found for the formula $\text{Cu}_2\text{H}_2(\text{C}_2\text{O}_4)_4$. What was apparently the same compd. could be prep'd. by digesting Cu_2O with $\text{H}_2\text{C}_2\text{O}_4$. E. B. MILLARD.

Dehydration products of gypsum. R. GRENGG. Vienna. *Z. anorg. Chem.* 90, 327-60 (1914).—Chiefly confirmation of facts given in the literature. Gypsum is transformed on gentle heating into rhombic $\text{CaSO}_4 \cdot 0.5\text{H}_2\text{O}$, the process involving a recrystn. with formation chiefly of needle-like forms; at 140° sol. anhydrite begins to form, and it forms solid soln. with the $\text{CaSO}_4 \cdot 0.5\text{H}_2\text{O}$. On further heating insol. anhydrite forms, and stronger ignition causes decompn., the CaO produced probably being taken into solid soln. by the insol. anhydrite; the substance, as the temp. is raised, first becomes amorphous, then cryst. "Estrich" gypsum contains a large excess of CaO. GEORGE W. MOREY.

Behavior of certain hydrazine salts on decomposition by heat. J. W. TURRENTINE. Cornell Univ. *J. Am. Chem. Soc.* 37, 1105-14 (1915).—The decomp. of hydrazine monochlorate by heat in neutral aq. solns. yielded no HN_3 ; HN_3 was formed, however, in H_2SO_4 soln. The corresponding di-salt yielded HN_3 both in the presence and absence of H_2SO_4 . The mono- and diperchlorate of N_2H_4 yielded no HN_3 either in acidified or unacidified solns. When the dry crystd. salt was decompd. by heat in a current of CO_2 , HN_3 was produced from the latter but not from the former. Both yielded gaseous Cl, N and O, and Cl and OH ions. The mono- and disulfates, under similar conditions, gave off H_2O , H_2S , SO_2 and S, but no HN_3 . HN_3 was not oxidized on boiling with H_2O_2 in alk. soln.; it may be sepd. from sulfites in this way, and this principle has been applied in a method (described) for detecting HN_3 in presence of SO_2 . E. B. M.

Electrochemical oxidation of hydrazine sulfate and ammonium hydroxide. J. W. TURRENTINE AND J. M. OLIN. Cornell. *J. Am. Chem. Soc.* 37, 1114-22 (1915); cf. preceding abst.—A soln. of $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{SO}_4$ (satd. in the cold) in 5% H_2SO_4 was electrolyzed between Pt sheet electrodes at its b. p. with high c. d., but no HN_3 was formed; none could be formed by using more H_2SO_4 . With high concs. of H_2SO_4 the main products were $\text{H}_2\text{S}_2\text{O}_8$ and O_2 . When a small wire anode was used in 10% H_2SO_4 , and the soln. was kept at 0° , some HN_3 was formed. The oxidation was a product of a secondary reaction of the persulfate ion (formed at the anode) on the hydrazine ion. NH_4OH , in the presence of NaCl (added in small amts. during the electrolysis) and glue, and with low c. d., was oxidized to N_2H_4 . E. B. MILLARD.

Description of a new compound, hydrazine diperchlorate. J. W. TURRENTINE AND A. C. GILL. *J. Am. Chem. Soc.* 37, 1122-8 (1915).—The reaction used was $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{SO}_4 + \text{Ba}(\text{ClO}_3)_2 = \text{N}_2\text{H}_4 \cdot 2\text{HClO}_3 + \text{BaSO}_4$. The compd. crystallizes with 2 mols. of H_2O , forming colorless tabular orthorhombic crystals. Crystals of the mono-perchlorate are probably monoclinic. The di-salt gives 4 ions in dil. soln., and is strongly acid. The substance explodes when struck with a hammer. E. B. MILLARD.

Preparation of chlorides of silicon. F. S. KIPPING. *Chem. News* 111, 135 (1915).—A criticism of a paper by Martin (*C. A.* 9, 1017). Martin prepared the tetrachloride and other chlorides of Si from Fe-Si, without reference to previous work by Warren who originated the method (cf. *Chem. News* 66, 113). W. H. S.

Isolated crystals of selenium of the second and fifth systems, and the physical conditions determining their production. F. C. BROWN. *Phys. Rev.* 5, 236-7 (1915).

—Rhombohedral, hexagonal and monoclinic crystals of Se were produced by subliming amorphous Se after it had been melted. At temps. between 190° and 220° large quantities of hexagonal needles were obtained, and at the highest temp. various undetd. combinations of forms appeared. If kept at a temp. of 170° for 3 months, lamellar monoclinic crystals were produced. Both crystal forms were produced at a lower temp. in a vapor of Se than was required in the presence of air at normal pressure. It is assumed that the v. d. as well as the temp. is a detg. factor in the control of crystal forms. The electrical, photo-electric and electro-mechanical properties of crystals of each system do not exhibit any decided differences.

W. H. S.

New observations on iodic salts. FR. FICHTER AND HANS KAPPELER. *Basil. Z. anorg. Chem.* 91, 134-44(1915).—(Expts. by EDUARD KRUMMENACHER). By the oxidation at low temp. of I dissolved in HClO_4 by a current of dry ozone, *iodic perchlorate*, $\text{I}(\text{ClO}_4)_2 \cdot 2\text{H}_2\text{O}$, was obtained; decompd. on warming to room temp. by auto-oxidation, decompd. by H_2O , indifferent to organic solvents, not explosive. (Expts. by LOUIS HELFFER). *Iodic sulfate*, $\text{I}_2(\text{SO}_4)_3$, was prepd. by heating $(\text{IO})_2\text{SO}_4 \cdot 0.5\text{H}_2\text{O}$ with SO_3 in a sealed tube at $100-120^{\circ}$; the large light yellow crystals are instantly decompd. by moisture. $\text{I}(\text{IO}_3)_2$ was prepd. by heating I dissolved in anhydrous HPO_4 . The compds. HI_2O_2 and $\text{I}_4\text{O}_{13}\text{SO}_3$ described in the literature probably do not exist.

GEORGE W. MOREY.

Formation of crystalline hematite during the burning of bricks. FRANK HUGHES. *Cairo Sci. J.* 8, 188-9(1914).—A brilliant cryst. deposit which collected in crevices between burnt bricks was in the form of very thin plates and had all appearance of a sublimate. An analysis of the cryst. portion showed 97% Fe_2O_3 and proved it to be similar to the form known as "micaceous hematite." These crystals could only have occurred as a result of slow deposition from gases and the Fe chlorides have been shown to be volatile in an inactive atm. Attempts in the lab. to obtain a cryst. Fe oxide by passing a mixt. of HCl gas and air over heated Fe compds. have been unsuccessful, probably because a sufficiently high temp. was not obtainable.

R. L. SIBLEY.

Reduction of iron oxides by platinum (SOSMAN) 2. Transformation of the trichlorides of chromium and titanium (HEYDWEILLER) 2.

7. ANALYTICAL CHEMISTRY.

E. G. R. ARDAGH.

Use of the interferometer for the analysis of solutions. L. H. ADAMS. Washington, D. C. *J. Am. Chem. Soc.* 37, 1181-94(1915).—A. presents a brief description of the principle and mode of operation of the interferometer. It may be used to det. the single varying constituent in a mixt. or soln. with ease, rapidity and very great accuracy. Error due to difference in optical dispersion can be obviated by use of the methods discussed.

E. B. MILLARD.

Calculation of the capacity of smooth filters. L. WOLTER. *Chem. Ztg.* 38, 1243 (1914).—From the known diam. (d) of a smooth filter, the capacity (C) can be calc. when the funnel angle is 60° by the formula, $C = (\pi d^3/192) \sqrt{3}$. Assuming that the filter is to be filled to within 0.5 cm. of the edge, becomes the formula $C = [\pi(d-1)^3/192] \sqrt{3}$. A table showing calc. capacities of filters of usual sizes is given.

E. W. BOUGHTON.

A precipitant for ammonia. (A substitute for Nessler's reagent). S. S. GRAVES. New York City. *J. Am. Chem. Soc.* 37, 1171-81(1915).—A sufficient excess of NaCl prevents the formation of HgO when an alkali carbonate is added to HgCl_2 soln., by

driving back the dissociation of the complex Na_2HgCl_4 . A soln. composed of 50 cc. satd. HgCl_2 , 15 g. NaCl , 35 cc. satd. Li_2CO_3 soln. and 65 cc. H_2O proved to be a satisfactory reagent, for it pptd. a white cloud with NH_3 and could be used nephelometrically to det. NH_3 . A small amt. of sol. starch was added as a protective colloid for the NH_4 complex formed. The application of the reagent to micro-Kjeldahl detns. and other biological problems is discussed. E. B. MILLARD.

Nessler reagent. G. FRERICHS AND E. MANNHEIM. *Apoth. Ztg.* 29, 972-4 (1914).—The following method for prepg. this reagent is suggested: In a 100 cc. flask containing 3 g. H_2O dissolve in the cold 2.5 g. KI and 3.5 g. HgI_2 , then add 100 g. 15% KOH and allow the mixt. to stand several days for the eventual deposition of a slight ppt. due to traces of NH_3 usually present in the alkali. Decant the clear soln. from the ppt. Should it seem desirable to render the reagent immediately available, add a small quantity of talc and pass the liquid through a small sand filter. In testing distd. H_2O , use 10 cc. of the latter to about 1-2 cc. of reagent; in testing hexamethylenetetramine for NH_4 compds., use about 10 drops reagent to 10 cc. of soln. (1:19) under exam. W. O. E.

Method for the titration of small amounts of halides. F. C. McLEAN AND D. D. VAN SLYKE. *J. Am. Chem. Soc.* 37, 1128-34 (1915).—The halide was pptd. in the presence of free HNO_3 by an excess of 0.04 or 0.02 *N* standard AgNO_3 , the ppt. filtered off, and the excess Ag detd. by titration with 0.02 *N* KI in the presence of a dil. soln. contg. $\text{Na}_2\text{C}_4\text{H}_4\text{O}_7$ (citrate), NaNO_3 , and sol. starch. With one drop of KI in excess a distinct color was obtained. Amts. of halide not greater than 0.5 mg. were detd. to 1 part in 1000. E. B. MILLARD.

Notes on permanganate titrations. HENRY ZIEGEL. *Chem. Analyst* 12, 211-2 (1915).—In titrating Fe with KMnO_4 the concn. of free acid should not exceed 5% by vol. Solns. of FeCl_3 should not be boiled as FeCl_3 is appreciably volatile with steam.

H. M. LANCASTER.

Determination of boron in iron. J. M. LINDGREN. Urbana, Ill. *J. Am. Chem. Soc.* 37, 1137-9 (1915).—The sample was dissolved in HNO_3 , HCl and H_2O (10 cc. each for 2 or 3 g. Fe), treated with double the theoretical amt. of pure CaCO_3 and boiled under a reflux condenser to insure the absence of CO_2 or bicarbonate. After filtration, using asbestos fiber to open the ppt., the soln. was titrated with 0.1 *N* alkali, free from CO_2 , using phenolphthalein, then adding mannitol and continuing the titration. The results obtained agree fairly well with the amts. of boric acid taken. E. B. M.

Determination of arsenic in iron, steel and ores. A. KLEINS. Duisburg-Meiderich. *Chem. Ztg.* 39, 43 (1915); cf. *C. A.* 9, 1286.—Treat 1 g. of iron or steel with 120 cc. of HNO_3 (d. 1.2) and evapor. the soln. to dryness. Heat on the hot plate until evolution of brown fumes ceases. Cool and dissolve residue in 100 cc. HCl (d. 1.19) warming gently to avoid loss of AsCl_3 . Wash soln. into a 300 cc. flask and heat on the water bath till odor of Cl is no longer noticeable. After cooling add 1 g. of KBr and 3 g. of hydrazine sulfate and connect flask by means of a long jointed glass tube to the upper end of a spiral condenser. Distil until all but a little of the liquid has passed over and the residue begins to sputter. The distillate should contain all of the AsCl_3 but no Fe or free Cl . Dil. with an equal vol. of H_2O and then sat. with H_2S . After the ppt. has settled, drive out the excess of H_2S by passing in CO_2 . Filter and wash until the washings are free from chlorides. Dissolve the ppt. on the filter with NH_4OH (d. 0.93), washing with cold H_2O and allowing the soln. and washings to run into 5 cc. of a soln. composed of 20 g. CdSO_4 , 400 cc. H_2O and 600 cc. NH_4OH (d. 0.96). The pptd. CdS is filtered off and washed with H_2O . Place filter and ppt. in 100 cc. conductivity water. Add 2.5 cc. starch soln. and 75 cc. dil. HCl (a mixt. of 850 cc. of cond. water

and 300 cc. conc. HCl) and titrate at once with standard I soln. (7.928 g. of I and 25 g. of KI per l. 1 cc. = 1 mg. S = 0.00156 g. As). Seven sets of very concordant results are given.

E. W. BOUGHTON.

Rapid method for the determination of chromium in iron and steel. H. TUSKER. *Chem. Ztg.* 39, 122(1915).—Dissolve 2 g. of the drillings in 50 cc. H_2SO_4 (1:5) in a 1 l. Erlenmeyer flask, dil. to 300 cc. with H_2O , add 8 g. of $(\text{NH}_4)_2\text{S}_2\text{O}_8$ and boil till all Mn is converted into HMnO_4 or MnO_2 (with over 0.3% Mn, the Mn generally seps. as MnO_2). If HMnO_4 forms add 5 cc. dil. HCl and boil till Cl is expelled, to decompose HMnO_4 and the excess of $(\text{NH}_4)_2\text{S}_2\text{O}_8$ (about 5 min.), dil. to about 500 cc., cool, and titrate with FeSO_4 and KMnO_4 in usual manner. When MnO_2 seps., boil about 10 min. to decompose the excess of $(\text{NH}_4)_2\text{S}_2\text{O}_8$ and to reduce the vol. of soln., then add 5 cc. of conc. HCl and boil till the soln. becomes clear (a slight turbidity does not affect the results). The CrO_2 is not reduced by the HCl. Dil. and titrate as usual. An addition of MnSO_4 is not necessary, as the end-point is sharp, the pink color remaining some time. Excellent results are reported on a sample of steel by this method in comparison with 2 accepted methods.

F. W. SMITHER.

Determination of arsenic in the residue from the solution of iron and steel. L. BRANDT. *Z. öffent. Chem.* 21, 6-10(1915); *Chem. Zentr.* 1915, I, 459.—The total amt. of As is not in the residue; it is necessary to examine the soln. also and the gases produced by soln. with H_2SO_4 , either by pptn. with ZnS or by absorption in a HCl soln. of Br. For detn. of As is recommended pptn. with hypophosphite according to B., *C. A.* 8, 2325, and titration with 0.1 N I soln., applying a correction of 0.65 cc.

E. H.

Electrolytic analysis of alloys containing large amounts of lead, white bearing metal, type metal and brazing solders. I. COMPAGNO. Rome. *Ann. chim. applicata* 3, 164-8(1915); cf. *C. A.* 8, 642.—In white metal Pb is associated with Sn and Sb, and is sometimes accompanied by Cu, Fe, Zn, etc., as adulterants or impurities. The standard methods of analysis are objectionable, because of (1) the difficulty of complete soln. of the alloy, (2) the delicate operations attending the estn. of the PbSO_4 and recovery of small quantities of Pb passing into soln. during filtration, and (3) the prolonged action of H_2S necessary in sepg. Sn, according to Clarcke's method. C. proceeds as follows: The alloy in fragments is dissolved in a covered 150 cc. beaker with a mixt. of 4 cc. concd. HCl and 4 cc. HNO_3 (d. 1.2). After a few hrs. contact the liquid is slightly warmed to drive off nitrous vapors, and allowed to cool. The watch-glass is washed with 2-3 cc. cold H_2O , the ppt. washed by decantation 2 or 3 times with cold H_2O acidulated slightly with HCl. The decantations are made alk. with NaOH soln., and 30 cc. of Na_2S soln. (d. 1.225) added; the Pb present, and Cu, Fe, Zn, etc., are pptd. as sulfides; Sb and Sn remain dissolved as sulfo-salts. Add 0.4 g. KCN to dissolve Cu, and boil several minutes, shaking continually. After settling, filter by decantation, and decant again 2 or 3 times with warm H_2O contg. a few drops of Na_2S , collecting the filtrate in a high-form beaker of 250 cc. capacity. The ppt. of PbCl_2 remaining in the 1st beaker is dissolved in the hot with the smallest possible amt. of NaOH, the liquid dild. with 15 cc. hot H_2O , and 20 cc. Na_2S soln. (d. 1.225) added, and then 0.1 g. KCN. Boil for a few min., allow to settle, filter by decantation as before, and combine the ppts. and the filtrates. The filtrate is evapd. on the sand-bath to about 130 cc. and in 1 portion Sb and Cu are detd. together electrolytically and in the other portion Cu separately, and then Sn. The filter and the sulfides on it are brought into the original beaker and treated with 25 cc. HNO_3 (1.2), then boiled, the liquid filtered by decantation, the residue treated again as at first, and then again, but with 20 cc. conc. HNO_3 , boiling till the S collects in globules, then washing with much cold H_2O . In the filtrate of 300-350 cc., Pb is detd. electrolytically, using a

Winkler net anode, a cylindrical net cathode, c. d. = 0.3 amperes, 2-2.5 volts. It is well to keep the liquid slightly warm for about $\frac{1}{4}$ hr. before electrolysis. The results are very good. Fe, Zn, etc., are detd. by the usual methods. S. LEVY.

Penot's chlorometric method. J. CLARENS. *Ann. chim. anal.* 20, 81-4(1915); see C. A. 8, 3279. E. J. C.

Toxicological estimation of lead, especially in the urine of individuals suffering from lead poisoning. G. MEILLÈRE. *J. pharm. chim.* 10, 225-31(1915).—When Pb is to be detd. in liquids which cannot well be evapd., e. g., conc. mother liquors, or which ppt. on evapn., or in organic liquids, e. g., wine, urine, etc., quant. sepn. of Pb is effected by dissolving 0.5 g. Pb-free CuSO_4 per l. of liquid, adding 10 cc. of pure HCl per l., satg. cold with H_2S , then heating on the water bath. PbS is pptd. completely, carried down by CuS, and is free from Fe, Mn, Zn and phosphates. Filter, wash with $\text{H}_2\text{O} + \text{H}_2\text{S}$, dissolve in pure, hot HNO_3 , add H_2O , filter, evap. till dry, heat to low redness to destroy trace of organic matter, then take up the residue with 6 cc. HNO_3 , dil. with H_2O to 100 cc. and ppt. PbO_2 electrolytically at the anode. Minute details are given. S. WALDBOTT.

Determination of sulfur in organic substances. A. KRIEGER. *Chem. Ztg.* 39, 22-3(1915).—A discussion of the sources of error in the Eschka method is given. K.'s method, based on the work of Holliger and Dennstedt (cf. C. A. 3, 1380, 1625, 2281) is as follows: CoO or Pt-black are not used. A weighed sample (0.5-1 g. according to the S content) is distributed in a boat and heated in a stream of O_2 , a Cu spiral, heated to dull redness, being placed before the boat. The combustion gases pass over red hot SiO_2 which occupies about 10 cm. of the tube. The substance is burned at the lowest possible temp. The SO_2 is absorbed in a measured quantity of 0.2 N NaOH soln., the excess of alkali being titrated with HCl. The method agreed to 0.02% with control detns. by the Eschka method in which all sources of error were carefully considered, and by gravimetric detns. of the absorption soln. A disadvantage of the method is that some S remains with the ash, especially if this is high in CaO and MgO. The method is not recommended for materials of low S content, of which a large sample must be used. For such material, but not for coal and coke, oxidation with strong HNO_3 and subsequent pptn. with BaCl_2 is recommended. E. W. BOUGHTON.

Detection and differentiation of albuminous substances in plastic masses. F. STEINITZER. *Kunststoffe* 5, 73-5, 88-90(1915).—Tables have been compiled from the literature showing the principal reagents and tests for: glue and gelatin, egg and blood albumin, casein and gluten, leather meal, wood and cork meal, etc. The tests cover unhardened, hardened, and coagulated masses. Some notes on the tests are also given.

F. W. SMITHER.

Detection of cinnamic acid. D. SCHENK AND H. BURMEISTER. *Pharm. Ztg.* 60, 213-4(1915).—The method presupposes a suitable sepn. of the acid from food and drug mixts. by the use of appropriate solvents. For example, in fruit juices to which the acid may have been added as a preservative, a suitable sample (30-50 cc.) is strongly acidified with H_3PO_4 and exhausted with Et_2O . The ethereal soln. is thereupon treated with Na_2CO_3 soln., the latter then extd. twice with Et_2O to remove furfural compds. possibly present, after which operation it is transferred to a porcelain dish and very dil. KMnO_4 soln. added drop by drop until the color just ceases to be discharged. The resulting soln. is extd. with Et_2O , the ethereal layer removed to a beaker and rotated to eliminate most of the H_2O , then poured into a porcelain dish containing about 10 drops 5% phenol in Et_2O and allowed to evap. 3-5 cc. conc. H_2SO_4 are thereupon added, the typical quince-yellow color developing immediately due to the presence of BzH arising from the oxidation of cinnamic acid. W. O. E.

Castor oil plants to detect ethylene in air. E. M. HARVEY. *J. Roy. Hort. Soc.* 40, 300(1914); *Pharm. J.* 94, 357(1915).—Growing plants of *Ricinus communis* are sensitive to as little as 0.00001% of C_2H_4 in the atm. An amt. of 1:1,000,000 causes the petioles of the leaves to droop or the laminae to fold down. Similar observations have been made with sweet peas seedlings. S. WALDBOTT.

8. MINERALOGICAL AND GEOLOGICAL CHEMISTRY.

EDGAR T. WHERRY.

Layer dispersed systems. Geological examples. R. E. LIESEGANG. Frankfurt. *Kolloid-Z.* 16, 20-2(1915).—The bands colored with Mn and Fe in the trachyte of Hohenberg and the sandstone of Munzenberg are discussed. H. I. MATTILL.

Geochemical metal adsorption. O. NAGEL. Vienna. *Kolloid-Z.* 16, 19-20 (1915).—Pt is repeatedly found in sediments which have a high adsorptive capacity, leading to the conclusion that it was deposited there by processes of adsorption. For instance Penn. (?) clay and Brazilian itabirite contain it, probably because of adsorption by hematite. The pptn. of Au by adsorption is unquestionable in some incrustations on siderite and Brazilian limonite, and in Calif. cinnabar. The films of Ag over the skeletons of fossil fishes and in coal may be due to reduction from soln. rather than adsorption. Carnotite is found on fossils of plants and wood and K is probably held in clays by adsorption. H. I. MATTILL.

A gold-platinum-palladium lode in southern Nevada. ADOLPH KNOPF. U. S. Geol. Survey, *Bull.* 620-A, 1-18(1915).—This Au-Pt-Pd deposit at the Boss mine, Clark Co., Nevada, is not closely similar to any other deposit carrying Pt metals heretofore described. The ore shoots, occurring in dolomite, consist of fine-grained siliceous ore carrying Bi-bearing plumbojarosite, a greenish yellow mineral of smooth unctuous feel, seen under the microscope to consist of perfect hexagonal plates averaging 0.01 mm. in diameter. It carries Bi_2O_3 6.34, Au 0.79, Pt 0.05 and Pd 0.22%. The Au in this ore cannot be separated so as to be visible by panning, but is rather fine and resembles a black sand. It is not, however, alloyed with Pt; treatment of the ore with HCl alone carries much of the precious metals into soln. It is believed that the metals were formerly associated with sulfides now completely oxidized. R. C. W.

Zinc deposits of eastern Tennessee. FRANK L. NASON. West Haven, Conn. *Eng. Mining J.* 99, 734-6(1915).—Contrary to the usually accepted theory of the origin of these ores, according to which they were deposited contemporaneously with the associated Knox dolomite, and later conc. by descending waters, N. holds that they are of deep-seated vein origin. They are limited in Tenn. to the Knox, although in Virginia they occur also in adjacent shales, and are localized along fault planes and brecciated zones. The total vertical range is 4600 feet, of which 3600 is actually exposed, which suggests profound vein origin. This is further shown by the existence of numerous strike veins carrying Zn minerals in the Cambrian and Pre-Cambrian formations, which are stratigraphically beneath the Knox, along the whole length of the Appalachians. While no igneous rocks are associated with the Zn ores in the Knox, they are abundantly associated with those of the underlying formations. It is, therefore, believed that the solns. carrying the Zn have risen from deep-seated eruptives along favorable channels, and that their metal content has been pptd. by reaction with the wall-rocks, especially with the purer limestones, and it is predicted that larger deposits are likely to be found the further down exploration is carried.

E. T. W.

Quicksilver deposits of the Kuskokwim region, Alaska. ANON. *Mining Eng. World* 42, 817-8(1915).—Cinnabar associated with stibnite occurs at 2 localities in mineralized shales adjacent to granitic dikes. E. T. W.

The origin of the inclusions in dikes. SIDNEY POWERS. *J. Geol.* 23, 1-11, 166-83 (1915).—Inclusions in dikes are rare; the majority have been shattered from the walls either in the formation of the fissure or in the injection of the dike magma. In a few instances the inclusions are pebbles derived from a conglomerate. The direction and amt. of movement of the inclusions does not depend as much upon the sp. gr. of the magma relative to that of the inclusions as upon the mechanics of intrusion and the circulation in the dike magma before its consolidation. The inclusions are in general rounded when coming from depths and angular when near the place of origin. The material worn from fragments during their rounding and the cement which is dissolved from conglomerates appear in the dike as xenocrysts. The question of fragmentation of the constituent minerals from differential expansion and the importance of the inversion point of quartz are of bearing in quartzose inclusions only where these have been heated to 575°.

W. F. HUNT.

Geology of the Diamond Hill-Cumberland District in Rhode Island-Massachusetts. CHARLES H. WARREN AND SIDNEY POWERS. *Bull. Geol. Soc. Am.* 25, 435-76(1914).—The area described is of interest because of the occurrence of the rare ultrabasic rock cumberlandite, of riebeckite granite and associated porphyries, and of a quartz deposit known as Diamond Hill. The greater part of the cumberlandite is highly altered. The original rock consists of a fine-grained groundmass of olivine (40%) crystallographically intergrown with 18-20% of magnetite and ilmenite. Phenocrysts of labradorite, singly and in clusters, constitute 10%. In the ore matrix is about 3% of dark green spinel crystals. Estimate of the mineral comp. of a section of the riebeckite granite gave 48.9% microcline-micropertthite, 33.3 quartz, 8.5 riebeckite, 7 aegirite, and 2.3 accessories (astrophyllite, fluorite, zircon, and ilmenite). The Diamond Hill quartz deposits cover about $\frac{1}{4}$ of a sq. mi. and of this $\frac{1}{4}$ is either quartz, chiefly of the milk-white variety, or highly silicified felsite. In the veins the crystals grow perpendicular to the walls, giving rise to comb structures. In the quartz casts of square, rectangular, or tabular outlines identified as casts of barite crystals are of frequent occurrence. The quartz represents the last phase of igneous activity, replacing the felsite where brecciation was greatest.

W. F. HUNT.

Origin of oolites and the oolitic texture in rocks. THOMAS C. BROWN. *Bull. Geol. Soc. Am.* 25, 745-80(1914).—Recent oolites now forming in Great Salt Lake, Pyramid Lake, various hot springs, and in the open ocean are composed of aragonite with nuclei of sand grains or other foreign material. Direct chem. pptn. has been caused by the reaction of Na_2CO_3 on the CaSO_4 held in soln. The older oolitic beds of Pa. were originally composed of aragonite. Where not affected by waters bearing other minerals in solution they changed to the more stable form, calcite. Sometimes the resulting cryst. calcite shows twinned lamellae. When the circulating waters contained Mg salts the oolites became altered to dolomite and lost their concentric and fibrous structures. In the case of siliceous waters the oolites were replaced by SiO_2 . The original nucleus was secondarily enlarged, deposition taking place in optical continuity. With the SiO_2 is often deposited Fe_2O_3 intimately mixed with the fibrous chalcedony. In the Clinton formation the original aragonite oolites were changed by ferruginous solns. into oolites of Fe_2O_3 and SiO_2 , with the former in excess. W. F. H.

Ground water for irrigation in the Sacramento Valley, California. K. BRYAN. U. S. Geol. Survey, *Water-Supply Paper* 375-A, 1-49(1915).—B. gives diagrams showing origin and movement of the ground water, its amt. and the fluctuations of the water table, and concludes that alkali would form even more extensively if it were not for

the winter rains which leach out the salts formed by evapn. during the summer, and also for the fact that sediments are deposited at the very points where there is the greatest tendency towards the formation of alkali, thus burying it. R. C. WELLS.

Isostasy and radioactivity. GEORGE F. BECKER. *Bull. Geol. Soc. Am.* 26, 171-204 (1915); see C. A. 9, 752. W. F. HUNT.

Bituminous sands of northern Alberta (ELLS) 22. Tungsten 4. Petrography of soils derived from volcanic ejecta (FRY) 15. Caffeine sodium salicylate (its separation from solution in a form analogous to stratification of rock) (LIESEGANG) 2.

9. METALLURGY AND METALLOGRAPHY.

WILLIAM BRADY, WILLIAM T. HALL.

The formation and decomposition of sulfates during roasting. II. B. DUDLEY, JR. *Met. Chem. Eng.* 13, 303-8(1915); cf. C. A. 9, 1293.—A study of the effect of reaction velocity. Expts. are reported on the velocity of decompn. of NiSO_4 in a current of air at 710° and 770° , of CdSO_4 in dry air current at 960° , $\text{Al}_2(\text{SO}_4)_3$ in a current of dry air at 735° and 800° , first alone and then with Fe_2O_3 , $\text{Al}_2(\text{SO}_4)_3$ in dry air at 800° with Pt-asbestos. The rate of dissociation of the sulfate was accelerated by the addition of Fe_2O_3 , the av. ratio of SO_3 to SO_2 being 0.71 vols. of the former to 1 of the latter. The amt. of Pt-asbestos required to produce a given effect was much less than of Fe_2O_3 . Since at atm. pressure and 800° SO_3 alone will dissociate until its ratio to SO_2 is only 0.433 to 1, the ratio 11:1 obtained when $\text{Al}_2(\text{SO}_4)_3$ was heated alone indicates conditions far removed from equil., while the ratios 0.71 and 0.73 to 1, obtained in the presence of catalysts, indicate conditions near to the equil. From exptl. and other data D. traces what may be called the "life history" of a sulfate or of a number of sulfates, from which it is concluded that there is no definite order in which the metal sulfates make their appearance in the roasting furnace. Sulfates may begin to form in roasting as soon as corresponding oxides are produced, provided SO_2 and O are present to form the necessary SO_3 —the condition being that the dissociation pressure of the sulfate is less than the existing partial pressure of SO_3 . This condition is most likely to occur in the deeper portions of the ore bed. The reverse of this condition will cause dissociation of the sulfate, and conditions tending to produce dissociation are to be expected at the upper surface of the ore bed. As the ore is generally stirred to a greater or less extent, at no time can a single oxide monopolize all of the SO_3 in any part of the furnace, hence many sulfates may be formed and decomposed at the same time. (This includes no consideration of the rate of formation and decomp. of the various sulfates which has been previously discussed.) As the ore is advanced in the furnace and its temp. is increased the dissociation pressures of the various sulfates that have been formed increase, and their tendency toward dissociation increases accordingly. Increasing temp. tends to reduce the partial pressure of SO_3 maintained within the interstices of the ore bed by shifting the equil. of the SO_2 , O, and SO_3 system. This SO_3 in these spaces may be reduced below the dissociation pressures of many of the sulfates, and at elevated temps. even in the deeper portions of the ore-bed sulfates may undergo decompn. at a fair rate. At this stage the presence of the Fe_2O_3 and other catalysts aids the dissociation of SO_3 , thus accelerating the dissociation of the sulfates. Therefore, at high temps. Fe_2O_3 aids in the dissociation of the same sulfates that are formed by its aid at lower temps. Since the basic sulfates have in general lower dissociation pressures than their corresponding normal compds., the former will persist at higher temps. and for a greater time than the latter. For the complete elimination

of S it may in some cases be necessary to produce reactions between various gang constituents and the remaining sulfates or basic sulfates. By this means the SO_2 is liberated and such compds. as silicates and ferrites are formed, with or without complete fusion of the roasted material. Tables and curves are given. F. W. S.

Treatment of copper mats in the basic converter at the works of Karabach (Ural, Kishtim district). K. D. KOLASNIKOW. *Rev. métal.* 11, 519-43(1914); *J. Soc. Chem. Ind.* 33, 596.—Mats contg. Cu 7-49, Fe 26-60, S 23-5%, are "blown" in 2 stages. The white mat, produced in the first stage, generally approximates to Cu_2S in compn. The coarse Cu from the second stage contains Cu 98-9%, together with about 97% of the Au and 40% of the Ag present in the white mat. The slag (contg. Cu 1-2%) varies in compn. from $3\text{FeO} \cdot \text{SiO}_2$, to $2\text{FeO} \cdot \text{SiO}_2$ according to the compn. of the mat bath and the temp. The complete data relating to the treatment of about 100 kg. of mat contg. Cu 33.5% are given and discussed in detail.

E. J. C.

A case of copper hydrometallurgy. Inexpensive and efficient treatment of smelter flue dust and carbonate ore. G. C. WESTBY. *Mel. Chem. Eng.* 13, 295-7(1915).—The plant described cost about \$1200 and the estd. cost of production per lb. of Cu resulting from the hydraulic sluicing of flue dust amounts to 7.5 cents. From an exptl. batch in which 248 tons of flue dust and 250 tons carbonate ore containing 19,073 lbs. of Cu were used 18,073 lbs. of Cu were recovered, the % recovery amounting to 94.4%. The treatment described proved a successful solution of a minor smelter problem.

C. A. NOWAK.

An attempt at tin concentration. JESSE SIMMONS. *Eng. Mining J.* 99, 816-7 (1915).—The ore contains cassiterite occurring in grains and crystals varying from the size of a pinhead to several times larger. The gang is quartz and mica. The process, as illustrated by a flow sheet, saves most of the mica contents and will also give clean quartz sand as another by-product. The former sells as scrap mica at from \$12 to \$15 per ton. The latter, containing no Fe or other coloring matter, should find ready sale to concrete workers.

L. A. TOUZALIN.

The continuous production of liquid metallic zinc in the blast furnace. A. RZE-HULKA. *Chem. Ztg.* 38, 895-7, 937-9(1914); *Oesterr. Z. Berg. Hüttenw.* 62, 573-7 (1914).—A discussion of the metallurgy of Zn, especially the economic phase. From theoretical deductions and calcs. it is concluded that it is impossible in the present state of science and technics rationally to reduce Zn ores to liquid Zn in the blast furnace on a practical scale.

F. W. SMITHER.

Cyaniding at the Bullfinch Proprietary, Western Australia. A. L. HAY AND R. B. WILLIAMSON. *J. West. Australia Chamber of Mines*, Dec., 1914 and Jan., 1915; *Mel. Chem. Eng.* 13, 331-2(1915).—The ore is a mixt. of both oxidized and sulfide material in about equal proportions. The metallic minerals are Au, galena, pyrite, marcasite and pyrrhotite. The galena is Ag-bearing and some native Ag occurs in the oxidized ore. A flow sheet shows the operations to be as follows: breaking in a Symons gyratory; crushing by 1200-lb. stamps, hydraulic classification with tube-milling of the over-size; pan-amalgamation of the tube-mill discharge; thickening and agitation of the classifier under-size; filtration by vacuum in a Ridgway filter; and pptn. in Zn boxes. Other details including costs are given.

L. A. TOUZALIN.

Recent Rand metallurgical practice. M. T. MURRAY. *Eng. Mining J.* 99, 771-3 (1915).—A review of recent changes. Better extn. and lower costs have been obtained by the application of new methods and machinery.

E. J. C.

Some appliances for metallographic research. W. ROSENHAIN. *Natl. Phys. Lab., England. J. Inst. Metals* 13, 26 pp.(1915) (advance copy).—A levelling device

for metallographic specimens consists of a telescope objective, in the axis of which is set a 45° plane glass reflector. Light is admitted through a hole in a side tube, this hole being at the same distance from the reflector as the reflector is from the principal focus. This light is reflected downward by the reflector onto a piece of plane plate glass with accurately parallel surfaces, the lower one of which is silvered. With this surface at right angles to the axis of the telescope the image of the hole in the side tube falls on the cross wires. If a polished metallographic specimen, mounted on a glass slide by soft wax, be placed on the plate glass, its surface reflects the image of the hole, and when this image falls on the cross hairs, the surface is parallel with the bottom of its mounts. The ordinary specimen may be levelled in a minute by this means so as to avoid refocussing in the exam. of an area 0.5 in. square under 400 diam. magnification. The device was constructed to R.'s design by R. and J. Beck. A furnace for taking heating and cooling curves at any desired rate of heating may be constructed by winding the upper 6 in. of a 24 in. fireclay tube with nichrome wire and lagging with sectional magnesia covering. With the hottest zone at 1000° , conduction and radiation give any lower temp. desired, down to 200° , at some lower portion of the furnace. Ten amps. at 100 v. are used, supplied by a large storage battery. The desired rate of heating or cooling is obtained by raising or lowering a Pt blank at such a rate (by elec. motor or by gravity controlled by a hydraulic cylinder with relief valve) as will give that rate. Differential curves are readily taken between blank and sample. A plotting chronograph capable of plotting inverse rate curves with a high degree of accuracy has been constructed on R.'s plans by the Cambridge Scientific Instrument Co., and is described in detail.

H. W. GILLET.

The influence of nitrogen upon the mechanical properties of iron. N. P. CHIVYEVSKII. *Rev. soc. russe metal* 1, 135-9(1913); *Rev. métal.* 11, II, 618-20.—Using a sample of Martin steel (containing 0.14% C, 0.18% Si, 0.45% Mn, 0.07% S and 0.03% P) in the form of wire of 0.63 mm. diam., a coil was made 40 mm. in diam. and placed in the tube of an Heraeus furnace. During periods varying from 1 min. to $\frac{1}{2}$ hr., NH_3 gas was passed over the metal heated to 900° , followed by N at 1100° for 4 hrs. After this treatment, the metal had a bright silvery appearance. The content of N was varied in different samples from 0.00393% to 0.222%. Mechanical tests made upon the treated steel show that N has a considerable and detrimental effect. Since acid Bessemer steel contains about 5 times as much N as Martin steel, C. suggests that this fact may in part account for the relative inferiority of the former.

L. T. F.

Iron and nitrogen. N. P. CHIVYEVSKII. *Rev. soc. russe metal* 1, 127-35(1913); *Rev. métal.* 11, II, 617-8.—Analyses show that Bessemer steel contains from 0.014 to 0.015% N and Martin steel from 0.003 to 0.004% N. Pure Fe does not combine directly with dry N at any temp., but in the presence of NH_3 gas, combination takes place readily, the optimum temp. being 450° . The effect of N upon Fe containing C, Mn, and Si was studied. A Swedish Fe containing 3.96% C could not be made to combine with N at any temp., showing that C plays no part in the absorption of N. With Mn and Mn-Fe alloys, combination occurs, the optimum temp. being 700° with NH_3 and 1000° with pure N. The compds. formed are Mn_3N_2 and MnN . That this may in part account for the presence of N in steel was shown by the fact that a steel containing Mn heated in a furnace showed the presence of nitrides on its surface. C. finds that Si, in the form of its nitrides Si_3N_4 , Si_2N_4 , and SiN , is sol. in Fe and that this, perhaps, more than Mn is the source of N in Fe. Al forms a nitride, AlN , which does not dissociate at 1700° . Al, added to liquid steel, combines with any N present to form AlN which remains in the Fe in the form of a solid soln.

L. T. FAIRHALL.

Experiments upon fragility. CH. DE FREMINVILLE. *Rev. métal.* 11, I, 971-1056 (1914).—A very complete study of the question of fragility in which a great number

of expts. with widely varying materials has been carried out. The attempt has been made to cover the field from a qual. viewpoint only.

L. T. FAIRHALL.

Calorizing metals. WILLIAM E. RUDER. *Trans. Am. Electrochem. Soc.* 27(1915) (advance copy); cf. Allison and Hawkins, *C. A.* 8, 3773.—Calorizing consists in producing a rich Al alloy upon the surface of the metal to be protected. The process is particularly applicable to metal containers and parts which are to withstand oxidation at temps. above red heat. The metal pieces to be treated are packed in a mixture of powdered Al_2O_3 , NH_4Cl (1%) and 5 to 50% of Al metal. For Cu and brass parts the mixture is kept low in Al and the temp. of firing held at about 700–800°. For steel and Fe, richer Al mixtures are used and fired at 900–950°. The firing is carried out in a gas-tight receptacle in a reducing or inert gas atm. (to prevent burning of Al). Usually 2–3 hr. firing is sufficient. R. records tests made on calorized *vs.* uncalorized Fe tubes. The tubes were heated in an open flame at 900° for 8 hr. At the end of this time the calorized tubes were practically unchanged whereas the uncalorized tubes were scaled and cracked about half way through. The Al alloy coating is about 0.025–0.010 mm. thick. When the piece is kept at a high temp., as in service, this narrow band of alloy gradually widens as the Al diffuses into the Fe. This diffusion which proceeds very slowly at 800–900° becomes very rapid at higher temps. necessitating a heavy coat of rich Al alloy for pieces to be used above 1000°. For service above this temp. calorized wrought Fe and steel show better life than calorized cast Fe. The process is finding considerable application in furnace parts, pyrometer tubes, annealing boxes, combustion tubes, etc. Cu and Ni are also calorized and thus rendered more resistant to oxidation at high temp. Many photos and curves are shown. Calorized Fe is more resistant towards acid than the bare metal.

C. G. FINK.

Etching reagents and their application. O. F. HUDSON. Birmingham Univ. *J. Inst. Metals* 13, 22 pp. (1915) (advance copy).—The various etching agents best fitted for use on Cu, brass, bronze, Al bronze, German silver, Ni-Cu alloys, Au, Pt, Al, Pb, Sn, Zn, and the alloys rich in the last 6, as well as for Fe and steel, are discussed, the comp. and strength of the reagents being fully described, and many comments on the technic of etching being given.

H. W. GILBERT.

Ingot mold compound for the casting of brass cartridges. M. F. CERON. *Res. metal.* 11, I, 780–4(1914).—To overcome the tendency which brass has on solidifying of forming pockets that retain gaseous or solid impurities, the principle of progressive cooling from the lower part of the mold to the upper is utilized. The mold is constructed of Cu, Fe and a refractory earth, Cu forming the lower layer. Cu conducts heat so much better than Fe that the mass slowly solidifies from the bottom giving a casting free from pockets of impurities.

L. T. FAIRHALL.

The mechanical anisotropy of coarse-grained metals and alloys and the Brinell test. A. PORTEVIN. *Compt. rend.* 160, 344–6(1915).—Metals and alloys are made up of individual grains or crystals and in each crystal the resistance to mechanical strain is a function of the direction in which the force is applied. With fine-grained metals or alloys the crystals are arranged so irregularly that such materials are practically isotropic. The expts. described show that with coarse-grained metals the results obtained in the Brinell test are dependent upon the direction in which the force is applied. Very consistent measurements can be made when only a single grain is affected but the values are different in different directions. When the test is applied so that different grains are affected and in different directions, then the results are likely to vary very considerably.

W. T. H.

The elasticity of flexure of cast iron. A. ONO. *Mem. Coll. Eng. Kyushu Imp. Univ.* 1, 111–64(1915).—Tensile strength, compression and bending tests were applied

to cast Fe rods containing 3.36 C, 2.06 Si, 0.99 Mn, 0.18 P, 0.05 S and 0.24% Cu. For the details concerning the numerous tests and the mathematical discussion of the results, the original must be consulted.

W. T. H.

The quantitative effect of rapid cooling upon the constitution of binary alloys. III.
G. H. GULLIVER. *J. Inst. Metals* 13, 31 pp. (1915) (advance copy).—A mathematical discussion of the deviation from equil. conditions of rapidly cooled alloys, and the application of the theory to some specific cases. Thus, at a normal rate of cooling, the ordinary alloy with 92% Al and 8% Cu contains about 10% eutectic, although at equil. it is homogeneous without eutectic. To get 10% eutectic in an alloy under equil. conditions requires about 12% Cu. The application of the theory to Al-Sn alloys indicates that the satn. point of Sn in Al solid soln. is less than 10% Sn, although 20% is usually assumed. Curves are given showing the application of the theory to parts of the Pb-Sn, Cu-Sn, Cu-Zn, Cu-Ni and Cu-Al diagrams.

H. W. GILLET.

The permanent deformation of copper produced by compression and by traction.
M. BRILLOUIN. *Ann. phys.* 2, 489-96 (1914).—The permanent deformation produced in well annealed, electrolytic Cu has been studied under different conditions by Vielle (1892) and by Bouasse (1899). In this paper the results obtained by these 2 investigators have been compared and reconciled with one another.

W. T. H.

Some experiments upon copper-aluminium alloys.

J. H. ANDREW. *Engineering* 99, 446-9 (1915); *J. Inst. Metals* 13, 14 pp (1915) (advance copy).—The equil. diagrams of Carpenter and Edwards (*C. A.* 1, 1534) and of Curry (*C. A.* 1, 2995) differ from one another in several important details, especially with regard to alloys containing between 80 and 100% Cu. Alloys containing 10-20% Al were prepared and studied by means of cooling curves. From the results obtained the diagram has been modified slightly (see fig.).

L. F. HAMILTON.

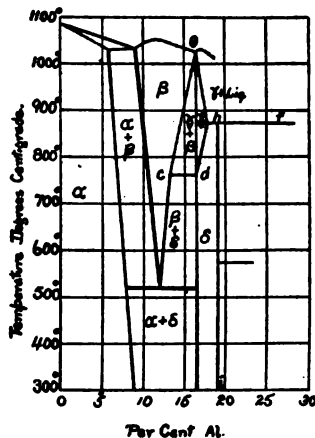
The constitution of the alloys of copper with tin.

JOHN L. HAUGHTON. *Engineering* 99, 419-22 (1915).—On account of serious discrepancies in the Cu-Sn equil. diagram as drawn by previous investigators, it is proposed to reconstruct the entire diagram and to

publish the results from time to time as soon as sufficient data has accumulated. This paper is concerned with the range and position of the constituent ϵ which is not shown at all in the diagram of Giolitti and Tavanti (*C. A.* 2, 3054), is shown existing along a line sloping from 61.1-65% Sn by Heycock and Neville (1903), as a narrow strip containing 59.5-60.5% Sn at its temp. of formation and 59.5-62% Sn at 0° by Shepherd and Blough (*C. A.* 1, 36), while Hoyt (*C. A.* 8, 484, 3413) shows it by means of a lenticular-shaped area forming at 49% Sn and spreading out to a range from 47 to 50% Sn at 300°. Hoyt gives 500° as the temp. at which it first appears but by others 400° is usually assumed. The study of heating and cooling curves and of photomicrographs now shows that the comp. of ϵ varies slightly with the temp. at which it seps. out. Pure ϵ , which is formed by the reaction $\eta + \text{Sn} = \epsilon$ contains 59% Sn at 400° and between 59.8 and 61% Sn at 250°. The temp. at which ϵ is first formed is indicated at 401° by cooling curves and at 415° by heating curves.

W. T. HALL.

Action of lead, copper, tin, nickel, zinc and aluminium on water. W. P. JORISSEN. *Leiden. Chem. News* 111, 56-7, 91-2, 102 (1915).—The principal investigations on



Per Cent Al.

the corrosion of these metals are summarized and discussed chiefly from the standpoint of electrolytic corrosion and passivity. The difficulty in predicting what will happen when one of these metals is brought into contact with a special kind of drinking H_2O is pointed out as well as the need of further expts. to show the order of the metals, with respect to their potentials, when placed in different salt solns. and in the various kinds of H_2O found in nature. W. H. S.

The properties of some nickel-aluminium and copper-nickel-aluminium alloys. A. A. READ AND R. H. GREAVES. Univ. College, Cardiff. *J. Inst. Metals* 13, 52 pp. (1915) (advance copy).—The physical properties of some of the light alloys of Al with Ni and with Ni and Cu up to about 12% of Cu and Ni were studied. An alloy of 80 Al, 20 Ni was made up by adding shot Ni to molten Al at about 850° (estd.), too low temps. not giving rapid enough soln. of the Ni and too high ones probably causing the formation of Al_3Ni . Tensile tests were made on some of these as cast, also on hot rolled, cold drawn and annealed rods. Increase in Ni in the binary alloys (the range covered by the samples was 0 to 5.5% Ni) increases tensile strength and decreases elongation. The alloy with 5.5% Ni has 19000 lbs. per sq. in. tensile strength and 9% elongation on the chill casting 1 in. diam., turned down to 0.564 in. diam. The strongest chill cast alloy contained 2% Cu and 5.25% Ni and gave 25500 lbs. per sq. in. and 6%. In cold rolling, the alloys whose comps. lie in the corner of the triangular diagram back of a line drawn from 4.5% Ni to 3.5% Cu were sound; beyond it they cracked. In hot forging the division line of soundness runs from 7.5% Ni to 5.5% Cu, in wire drawing from 4% Ni to 6% Cu. The yield points by several methods, and the approximate true elastic limits were compared. In general the alloys were studied by taking const. Cu content (as 1%, 2%, 4%) and adding various amts. of Ni, and *vice versa*. All castings were poured as cold as possible, but no actual measurements of pouring temp. were made. Qual. expts. show that castings poured hot are weaker than those poured cold. Alternating stress tests on an Arnold machine were made on hot and cold rolled and on annealed rods, 2% Ni giving the best results on the annealed samples, 2% Cu + 1 to 2% Ni, on the others. Hardness was detd. by Shore and Brinell methods, and increases with increases in Cu + Ni. The sp. gr. is a linear function of total Cu + Ni present, and is slightly lower than the calc. density. In the range studied, the m. ps. drop as the Cu + Ni increases, the alloy with 5.5% Ni melting at 637° and that with 4.1% Cu + 4.3% Ni at 619°. Elec. cond. of the 1.9% Ni alloy (pure Al = 100) is 93.2, of the 4.3% Ni 86.5, of the 4.1% Cu + 2.2% Ni 77.8. Corrosion tests were made in fresh and sea water, but the results are not very conclusive. All the alloys corroded more than pure Al. Six photomicrographs are given. Ni forms a eutectic with Al just as Cu does, and substitution of an equal wt. of Ni for Cu makes no marked difference in the microstructure, *i. e.*, 4% Ni + 4% Cu contains about the same amt. of ternary eutectic that 8% Cu does of binary. In general, the properties, *d.*, tensile strength, etc., of an Al-Cu are not materially altered by substitution of Ni for Cu, since Cu and Ni have almost identical ds. and similar atomic vols. On account of the fact that the cost of Ni is higher than that of Cu, the greater difficulty of making an Al-Ni than an Al-Cu alloy, and the greater tendency of the Ni alloy toward pipping, there is apparently nothing to be gained in substituting Ni for Cu in the light Al alloys.

H. W. GILLET.

Alloys of mercury with thallium. P. PAVLOVICH. *J. Russ. Phys. Chem. Soc.* 47, 29-46(1915).—An exam. of the diagrams of fusion, elec. cond., hardness and potential of alloys of Hg with Tl resulted in the following conclusions: The statement of Kurnakov and Pushin (*J. Russ. Phys. Chem. Soc.* 38, 1166) concerning the existence of an irrational compd. of these metals is correct. Such an irrational compd. is indicated on the m. p. curve at 29-30 (at.) % Tl, on the cond. curve at 26-28% Tl, and on the

e. m. f. curve at 27-28.4% Tl (*loc. cit.*, 899). The existence of such an irrational compd. may be due to the dissociation of Hg_2Tl , forming with its components solid solns. within the range of 21-31 at. % of Tl. The presence of Hg_2Tl in the α phase of the system Hg-Tl is corroborated by the fact that in the range of this compd. the temp. coeff. of resistance is nearly the same as that of the pure metals (Stepanov's rule, elec. cond. of metallic alloys). In the range of 86-100% of Tl there is an enormous increase of hardness.

H. M. GORDIN.

Alloys having remarkable properties at very high or very low temperatures. L. GUILLET. *Rev. metal.* 11, I, 969-70(1914).—Alloys or metals having a high temp. resistance have a breaking strength and an elastic limit of 5-8 kg. per sq. mm. at about 750-800°. A Ni-steel alloy hardened with Cr and W is described which has a breaking strength of 24 kg. at 800°. Another alloy shows a resistance of 50 kg. at -195°, while soft steel gives a resistance of no more than 3 kg. at this temp. Tammann cites two alloys of Cr-Co, one of which (Cr 25%, Co 75%) has a resistance of 44.9 kg. at 720°; the other (Cr 30%, Co 70%) has a resistance of 65.1 kg. at the same temp.

L. T. FAIRHALL.

Rust formation in the galvanized iron pipes of a hot water plant. T. E. MEYER. *Gesund. Ing.* 38, 89-90(1915).

ARTHUR LEDERER.

The valuation and estimation of coke (THALER) 21. Corrosion of gas holders (BRAINE) 21. Lead roasting process (REINDERS) 2.

U. S., 1,137,144, Apr. 27. E. F. KENNEY. Casting sound ingots by pouring the metal into a mold with a nonconducting top and while the interior of the ingot is still molten placing the mold, with its top and contents, in a heating furnace and heating sufficiently so that the molten metal in the top fills any cavities caused by shrinkage.

U. S., 1,137,244, Apr. 27. T. E. THOMAS. Blast furnace formed of inner and outer masonry walls above the bosh, with several intervening tiers of box-like cooling chambers through which H_2O is circulated.

U. S., 1,137,264, Apr. 27. E. GATHMANN. Ingot-mold with a feeder or sink head through which the metal is poured carried on a support which allows its adjustment and suspension at different distances below the top of the mold. Cf. C. A. 9, 51.

U. S., 1,137,293, Apr. 27. F. SCHÖNEMANN. Case-hardening furnace, with a muffle and a support, attached to the closure of the muffle, for carrying and rotating the article (e. g., a straightening roll) to be hardened.

U. S., 1,137,378, Apr. 27. W. N. BEST. Furnace for melting metals in portable crucibles.

U. S., 1,137,415, Apr. 27. J. G. MORGAN. Blast furnace with a straight vertical chute extending into it from the top for feeding lime into the furnace at a level above the zone of fusion and below the zone where CO_2 is present.

U. S., 1,137,559, Apr. 27. U. WEDGE. Metallurgical furnace with superposed hearths formed of sections fitted side by side, some of which are provided with elec. resistance heaters. Cf. C. A. 9, 1028, 1296.

U. S., 1,137,681, Apr. 27. A. VÖGLER. Making high-grade steel and slag rich in soluble phosphates in an open hearth or elec. furnace. The slag is retained on the metal bath until sufficiently rich in phosphates and then removed by blowing while the metal is retained in the furnace. Fresh additions of slag-forming material are made to remove any residual P, the finished metal is tapped off from beneath the slag and the latter is left in the furnace to be enriched in phosphates from the next charge.

U. S., 1,137,835, May 4. G. S. BROOKS. Making briquets for zinc furnaces by forming a plastic mixt. of salt soln., ore and coal of the usual fineness (about 1.5-4 mm.) and a portion of more finely powdered ore, coal or ZnO, molding and pressing into shape which will conform to the interior cross section of the retort used, and then slowly drying to bring the salt to the surface and form a protecting layer on the briquet.

U. S., 1,137,986, May 4. E. W. KÜTTNER. Forming insulating oxide coatings on aluminium wire by oxidizing the entire surface of the wire, after it is coiled, *e. g.*, to form solenoids, and then applying oxidizing varnish and heating. Successive coatings are applied until the desired thickness is obtained. Wax, resin, pitch or rubber also may be used as coatings.

U. S., 1,138,073, May 4. A. O. BLAICH. Case-hardening mixture formed of charred leather impregnated with a mixt. of a Na salt and CaCO_3 . Cf. C. A. 8, 2667.

U. S., 1,138,284, May 4. H. B. FABER. Rotary metallurgical filter with a valve having a rotating wall of Pb and a stationary wall of bronze with an intervening layer of "duriron" or "tantiron." This construction avoids corrosive action of solvents and injurious galvanic action.

U. S., 1,138,346, May 4. C. J. BACON. Boiler for utilizing waste heat from regenerative metallurgical furnaces.

U. S., 1,138,482, May 4. A. C. IONIDES, JR. Gas-fired furnace for melting cast iron, etc., in crucibles.

U. S., 1,138,555, May 4. O. B. GOLDING. Furnace for heating steel bars for the manufacture of tin-plate.

U. S., 1,138,651, May 11. G. P. GIBSON. Smelting furnace for reducing iron or lead ore. The furnace comprizes a series of blast furnaces in a row, each having an enlarged central ore chamber and a contracted discharge throat at the lower end. The blast furnace units all discharge into a single muffle melting furnace with an inclined hearth leading to a pit for receiving molten metal from the melting chamber. Cf. C. A. 8, 3287.

U. S., 1,138,845, May 11. H. B. COHO. Alloy for bearings and for use as a substitute for brass, formed of Pb 10-90 and Cu 90-10 parts fused with 5-25% its wt. of needles of Sb sulfide. Sn may be added to form a substitute for Babbitt metal.

U. S., 1,138,866, May 11. E. HALLGREN. Crucible furnace for melting metals.

U. S., 1,139,067, May 11. C. W. PATTEN. Apparatus for amalgamating ore.

U. S., 1,139,143, May 11. F. W. STEVENS. Apparatus for recovering gold by amalgamation.

U. S., 1,139,206, May 11. H. H. MCGOVERN. Centrifugal ore-separator.

U. S., 1,139,219, May 11. J. I. PEYTON and S. E. HITT. Open-top ingot mold with a thick-walled vacuum chamber in its walls near the top to retard radiation of heat.

U. S., 1,139,284, May 11. S. E. HITT and J. I. PEYTON. Ingot mold with a series of thick-walled vacuum chambers in its side walls near the top.

U. S., 1,139,324, May 11. F. P. ARNOLD and G. F. WEDEMAN. Apparatus for amalgamating ores.

U. S., 1,139,412, May 11. H. A. HADFIELD, A. G. M. JACK and I. B. MILNE. Hardening armor-piercing projectiles by heating the external shoulder of the shell to about 925° , the inner surface adjacent the shoulder to about 900° , the point to about 875° and the base to a lower temp., dipping the shell to its base in oil for 8-14 min. and then raising it about $\frac{1}{3}$ its length and allowing it to remain in this position for about 8 min. longer, raising it again an equal distance and allowing it to remain in this position

about 18 min., lowering the shell to its base again in the oil and pouring H_2O into the shell, reheating the base to $650-725^\circ$ and the core to $600-650^\circ$ while the point is immersed in H_2O and quenching after cooling to about 300° .

U. S., 1,139,428, May 11. B. MACDONALD. Apparatus for extracting copper or other metals from ores by leaching and precipitation.

Brit., 29,634, Dec. 23, 1913. J. R. SPEER and W. L. FORSTER. An iron or steel alloy has the following % comp.: Cr 0.5-1.5, Ni 0.25-1, Si 0.1-2, C 1.5-3.5, Mn 0.45, P less than 0.12, S less than 0.05. The alloy may contain Cr 0.9, Ni 0.5, Si 0.7, C 1.88, S 0.033, P 0.04, and Mn 0.25. Traces of Cu or W may be present. The alloys are made in a regenerative open-hearth, or elec. furnace, by melting or extn. processes, and are suitable for castings and for use in making tools.

Brit., 29,813, Dec. 27, 1913. J. LAMBOT. A gas-fired tilting furnace of the open-hearth type, with air and gas ports formed in a detachable head secured to the furnace. Cf. C. A. 9, 596.

Brit., 118, Jan. 2, 1914. J. T. DWYER. Soft solder contains 50-75 parts of Pb, 25-50 of Sn, and 0.01-0.05 of P, with or without a small quantity of Sb. Specific alloys contain 57.5 Pb, 42.5 Sn, and 0.03 P, or 56.5 Pb, 41.5 Sn, 0.02 P, and 2 Sb.

Fr., 466,072, Dec. 11, 1913. D. C. REINOHLE. In the recovery of the precious metals, the container for the extn. with cyanogen solns. (time of treatment 48 hrs.) and the containers for the pptn. (time of treatment 48-100 hrs.), are rendered superfluous while the time of extn. is reduced to about 15 min. (so that the base metals do not go into soln.), if the ground ore (150-200 mesh), in predetd. amts., is brought into contact with gradually increasing amts. of the solvent, with aeration and stirring. Suitable app. is specified.

Ger., 279,646, Mar. 23, 1913. E. FERRARI. App. for casting metal with exclusion of air.

Ger., 280,508, Sept. 17, 1912. E. DEISTER and W. F. DEISTER. Operation of a slime hearth for dressing ores.

Ger., 280,752, June 18, 1913. W. A. GUERTLER. A bed metal contains a soft ground mass with Pb as the principal constituent, together with variable additions of other elements and with Fe as a stiffening reinforcement, and also with other elements in variable, but relatively small proportions. The metal product is prepared by centrifuging the finely divided components in the liquid or powdered state, with or without the employment of an indifferent or favorable gas, and subsequent thermal or mechanical treatment of the product. As additions to the base metal are specified, Zn, Al, Sn, Sb, Bi, P, Si, and as additions to the reinforcing metal are specified Ni, Co, Cu, Mn, Cr, W, Mo, V, Ti, Si, and C.

Ger., 280,979, June 3, 1913. WARME-VERWERTUNGS-GES. App. for utilizing the heat of cooling slags, with the employment of a water-jacketed cooling car. The steaming of the cooling H_2O is prevented by pressure.

10. ORGANIC CHEMISTRY.

C. A. ROULLER.

Acid salts of dibasic acids. II. Metallic *d*-camphorates. E. JUNGFLISCH AND P. LANDRIEU. *Ann. chim.* 2, 333-89(1915); cf. C. A. 8, 1565, 3435.—This article gives in greater detail the methods of prepn. and the properties of salts previously described.

LOUIS E. WISE.

Constitution of linaloöl. P. BARBIER AND R. LOCQUIN. *Ann. chim.* 2, 389-402(1915); cf. C. A. 8, 3009. LOUIS E. WISE.

Synthesis by means of organo-metallic zinc derivatives. II. γ -Chloro ketones and their transformation products. H. WOHLGEMUTH. *Ann. chim.* 2, 403-65(1915); cf. C. A. 8, 3289; 9, 1310.—In part a collective article. The action of various amines upon some of the previously described γ -Cl ketones was also studied. MeCHCl-(CH₂)₂COEt (A) in EtOH, when heated under reflux for 2 hrs. with 2 mols. HONH₂·HCl (which had been just neutralized with K₂CO₃), gave rise to the compound C₇H₁₁ON₂ (B), b₁₃ 118-9°, n_D²⁰ 1.49394, which is either the orthoxazine, N:CEt.CH₂.CH₂.CHMe.O or the isoxazine, HN.CEt:CH.CH₂.CHMe.O, the latter

formula being in somewhat better accord with the experimentally detd. mol. refraction and dispersion. The *picrolonate* of (B), brilliant, brownish red prisms, m. 148°, on a Hg bath. By adding 13.5 g. (A) to a satd. aq. soln. of 7.8 g. HONH₂·HCl, incompletely neutralized by the addition of 6.5 g. K₂CO₃, shaking the mixt. at intervals during 8 days and finally extg. with Et₂O, W. obtained the *oxime* of (A), oil, which when heated in abs. EtOH with C₄H₅N on a H₂O bath for 6 hrs., gave rise to (B). The compound, C₄H₁₁ON (CH₂.CH₂.CH₂.O.N:CEt or CH₂.CH₂.O.NH.CEt:CH), b₁₃

130-1°, was prepd. from CH₂Cl(CH₂)₂COEt (C) by a very similar method. H₂NNH₂·H₂O reacting with (A) gave rise to 6-methyl-3-ethyltetrahydropyridazine, CH₂.CH₂.CEt:N.NH.CHMe, b₁₁ 77.5-8.0°; *hydrochloride*, hygroscopic powder (from

acetone), m. 117°; *benzoyl derivative*, faintly colored prisms, m. 56°. 3-Ethyltetrahydropyridazine, b₁₁ 77°, was prepd. by a similar method. Its hydrochloride and chloroplatinate are very unstable; its *benzoyl derivative*, b_{12.6} 202°; *urea derivative*, H₂NCON.CH₂.CH₂.CH₂.CEt:N.NH₂·H₂O, efflorescent prisms, m. 81°, was formed when

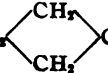
(C) in HCl was treated with KNCO or when the semicarbazone of (C) in abs. EtOH was treated with an equimol. amt. of C₄H₅N for 6 hrs. under reflux. The γ -Cl ketones, when treated with PhNHNH₂ in EtOH gave rise to *N*-phenyltetrahydropyridazines. 1-Phenyl-3-ethyl-6-methyltetrahydropyridazine (from A), CH₂.CEt:N.NPh.CHMe.CH₂

or CH₂.CH:CEt.NH.NPh.CHMe, b₁₁ 205-7°; its corresponding *phenylcarbamyl derivative*, leaflets, m. 152-3°. 1-Phenyl-3-ethyltetrahydropyridazine (from C), microcrystals, m. 77-8°; *phenylcarbamyl derivative*, needles, m. 158°. LOUIS E. WISE.

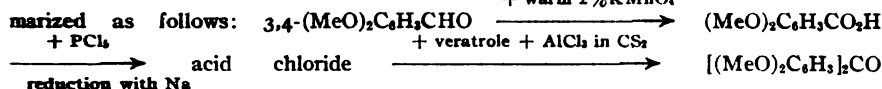
Catalytic reduction of indigo and vat dyes. ANDRÉ BROCHET. *Compt. rend.* 160, 306-8(1915).—A method is given for the prepn. of concd. solns. of indigo white, free from inorg. salts and other impurities. 10 g. of dry indigo suspended in 250 g. H₂O containing a given small amt. of NaOH and 5 g. active Ni was shaken in a H atm. at 70° for about 40 min., 851 cc. or 0.076 g. of H (dry) being required for complete reduction. The filtered solution which contains the indigo white may be further concd. *in vacuo*. The Schützenberger process now in general use requires 7 g. NaHSO₃ to effect a similar reduction and yields a contaminated product. The Ni retains its catalytic properties for a long time. By similar methods the leuco bases of other vat dyes (derivs. of indigo and thioindigo) may be readily prepd. LOUIS E. WISE.

Reaction of homopiperonyl and homoveratryl alcohols. GERTRUDE M. ROBINSON. Sidney. *J. Chem. Soc.* 107, 267-76(1915).—2,3,6,7-Dimethylenetetraoxy-9,10-dihydroanthracene (A), obtained by Ewins (C. A. 4, 195) by the action of PCl₅ on homopiperonyl alc. (B), was more readily synthesized by gradually adding 2 g. H₂SO₄ in 20 cc. glacial AcOH to 20 g. (B) in 60 cc. hot AcOH. When treated with

a HNO_3 -AcOH mixt., (A) formed a NO_2 deriv. m. 217° . 2,3,6,7-Tetramethoxy-9,10-

dihydroanthracene (C), $(\text{MeO})_2\text{C}_6\text{H}_3$  $\text{C}_6\text{H}_3(\text{OMe})_2$, needles, m. 227° , was prepd.

by the action of 35% HCO_2H on o -(MeO) $_2\text{C}_6\text{H}_4$ in H_2SO_4 , or (less readily) by the action of glacial AcOH containing a few drops of H_2SO_4 upon homoveratryl alc. (C) dissolves in H_2SO_4 , forming a magenta-colored soln., which on warming changes to a violet. On boiling with HI, (C) formed a dark product, which, after washing with NaHSO_3 and distg. over Zn dust in a stream of H_2 , was converted into 9,10-dihydroanthracene, m. 106° (cf. Lieberman and Topf, *Ann.* 212, 5). When heated with HNO_3 , (C) was oxidized to a mixt. of 2,3,4,5-(MeO) $_2(\text{O}_2\text{N})_2\text{C}_6\text{H}_3$, m. 132° , and 6-nitroveratric acid, m. $187-8^\circ$. (C), when mixed with an excess of PbO and distd., was converted into 2,3,6,7-tetramethoxyanthracene (D), prisms from AcOEt with 1 mol. of solvent, m. 141° , resolidifying and rem. about 169° . When recrystd. from EtOH (D) m. 173° . Solns. of (D) exhibit a brilliant blue fluorescence. In an attempt to obtain (D), R. treated hydroveratroin with SnCl_4 , but the resultant product was found to be tetramethoxydeoxybenzoin (cf. *Ann.* 329, 48). By condensing $(\text{CHO})_2$ and veratrole, in the presence of H_2SO_4 , (D) was not formed, but *s*-tetraveratrylethane, $\{[3,4-(\text{MeO})_2\text{C}_6\text{H}_3]_2\text{CH}_2\}_2$, needles from AcOEt, m. 148° . The synthesis of 3,4,3',4'-tetramethoxydiphenylmethane, $[(\text{MeO})_2\text{C}_6\text{H}_3]_2\text{CH}_2$ (E), leaflets from light petroleum, m. 70° , b_{24} 257° , may be summarized as follows:



$\rightarrow$ (E). On treatment with H_2SO_4 and HCHO, followed by the addition of H_2O , (E) yielded (C). The 6,6'-dinitro derivative of (E), pale yellow needles, m. 183° , was obtained either by treating (C) with a HNO_3 -AcOH mixt., or by the direct nitration of (E) in glacial AcOH. The di- NO_2 deriv., when boiled with 15 parts HNO_3 , formed the 2,6,2',6'-tetranitro derivative of (E), nearly colorless, rhombic prisms, m. 210° . Isosafrole undergoes polymerization when treated with H_2SO_4 -AcOH mixt., forming *trans*(?)-di-isosafrole, m. 145° (cf. Angeli and Mola, *Gazz. chim. ital.* 24, 127) and an oil (F), b_{30} 225° . The isomeride, m. 92° , described by Mayer (cf. *C. A.* 8, 3022) was not isolated. Attempted nitration of (F) resulted in an oxidation with the production of EtCO_2H , but no well defined NO_2 derivs. of (F) were obtained.

LOUIS E. WISE.

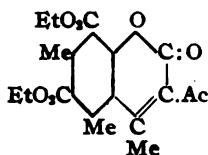
Volatile oil from tubers of *Kaempferia ethelae*. ERNEST GOULDING AND OSWALD D. ROBERTS. *J. Chem. Soc.* 107, 314-9(1915).—By steam distn. of 31.8 kg. of the tubers and rootlets of *Kaempferia ethelae* (grown in the Transvaal), G. and R. obtained 440 g. of a light oil (A) and 33 g. of a heavy oil (B). (A) had the following const.: d_{15}^{15} 0.9437; α_D^{25} $19^\circ 47'$; acid no. 2.3; ester no. 5.0; ester value after acetylation 47.6. The mixt. of (A) and (B) had approx. the following compn.: terpenes (including dipentene, identified by means of the tetrabromide, m. $124-5^\circ$, and very probably pinene) 21.8%; cineol, m. 112° , 17.2%; acids (chiefly or entirely AcOH) 0.1%; phenols, 0.5%; alcs. (including linalool, identified by means of its conversion product, citrylidene-cyanoacetic acid, m. $120-1^\circ$), 11.2%; esters (chiefly *o*- $\text{MeHNC}_6\text{H}_4\text{CO}_2\text{Me}$, identified by means of $\text{MeHNC}_6\text{H}_4\text{CO}_2\text{H}$, m. 179°), 1.3%; a new ketone, $\text{C}_{24}\text{H}_{28}\text{O}_4$ (C), diamond-shaped crystals, m. 102° , $[\alpha]_D^{25}$, $198^\circ 20'$, 13%; and a residue consisting largely of sesquiterpenes, 34.9%. (C) was isolated from a fraction of the oil b_{30} above 135° . It is practically odorless, but its EtOH soln. possesses a characteristic odor of crushed ivy leaves. It is highly unsatd., adds Br readily, but does not unite with NaHSO_3 or Na_2SO_3 , and is not attacked by alk. KMnO_4 . CrO_3 , however, decomps. (C) completely.

When treated with HONH_2HCl and a slight excess of aq. NaOH , (C) forms a *hydroxylamine oxime*, microcrystals, m. 184° , which when shaken with very dil. HCl was converted into the free *oxime*, cryst. tufts, m. 166° . No acetate of (C) could be obtained, but a *benzoate*, cream-colored powder, m. above 260° (decompn.), was prepd. The action of 0.5 N alc. KOH on (C) gave rise to an unidentified compd., m. about 200° (decompn.).

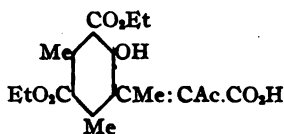
LOUIS E. WISE.

Formation of coumarin derivatives and the preparation of stable coumarinic acids.

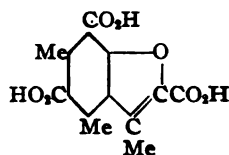
LOUIS A. JORDAN AND JOCELYN F. THORPE. Imp. Coll., So. Kensington. *J. Chem. Soc.* 107, 387-406(1915).—The compd. m. 134° (cf. C. A. 7, 336) previously obtained in small amt. as a by-product in the synthesis of Et β -methylgluconate from Et isodehydroacetate, was prepd. in larger quantity and has been shown to be *ethyl 3-acetyl-4,5,7-trimethylcoumarin-6,8-carboxylate* (I), needles, m. 135° , b₁₅ 253° . When dissolved in warm, concd. aq. KOH , (I) is converted into α -acetyl-3,5-dicarbethoxy- β ,4,6-



(I)



(II)



(III)

trimethylcoumarinic acid (II), small plates from EtOH , m. 146° , giving a purple color with FeCl_3 and passing back into (I), when heated above its m. p. Similarly other coumarins, having substituting groups in position 4, when sapond. with alkali, yield *colorless* salts of the corresponding coumarinic acids. Apparently these acids have the normal coumarin (not the *o*-quinone) structure. *Ethyl 4,5,7-trimethylcoumarin-6,8-dicarboxylate* (A), concentric needles, m. 131° , derived from (I) by the elimination of the 3-Ac group by Perkin's method (cf. *J. Chem. Soc.* 87, 109), yielded *3,5-dicarbethoxy- β ,4,6-trimethylcoumarinic acid*, plates, m. 122° , which when treated above its m. p. is reconverted into (A). α -Acetyl-3-carboxy-5-carbethoxy- β ,4,6-trimethylcoumarinic acid (B), plates from EtOH , m. 176° , was formed when (I) was boiled for several hrs. with 50% aq. NaOH . (B) was converted into *6-ethyl 8-hydrogen 3-acetyl-4,5,7-trimethylcoumarin-6,8-dicarboxylate* (C), small needles from EtOH , m. 235° . The elimination of the 3-Ac group from either (B) or (C) led to the formation of *3-carboxy-5-carbethoxy- β ,4,6-trimethylcoumarinic acid*, needles, m. 129° , which, when heated in sealed tubes with H_2O at 180° for 5 hrs., yielded *6-carbethoxy-4,5,7-trimethylcoumarin*, needles, m. 124° , which suffered no sapon. even on prolonged boiling with 50% aq. NaOH . On hydrolysis with 50% H_2SO_4 (I) yielded a mixt. of *4,5,7-trimethylcoumarin* (D) (cf. Clayton, C. A. 3, 776) and *3-carboxy- β ,4,6-trimethylcoumarinic acid* (E), needles, m. 300° (with evolution of CO_2 and the formation of (D)). (D) and (E) were sepd. by means of dil. Na_2CO_3 , in which (D) is insol. Although (E) titrates as a dibasic acid and exhibits great stability when the CO_2H group is free, its *di-ammonium salt* when heated loses NH_3 and an attempt to prep. its Ag salt led to the production of *silver 4,5,7-trimethylcoumarin-8-carboxylate* (F). On attempting to obtain the corresponding free carboxycoumarin from (F), (E) was regenerated. When treated with EtI in Et_2O (F) yielded the *8-carbethoxy-4,5,7-trimethylcoumarin*, laminas, m. 133° , reconverted into (E), when boiled with aq. NaOH . (D), when dissolved in warm aq. KOH , and the soln. carefully acidified at 0° , yielded *β ,4,6-trimethylcoumarinic acid*, very unstable needles, m. 128° , which rapidly passed back into (D) on standing at room temp. (I) in hot POCl_3 , when treated with an equiv. amt. of PCl_5 , forms a purple soln. from which Et_2O ppts. an unstable blue substance, which on treatment with EtOH is converted into *ethyl 2-chloro- α -acetyl-3,5-dicarbethoxy- β ,4,6-trimethylcoumarin*

somate, oil, boils with decompn., passing into (II) when treated with aq. NaOH. Br in CHCl_3 , acting upon (I) or upon (A), forms *ethyl 3-bromo-4,5,7-trimethylcoumarin-6,8-dicarboxylate*, microneedles, m. 114° , which when boiled with alc. KOH gave rise to *4-carbethoxy-6-carboxy-2,3,5-trimethylcoumarilic acid* (III), flakes, m. 197° . (D) absorbs Br with the formation of *3-bromo-4,5,7-trimethylcoumarin*, plates from EtOH, m. 163° , which when boiled with aq. KOH and the soln. acidified, yields *2,3,5-trimethylcoumarilic acid*, m. 149° . On nitration with $\text{HNO}_3\text{-H}_2\text{SO}_4$ mixt. below 0° , (D) in H_2SO_4 yields *6-nitro-4,5,7-trimethylcoumarin*, colorless needles, m. 208° , from which no corresponding coumarinic acid could be obtained. If this nitration is carried further by using an excess of nitrating mixt., and keeping the resulting soln. at room temp. for 12 hrs., the *3,6,8-trinitro-4,5,7-trimethylcoumarin*, cream-colored, flattened needles, m. 225° , was formed. The latter, when sapon. with alkali, yielded *ω,3,5-trinitro-2-hydroxy-α,4,6-trimethylstyrene*, $\text{O}_2\text{NC}:\text{C}(\text{OH})\cdot\text{C}(\text{CMe}:\text{CHNO}_2):\text{CMe}\cdot\text{C}(\text{NO}_2):\text{CMe}$,

nodules from C_6H_6 , m. 103° . By nitrating (I) or (A) at 0° with $\text{H}_2\text{SO}_4\text{-HNO}_3$ mixt., *ethyl 6-nitro-4,5,7-trimethylcoumarin-8-carboxylate*, needles from glacial AcOH, m. 170° , was formed. (E) when boiled in 35% HNO_3 yielded *6,8-dinitro-4,5,7-trimethylcoumarin*, needles from abs. EtOH, m. 203° , which on boiling with aq. KOH forms *3,5-dinitro-β,4,6-trimethylcoumarinic acid*, yellow, m. 182° (decompn.).

LOUIS E. WISE.

Preparation of allyl alcohol. FREDERICK D. CHATTAWAY, Oxford. *J. Chem. Soc.* 107, 407-10 (1915).—An improved method for the prepn. of $\text{C}_3\text{H}_5\text{OH}$ is described. A mixt. of 500 g. anhydrous (CO_2H) and 500 g. glycerol was heated in partial vacuum on a H_2O bath for 4-5 hrs. (or longer) until HCO_2H ceased to distil over. The mixt. was then very gradually heated to 240° under ordinary pressure, the flask being fitted with a 4-bulb Young fractionating column. At $220\text{-}5^\circ$ CO_2 was given off and a mixt. (A) of approx. equal amts. of $\text{C}_3\text{H}_5\text{OH}$ and $\text{HCO}_2\text{C}_2\text{H}_5$ distd. over, leaving in the distg. flask a residue (B) containing somewhat <50% of the glycerol originally used. Practically no acrolein was produced. (A) was treated with 50 g. NaOH in 1 l. H_2O (to hydrolyze the formate), allowed to stand for 12 hrs. at room temp., and finally distd. The 1st 300 cc. of distillate contained all of the $\text{C}_3\text{H}_5\text{OH}$, which after fractionation (using a 12-bulb Young column) yielded about 200-10 g. of a $\text{C}_3\text{H}_5\text{OH-H}_2\text{O}$ mixt., b₇₆₀ $87\text{-}8^\circ$, which may be dehydrated by means of anhydrous K_2CO_3 , yielding approx. 150 g. pure $\text{C}_3\text{H}_5\text{OH}$. To obtain $\text{HCO}_2\text{C}_2\text{H}_5$, the sapon. of (A) is omitted and the mixt. distd., using a 12-bulb fractionating column, and collecting the fraction b. below 87° , drying over CaCl_2 , redistg. and collecting the fraction b₇₆₀ $82\text{-}3^\circ$. The yield of pure ester was about 90 g. The residue (B) may be made up to 500 g. with more glycerol, 500 g. (CO_2H), added and the process repeated. After 4-5 repetitions of this kind it is best to discard the residue, as it shows a tendency to froth during the preliminary heating. C.'s process gives a nearly theoretical yield of $\text{C}_3\text{H}_5\text{OH}$, calc. on the basis of the glycerol actually entering the reaction, the yield being twice as great as the best that can be obtained by Tollens and Heninger's method.

LOUIS E. WISE.

Hydrazides and azides of organic acids. XXIX. Hydrazide and azide of adipic acid, pimelic acid and trans-hexahydroterephthalic acid. THEODORE CURTIUS. Heidelberg. *J. prakt. Chem.* 91, 1-38 (1915).—I. (With ERNST DARMSTÄDTER). A study of the conversion of di- CO_2H acids, by means of their hydrazides and azides, into di- NH_2 compds. having 2 less C atoms: $(\text{CH}_2)_4(\text{CO}_2\text{H})_2 \longrightarrow (\text{CH}_2)_4(\text{NH}_2)_2$; $(\text{CH}_2)_5(\text{CO}_2\text{H})_2 \longrightarrow (\text{CH}_2)_5(\text{NH}_2)_2$; $\text{C}_6\text{H}_{10}(\text{CO}_2\text{H})_2 \longrightarrow \text{C}_6\text{H}_{10}(\text{NH}_2)_2$. *Adipinyl dihydrazide* (a), $(\text{CH}_2)_4(\text{CONHNH}_2)_2$, was obtained in 90% yield by slowly dropping $(\text{CH}_2)_4(\text{CO}_2\text{Et})_2$ into 4 mols. of boiling $\text{N}_2\text{H}_4\cdot\text{H}_2\text{O}$, and boiling the mixt. until crystals appeared. By repeating the operation with the filtrate a further amt. can be obtained;

lustrous leaves from H_2O or dil alc., m. 171° ; in H_2O it reacts alk., and reduces both Fehling soln. and $\text{AgNO}_3 + \text{NH}_4\text{OH}$, and yields N_2H_4 on boiling with HCl ; *hydrochloride*, by passing dry HCl into (a) in cold abs. alc., white powder, decomp. 275° ; *dibenzal derivative*, $(\text{CH}_2)_4(\text{CONHN}:\text{CHPh})_2$, by shaking (a) in H_2O with 2 mols. BzH , microscopic needles from AcOH , m. $215-6^\circ$; *silver salt*, by adding AgNO_3 in alc. to a mixt. of the benzal deriv. + EtONa in alc., decomp. $175-6^\circ$; *di-o-hydroxybenzal derivative*, from (a) and HOCH_2CHO , white ppt., m. 275° ; *dicinnamylidene derivative*, from (a) and $\text{PhCH}:\text{CHCHO}$, white powder from alc., m. $231-2^\circ$; *diacetone derivative*, m. 174° ; *diethylacetoacetate derivative*, white powder, m. 125° , which on warming with H_2O or alc. gives $\text{AcCH}_2\text{CO}_2\text{Et}$; *dibenzoyl derivative*, from (a) + NaOH and BzCl , microscopic needles from alc., m. 240° . *Secondary adipinyl hydrazide*,

$\text{HN.CO.}(\text{CH}_2)_4\text{.CO.NH}$, prepd. by adding I to (a) in warm abs. alc., white powder, m. 300° . If the reaction is carried on in dil. alc., only adipic acid is formed. *Adipinyl diazide* (b), $(\text{CH}_2)_4(\text{CON}_3)_2$, obtained by diazotizing (a) in cold H_2O , m. -1° , white crystals which explode when heated either directly or in H_2O . Addition of PhNH_2 to (b) in Et_2O yielded on standing 2 days at room temp. the *dianilide*, lustrous needles from PhNH_2 , m. 234° . The *ditoluidide*, similarly prepd. from $p\text{-MeC}_6\text{H}_4\text{NH}_2$, m. 216° , microscopic needles from AcOH . By adding abs. alc. to (b) in dry Et_2O *diethyl tetramethylenedicarbamate*, $(\text{CH}_2)_4(\text{NHCO}_2\text{Et})_2$, was obtained in 53% yield, long, fine needles, m. $85-6^\circ$. On hydrolysis with concd. HCl it gave a 43% yield of putrescine- HCl . *Adipinyl diglycine*, $(\text{CH}_2)_4(\text{CONHCH}_2\text{CO}_2\text{H})_2$, was prepd. by gradually adding, with shaking, (b) to a concd. soln. of glycine made alk. with NaOH , and acidifying with HCl ; prisms similar to hippuric acid, m. 190° . It acts as a dibasic acid, evolves CO_2 with Na_2CO_3 and gives a deep blue soln. with KOCi and PhOH ; *ammonium salt*, white crust, decomp. 205° , and loses NH_3 on boiling with H_2O ; *silver salt*, white ppt., darkens 220° , and m. 227° (decompn.); *ethyl ester*, from the Ag salt + EtI , bright yellow solid, m. 60° ; *amide*, from the ester + NH_4OH , white crystals, m. 132 . II. With HANS PRINGSHEIM. *Pimelyl dihydrazide*, prepd. similarly to (a), m. 182° , crystals from alc.; yield, 60%; *picrate*, small yellow leaves from dil. alc., m. 166° ; *dibenzal derivative*, white crystals from alc., m. 185° ; *di-o-hydroxybenzal derivative*, yellow flakes, m. 210° ; *diacetone derivative*, m. 129° ; *dibenzoyl derivative*, crystals from alc., m. 211° . The secondary hydrazide corresponding to that of (a) could not be prepd. in a similar way. In each attempt with various amts. of I, complete hydrolysis occurred, yielding pimelic acid. By diazotizing the hydrazide, the *diazide* (c), $(\text{CH}_2)_4(\text{CON}_3)_2$, was obtained, oil at room temp., which explodes on heating. With $p\text{-H}_2\text{NC}_6\text{H}_4\text{Me}$ it gave the *ditoluidide*, $(\text{CH}_2)_4(\text{CONHC}_6\text{H}_4\text{Me})_2$, lustrous leaves from alc., m. 206° . Heated with an excess of abs. alc., (c) gave *diethyl pentamethylenedicarbamate* in 42.8% yield, crystals from ligroin, m. 71° , which on hydrolysis with concd. HCl at 100° gave cadaverine. An attempt to condense (c) with glycine, as in the case of (b), was unsuccessful. *Succinyl diglycine*, prepd. from the corresponding diazide (cf. Curtius, *J. prakt. Chem.* 52, 221) and glycine, m. 205° , microscopic prisms from alc.; *ammonium salt*, white crystals from a c., m. 184° ; *silver salt*, white ppt.; *diethyl ester*, from the Ag salt + MeI , fine needles from ligroin + a few drops of alc., m. 116° ; *diamide*, plates, m. 234° . III. With RICHARD STANGASSINGER. *trans-Hexahydroterephthalyl dihydrazide* (d) was obtained in 94% yield by boiling for 2-2.5 hrs. on a H_2O bath 20 g. $\text{C}_6\text{H}_{10}(\text{CO}_2\text{Et})_2$ in 20 cc. alc. with 20 g. $\text{H}_2\text{N}_2\cdot\text{H}_2\text{O}$, fine needles from alc.; it reduces Fehling soln. and $\text{AgNO}_3 + \text{NH}_4\text{OH}$; *hydrochloride*, by passing HCl into (d) in alc., white powder, chars without m. The following derivs. of (d) were prepd. similarly to the corresponding derivs. of (a): *dibenzal derivative*, white insol. powder, m. above 300° ; *diacetone derivative*, hair-like needles from alc. + acetone; *diethylacetoacetate derivative*, white powder from alc., m. above 300° ; *disemicarbaside*, insol. powder m. above 300° ; *diaside*, micro-

scopic needles, m. 63° (decompn.). On standing *in vacuo* for 19 days it lost 2 mols. N, giving a product whose analysis agreed with that of the di-isocyanate; *diethyl trans-hexahydrophenylene-1,4-carbamate* (e), $C_8H_{10}(NHCO_2Et)_2$, needles, m. 236° ; *dimethyl ester*, large lustrous needles, m. $244-5^{\circ}$. By heating the diazide directly with $PhNH_2$ at 200° , the *diurea derivative*, $C_8H_{10}(NHCONHPh)_2$, was obtained, white, insol. powder, chars without melting. By carrying on the reaction in Et_2O or C_6H_6 , the *anilidourea derivative*, $PhNHCOC_8H_{10}NHCONHPh$, was obtained by extg. the reaction mixt. with alc., microscopic needles, m. above 300° . A compound, $CO(NHC_8H_{10}NHCONHPh)_2(?)$, insol. in alc., was also isolated, which in H_2SO_4 gives a deep red ring on addition of a few drops of $K_2Cr_2O_7$ soln. By dropping the azide in Et_2O into boiling H_2O , N and CO_2 are evolved, and on continued boiling for 16 hrs. and finally heating at 120°

for 8 hrs. the cyclic *diurea derivative*, $\overbrace{HN.C_8H_{10}.NH.CO.NH.C_8H_{10}.NH}$, was obtained. *trans-1,4-Diaminohexahydrobenzene hydrochloride*, prepd. either by heating (e) with concd. HCl for 7 hrs. at 120° , or by heating on a H_2O bath for 24 hrs., microscopic prisms. It differs from the *p*-diaminohexamethylene described by Bayer and Noyes (cf. *Ber.* 22, 2171 (1889)) in that it gives no coloration with $FeCl_3$; *chloroplatinate*; *picrate*, lemon leaves from H_2O , chars 275° ; *diacetyl derivative*; *dibenzoyl derivative*, white, insol. ppt., m. above 300° ; *free base*, by decomp. the HCl deriv. with NaOH, long prisms, m. $72-3^{\circ}$; t forms a carbonate with atm. CO_2 ; *sulfate*, long needles. **XXX. Formation of hydrazide-hydrazides and hydraziazides of tribasic acids.** *Ibid* 39-102. I. With EDMUND BOURCART. Tricarballic acid cannot be converted into $C_6H_5(NH_2)_3$ by the azide method (cf. *J. prakt. Chem.* 62, 232 (1900)), but tri-Et pyrazoline-3,4,5-tricarboxylate (a) can be converted into the corresponding tri- NH_2 deriv. Trimesic, hemimellitic and pyrazoletetricarboxylic acids, on the other hand, do not lend themselves to this reaction. Only the sym. tri- CO_2H acids form with $H_2N_2.H_2O$ hydrazides and azides of the types (b) and (c), resp., while those having 2 CO_2H groups in the *o*-position form hydrazihydrazides and hydraziazides of the type (I). The instability of 1,3,5- $C_6H_3(NH_2)_3$ probably explains why it cannot thus be obtained from trimesic acid. (a) was prepd. by allowing N_2CHCO_2Et to stand with cold di-Et fumarate; short needles from alc., m. 97° . By adding 10 g. of (a) in 30 g. hot alc. to 10 g. $H_2N_2.H_2O$ in 200 cc. of cold abs. alc., and allowing to stand for 1 hr., *pyrazoline-3,4,5-tricarboxyl trihydrazide*

(b), $\overbrace{(R = CONHNH_2) R.C:N.NH.CHR.CHR}$, is formed, white ppt., cannot be crystd. without decompn., becomes red $130-40^{\circ}$, m. 148° (decompn.). When heated with H_2O for 2-3 days, NH_3 is evolved, and on cooling a yellow acid seps.; *hydrochloride*, by adding cold, concd. HCl to (b), white, hygroscopic ppt., becomes yellowish red on standing; *sulfate* and *nitrate*, both unstable; *picrate*, small yellow needles; *sodium sulfate derivative*, white ppt., becomes red on standing; *chloroplatinate*; *cadmium chloride derivative*, white ppt. from (b) + $CdCl_2$; *tribenzal derivative* ($R' = PhCH:NNHCO$),

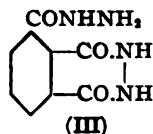
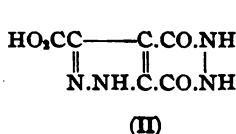
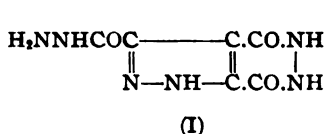
$\overbrace{R'C:N.NH.CHR'.CHR'}$, by shaking (b) in H_2O with BzH, white ppt.; *tri-p-nitrobenzol derivative*, white, light powder; *trihydroxybenzal derivative*, light yellowish powder, becomes red 130° ; *trivanillal derivative*, light, yellow powder, m. 139° (decompn.); *tripiperonal derivative*, white ppt.; *tricinnylamylidene derivative*, lemon, microcryst. powder; *trifarfuril derivative*; *triacetone derivative*; *triacetyl derivative*, by warming (b) with an excess of Ac_2O , white powder, becomes red $100-30^{\circ}$, m. 140° (decompn.); *triazide*

(c), $\overbrace{N_2OCC:N.NH.CH(CON_2).CHCON_2}$, by diazotizing (b) in dil. HCl, and extg. with Et_2O , viscous oil, very volatile *in vacuo* and explodes when heated; *trianilide*, from (c) in Et_2O and $PhNH_2$, amorphous ppt. from $CHCl_3$, does not m. below 300° ; *tri-p-toluidide*, amorphous ppt. On b. with abs. alc., for 2-3 hrs., (c) was converted into tri-

ethyl pyrazoline-3,4,5-tricarbamate, a viscous substance which could not be crystd.; on heating with 3-4 vols. concd. HCl for 24-36 hrs., at 60-70°, until evolution of CO₂ had entirely ceased, extg. with alc., filtering off the NH₄Cl and concg., a gelatinous residue was obtained whose properties and derivs. showed it to be chiefly *pyrazoline-3,4,5-triamine hydrochloride*; *picrate*, short yellow needles from H₂O, m. 180° (decompn.). Attempts to obtain the free base in pure form by decompn. of the picrate were unsuccessful. By diazotizing the HCl deriv., adding resorcinol and passing CO₂ through the resulting mixt., a dark brown, non-cryst. *dye* was obtained. Similarly, β -naphthol gave a brown *dye*. II. With LUDWIG H. HEYNEMANN. The tri-Et pyrazole-3,4,5-tricarboxylate (*d*), used for the following preps., was made from N₃CHCO₂Et and [: C(CO₂Et)]₃, according to the method of Buchner (cf. *Ber.* 22, 842). When allowed to stand with NH₄OH it gave the *triamide*, cryst. ppt., decompd. by boiling H₂O. (*d*)

was converted into the *trihydrazide* (*e*), H₂NNHCOC:N.NH.C(CONHNH₂):CCONH-NH₂, by the action of H₂N₂.H₂O in cold. abs. alc., microcryst. powder, does not m. below 300°, sol. in both dil. alks. and acids, and decompd. by boiling with H₂O. The following derivs. were prepd. from (*e*) and the corresponding aldehydes; *tribenzal derivative*, white, insol. ppt.; *trihydroxybenzal derivative*, yellow, flocculent ppt.; *tri-m-nitrobenzal derivative*, yellow ppt.; *tricinnamylidene derivative*, yellow, microcryst. powder from alc. There was also formed in this reaction *cinnamylideneazaine*, sepd. from the others by Et₂O, and the *cinnamylidenehydrazide derivative*, insol. in alc.

The *triaside*, N₃COC:N.NH.C(CON₂).CCON₂, prepd. by diazotizing (*e*), was obtained by slow evapn. from Et₂O as a cryst. solid. It explodes on heating, and is completely sapond. by cold dil. Na₂CO₃; *trianilide*, rosettes of needles from AcOH, does not m. below 270°. The white residue obtained by boiling the azide in Et₂O with abs. alc. for 6 hrs. did not respond to any of the tests for the expected triurethan. When 4 g. of (*d*) in abs. alc. is boiled for 3-7 hrs. with 2 g. H₂N₂.H₂O, the *hydrazide* (I)



is obtained in the form of the *diammonium salt*, needles from H₂O; with BzH it gave a *benzaldazine derivative*, m. 93°; *cinnamylidene derivative*, m. 162°. (I) was obtained by decompn. the di-NH₄ salt with dil. mineral acids. It shows both basic and acidic properties; *hydrochloride*, prepd. either by addition of concd. HCl or by passing dry HCl into the di-NH₄ salt in H₂O, white, cryst. powder; heated with dil. H₂SO₄ only the primary hydrazine residue is removed, while heating with concd. HCl in a closed tube removes the secondary groups with the formation of the *diacid ammonium pyrazole-*

tricarboxylate, HO₂CC:N.NH.C(CO₂H):CCO₂N₂H₄, silky needles, stable at 325°; shaken in H₂O with BzH, it yields, together with benzaldazine, the *free acid*, m. 230° (decompn.); *barium salt*, white powder. By shaking (I) in H₂O with BzH the *benzal derivative* was obtained as a white, flocculent ppt.; diazotized, (I) yields the *hydrazide* (*f*), yellow, flocculent ppt., which cannot be crystd., and is easily sapon. by alkalis; heated for 5 hrs. with PhNH₂ it yields the *hydrazianilide*. On boiling with H₂O (*f*) is converted into *pyrazolehydrazidic acid* (II), amorphous powder from H₂O, gives a white ppt. with HgCl₂ and (AcO)₂Pb. Heated with abs. alc., (*f*) yields a white cryst. powder, becomes brown 220°, and is sol. in strong acids and alkalies. It is probably the *hydrazidurethan*. III. With ALOYS J. SCHMITZ. The following derivs. of 1,3,5-

$C_6H_5(CO_2H)_3$ were prepd.: *Trimesyl trihydrazide* (g), $C_6H_5(CONHNH_2)_3$, by boiling for 12–16 hrs. $C_6H_5(CO_2Et)_3$ in abs. alc. with 8 g. $H_2N_2 \cdot H_2O$, microscopic crystals, does not m. below 300° ; *hydrochloride*, by passing HCl into (g) in alc., lustrous needles, unstable in the air, and loses H_2O at 100° ; *tribenzal derivative*, $C_6H_5(CONHN:CHPh)_3$, by direct heating of its components, powder by dissolving in AcOH and pptg. with H_2O , m. 224° ; *triaside*, by diazotizing (g) in dil. HCl, white flocculent ppt., explodes on heating or percussion; on boiling for 8 hrs. with H_2O , CO_2 , and N were evolved, but no other product was identified, while on boiling with alc., it yielded *triethyl benzenetri-carbamate* (h), $C_6H_5(NHCO_2Et)_3$, white ppt. by dissolving in alc. and pptg. with H_2O , m. $110-1^\circ$; *trianilide*, by heating the triazide with $PhNH_2$, brown ppt. from dil. AcOH, m. $118-20^\circ$ (decompn.). On heating (h) in alc. for 8 hrs. with dil. HCl at 100° , the expected $C_6H_5(NH_2)_3$ was not formed, but a compd. whose analysis agreed fairly closely with that of the *aminodiurethan*, $H_2NC_6H_5(NHCO_2Et)_2$, long needles by pptg. from alc. with H_2O , m. $172-3^\circ$. The following derivs. of $1,2,3-C_6H_3(CO_2H)_3$ were prepd.: $C_6H_3(CO_2Et)_3$ from acenaphthene according to the method of Graebe (cf. *Ber.* 25, 652; 26, 1797; *Ann.* 290, 206, 217); on heating in alc. with $H_2N_2 \cdot H_2O$ it yielded quant. *hemimellitethylhydrazide* (III), yellow powder, m. above 300° , gives ppts. with $CuSO_4$, $AgNO_3$, $HgCl_2$ and $FeCl_3$; *benzal derivative*, microcryst. powder, m. above 300° ; *hydraziaside*, white powder; *hydrazianilide*, yellow, cryst. powder; *urethan derivative*, white cryst. powder; *urea derivative*, by heating the hydraziazide with H_2O , monoclinic crystals from H_2O . Yield, 40%. Heated for 2 hrs. in a closed tube with concd. HCl, it was converted into *o*-aminophthalyl hydrazide. The latter on heating with concd. HCl for 30–40 hrs. at $145-50^\circ$ loses 1 mol. H_2N_2 salt, forming $1,2,3-H_2NC_6H_3CO_2H$, which is further converted into *m*- $H_2NC_6H_3CO_2H$ by loss of CO_2 .

D. BRREESE JONES.

Selenoaldehydes. L. VANINO AND A. SCHINNER. Munich. *J. prakt. Chem.* 91, 116–27 (1915).—Analogous to the formation of thioaldehydes by the action of H_2S on *O*-aldehydes, V. and S. have prepd. selenoaldehydes by means of H_2Se . *Selenoformaldehyde*, $HCHSe$, was obtained in 50% yield by passing H_2Se (prepd. by the action of H_2O on Al_2Se_3) into 36% $HCHO$ in 3 vols. concd. HCl. The soln. becomes turbid within 1 hr., and after standing 24 hrs. a white ppt. seps., which after filtering, washing with alc., and recrystg. from alc., forms difficultly sol. prisms m. 215° , and becomes green in sunlight. *Selenoacetaldehyde*, $MeCSeH$, was obtained by passing H_2Se into AcH in 3 vols. cold alc. satd. with HCl, and purified by dissolving in abs. alc. at 60° , and allowing to evap. slowly, needles, m. 139° . There was also formed a cryst. compound, m. $123-4^\circ$ from acetone, and m. 117° from $CHCl_3$. If the reaction is conducted in the absence of HCl, a viscous, oily product having an extremely disagreeable odor is formed, suggesting that, as in the case of $MeCSH$, different modifications of $MeCSeH$ are formed, depending on the conditions. *Selenobenzaldehyde* was obtained in 3 modifications: 21 g. BzH in 140 cc. abs. alc. treated with H_2Se turns yellow in a few min., then deep red, and finally yellow again with sepn. of a red flocculent ppt. After 2–3 hrs. a heavy red oil seps. whose analysis agrees with that of $PhCSeH$. From the yellow alc. soln. was obtained, in small yield, yellow prisms of the α -modification, $PhCSeH$, m. $83-4^\circ$, unstable toward light; β -modification, $(PhCSeH)_2 \cdot C_6H_6$, from H_2Se and BzH in abs. alc. satd. with HCl, golden needles from C_6H_6 , m. about 205° . Yield, 60%. By cong. the C_6H_6 filtrate from the β -deriv., and addition of much alc., the γ -modification, $PhCSeH$, seps. as fine, yellow needles, m. 166° . The β -deriv. yields, on heating at 310° with reduced Cu, stilbene in 55% yield, resembling in this respect $PhCSH$ (cf. H. Klinger, *Ber.* 9, 1895; 10, 1877 (1877)).

D. BRREESE JONES.

Mercury derivatives of aromatic amines. I. Contribution to the structure of primary and secondary *p*-aminophenylmercuric compounds. WALTER A. JACOBS

AND MICHAEL HEIDELBERGER. Rockefeller Inst. *J. Biol. Chem.* 20, 513-20(1915).—The monomol. structure of at least one mercuric aromatic amine was demonstrated by its reaction as a primary amine and of its Me deriv. as a secondary amine. *4-p-Dimethylaminobenzeneazophenylmercuric acetate*, from $p\text{-H}_2\text{NC}_6\text{H}_4\text{HgOAc}$ (A) and HNO_2 (this diazo soln. will be called (B)) and PhNMe_2 , brick-red crystals, m. 215° (uncor.), difficultly sol. except in HOAc , dyes silk bright yellow. *4-p-Diethylaminobenzeneazophenylmercuric acetate*, prepd. as the di-Me compd., orange-brown platelets, redden above 120° , m. $154.5\text{--}6^\circ$ (cor.). *4-p-Hydroxybenzeneazophenylmercuric acetate*, from (B) and PhOH , orange crystals, m. $218\text{--}9^\circ$ (cor.), dyes silk yellow in alk. soln. *4-o,p-Dihydroxybenzeneazophenylmercuric acetate*, from (B) and resorcinol, dark brown powder, darkens above 160° , decomp. $190\text{--}5^\circ$. *1-Amino-2-[p-naphthaleneazophenylmercuric acetate]-5-sulphonic acid*, from (B) and $\alpha,5\text{-C}_{10}\text{H}_6(\text{NH}_2)\text{SO}_3\text{H}$, brown-black, microcryst. powder, sol. in NaOH with deep maroon color, dyes silk orange. *4-o-Hydroxybenzylideneaminophenylmercuric acetate*, from (A) and $o\text{-HOC}_6\text{H}_4\text{CHO}$, deep yellow microcryst., darkens above 140° , m. about 185° (decompn.). *p-Methylnitrosoaminophenylmercuric acetate*, from $p\text{-MeNHC}_6\text{H}_4\text{HgOAc}$ and HNO_2 , m. $183\text{--}4^\circ$ (cor.). *3-Methyl-4-p-hydroxybenzeneazophenylmercuric acetate*, from $3,4\text{-Me}(\text{H}_2\text{N})\text{-C}_6\text{H}_3\text{HgOAc}$, HNO_2 and PhOH , m. $204.5\text{--}5.0^\circ$. I. GREENWALD.

The preparation and melting points of the higher aliphatic hydrocarbons. P. A. LEVENE, C. J. WEST AND J. VAN DER SCHEER. Rockefeller Inst. *J. Biol. Chem.* 20, 521-34(1915).—The normal aliphatic hydrocarbons with an even number of C atoms from C_{16} to C_{26} were prepd. Those from C_{16} to C_{22} were prepd. from the corresponding iodides by reduction with Zn and HCl ; the others from the iodides with $1/2$ the number of C atoms through the action of Mg in dry Et_2O . Hydrocarbons were also prepd. by reducing lignoceric, ceryl and melissyl alcs. Since the m. ps. differed from those of the normal hydrocarbons having the same number of C atoms, it is concluded that these hydrocarbons, and consequently the corresponding alcs. and acids, possess a branched C chain. The m. ps. were detd. in a H_2SO_4 bath with stirring arrangement, which was heated at the rate of 1° in 6 or 7 secs. for the last 15° . The consts. found for the normal compds. were: $\text{C}_{16}\text{H}_{34}\text{I}$, $b_{0.6}$ 152° ; $\text{C}_{18}\text{H}_{38}\text{I}$, $b_{1.0}$ 110° , m. 20° ; $\text{C}_{18}\text{H}_{37}\text{OH}$, $b_{1.6}$ 210° , m. 58.5° ; $\text{C}_{18}\text{H}_{37}\text{I}$, $b_{0.8}$ $169\text{--}70^\circ$, m. 34° ; $\text{C}_{18}\text{H}_{38}$, $b_{1.8}$ 177° , m. 28° ; $\text{C}_{19}\text{H}_{40}\text{CO}_2\text{H}$, m. 77° ; $\text{C}_{20}\text{H}_{42}\text{OH}$, $b_{0.3}$ 210° , m. $66\text{--}7^\circ$; $\text{C}_{20}\text{H}_{42}\text{I}$, $b_{0.5}$ 192° , m. 42° ; $\text{C}_{20}\text{H}_{40}$, $b_{0.6}$ 148° , m. 38° ; $\text{C}_{22}\text{H}_{46}\text{OH}$, m. $73\text{--}4^\circ$; $\text{C}_{22}\text{H}_{46}\text{I}$, m. 49° ; $\text{C}_{22}\text{H}_{46}$, m. 47° ; $\text{C}_{19}\text{H}_{39}\text{OH}$, $b_{0.8}$ 117° ; $\text{C}_{19}\text{H}_{39}\text{I}$, $b_{0.8}$ 117° ; $\text{C}_{22}\text{H}_{44}$, $b_{0.4}$ 199° , m. $59\text{--}60^\circ$; $\text{C}_{19}\text{H}_{39}\text{I}$, $b_{0.8}$ 128° ; $\text{C}_{22}\text{H}_{48}$, $b_{1.1}$ 224° , m. $64\text{--}5^\circ$; $\text{C}_{18}\text{H}_{32}\text{I}$, $b_{0.4}$ $138\text{--}9^\circ$; $\text{C}_{20}\text{H}_{42}$, $b_{1.0}$ 235° , m. $69\text{--}70^\circ$; $\text{C}_{22}\text{H}_{46}$, $b_{1.4}$ 245° , m. $74\text{--}5^\circ$; $\text{C}_{17}\text{H}_{36}\text{OH}$, m. 54° ; $\text{C}_{17}\text{H}_{36}\text{I}$, $b_{0.4}$ $158\text{--}9^\circ$; $\text{C}_{24}\text{H}_{50}$, $b_{1.0}$ 255° , m. $76\text{--}76.5^\circ$; $\text{C}_{24}\text{H}_{50}$, $b_{1.0}$ 265° , m. 78.5° . *Cerane*, from ceryl alc., is *isohexacosane*, $b_{0.7}$ 207° , m. 61° . *Mellisane*, from melissyl alc., is *isotriacontane*, $b_{0.3}$ 222° , m. $73\text{--}4^\circ$. The structure of lignoceric alc. and acid and the m. p. of tetracosane and isotetracosane have already been considered (*C. A.* 8, 3188). I. GREENWALD.

The quaternary salts of hexamethylenetetramine. I. Substituted benzyl halides and the hexamethylenetetramonium salts derived therefrom. WALTER A. JACOBS AND MICHAEL HEIDELBERGER. Rockefeller Inst. *J. Biol. Chem.* 20, 659-83(1915).—Substituted benzyl groups were in turn substituted in hexamethylenetetramine (a) for the purpose of prep. a new group of bactericides. The salts of these new derivs. of (a) were usually prepd. by boiling together in dry CHCl_3 (5-7 cc. per g. of (a)) equimol. amts. of the corresponding halides and of (a) until the sepn. of the products had reached a max. In some cases the mixt. was heated in a sealed tube at 100° for 30 min. This was then washed with CHCl_3 , then Me_2CO and dried over H_2SO_4 or CaCl_2 and paraffin. If pure materials were taken, the product was also pure. Recrystn. was usually impossible, as in H_2O or EtOH decompn. occurred and in other

solvents the preps. were not sufficiently sol. Yields were generally good. The m. p. was detd. by rapidly heating to within a few degrees, then more slowly. When H_2O solns. of these salts are warmed or allowed to stand, $HCHO$ is liberated and a product seps. as a colloidal suspension, as an emulsion of oil drops or as a cryst. ppt. These are sol. in acids and, so far as examd., consist chiefly of the methylene derivs. of the corresponding primary amines. The derivs. of (a) prepd. and the m. p. of the salt are given below. The salts, unless otherwise noted, are chlorides. Following these are the other new compds. prepd. in the course of the work and also new methods of prepg. and new const. for compds. already known. *o*-Methylbenzyl, 202-4°; *m*-methylbenzyl, 204-5°; *p*-methylbenzyl, turns yellow 186°, m. 198°; 3,5-dimethylbenzyl, 203-4°; *o*-xylene (dichloride), decomps. 162°; *m*-xylene (dichloride), m. 180-6°; mesityl (dichloride), decomps. 188-91°; β -naphthobenzyl, 190-5°; *o*-chlorobenzyl, m. 201-3° (decompn.); *p*-chlorobenzyl, m. 202-5° (decompn.); *o*-bromobenzyl, m. 183-6° (decompn.); *p*-bromobenzyl (impure?), m. 192° (decompn.); *p*-iodobenzyl (bromide), m. 181-2° (decompn.); *o*-cyanobenzyl, m. 183° (decompn.); *p*-cyanobenzyl, m. 193-3.5° (decompn.); *o*-nitrobenzyl, m. 178-9° (decompn.); *m*-nitrobenzyl, m. 199-202° (decompn.); *p*-nitrobenzyl, m. 173-4° (decompn.); 2,4-dinitrobenzyl, m. 178-9° (decompn.); *o*-acetylaminobenzyl, m. 180-2° (decompn.); *p*-acetylaminobenzyl, m. 175-7° (decompn.); 2-acetoxy-3,5-dimethylbenzyl, m. 158°; 2-hydroxy-3,5-dibromobenzyl, m. 173-4°; 2-acetoxy-3,5-dibromobenzyl, m. 151-3° (decompn.); 4-acetoxy-3,5-dibromobenzyl, m. 184-5°; 2-acetoxy-3,5-dimethyl-4,6-dibromobenzyl, m. 150-1°; 2-hydroxy-5-nitrobenzyl, m. 210° (decompn.); 3-nitro-4-acetoxybenzyl (iodide), m. 159° (decompn.); *o*-methoxybenzyl, m. 201-2° (decompn.); *p*-methoxybenzyl, m. 180-5° (decompn.); β -methoxy- α -naphthobenzyl, m. 185-6° (decompn.); 2-methoxy-5-nitrobenzyl, m. 191-5° (decompn.); 3-nitro-4-methoxybenzyl, m. 183-8°; *o*-ethoxybenzyl, m. 188-91° (decompn.); 3,4-methylenedioxybenzyl, m. 203-4°; 2,3-dimethoxybenzyl, m. 200-1° (decompn.); 3,4-dimethoxybenzyl, m. 187-8° (decompn.); 2-nitro-3,4-dimethoxybenzyl, m. 187-9° (decompn.); 3-methoxy-4-ethoxybenzyl, m. 178-81° (decompn.); 3-carboxy-4-hydroxybenzyl, m. 188-90° (decompn.); 3-carbomethoxy-4-hydroxybenzyl, m. 191-1.5° (decompn.); 2-hydroxy-3-carboxy-5-methylbenzyl, m. 179-81° (decompn.); 2-hydroxy-3-carbomethoxynaphthobenzyl, m. 195-8° (decompn.); 2-methoxy-5-carboxybenzyl, m. 204-5° (decompn.); 2-methoxy-5-carbomethoxybenzyl, m. 208-8.5° (decompn.); 3-aldehydo-4-hydroxybenzyl, m. 194° (decompn.); 2-hydroxy-3-methoxy-5-aldehydobenzyl, m. 163-4° (decompn.). *o*-Bromobenzyl chloride, from boiling o -BrC₆H₄Me and Cl, b₂₀ 124-6° (cor.); *p*-nitrobenzylpyridinium chloride, colorless, m. 204-7°; 3-nitro-4-hydroxybenzylpiperidine, from the benzyl chloride and piperidine (yield, 50%), m. 141-3°; 3-nitro-4-acetoxybenzylpiperidine hydrochloride, from above and AcCl, m. 178-9°; 3-amino-4-hydroxybenzylpiperidine dihydrochloride, from the NO₂ compd. and SnCl₄, decomps. about 180°; *o*-acetoxyesityl pseudochloride (2-acetoxy-3,5-dimethylbenzyl chloride), from the HO compd. and Ac₂O, m. 37.5-38° (cor.); 3-nitro-4-acetoxybenzyl chloride, from the HO compd. and Ac₂O, m. 59.5-60° (cor.); 3-nitro-4-acetoxybenzyl iodide, from the chloride and NaI, m. 65.5-68° (cor.); 3-nitro-6-acetoxybenzyl chloride, prepd. as the isomer, crystals with EtOH, softens 55°, m. 83° (cor.); β -methoxy- α -naphthobenzyl alcohol, from the amine and HNO₂, m. 100-1° (cor.); chloride, from the alc. and HCl; 2-methoxy-5-nitrobenzyl alcohol, from the aldehyde and NaOH, m. 124-5°; chloride, from the alc. and HCl, m. 50.5-1.0° (cor.); 3,4-O₂N(MeO)C₆H₂CH₂OH, from the aldehyde and NaOH, m. 59-60.5° (cor.); chloride, from the alc. and HCl, m. 86° (cor.); 2,3-(MeO)₂C₆H₂CH₂Cl, m. 69-70.5°; 2,4-dimethoxybenzyl alcohol, from the aldehyde and KOH, b₁₀ 177-9°; 2,3,4-O₂N(MeO)₂C₆H₂CH₂OH, from the aldehyde and KOH; chloride, from the alc. and HCl; 3,4-MeO(EtO)C₆H₂CH₂OH, from the aldehyde and KOH; chloride, b_{0.6-0.7} 127°, m. 42-42.5° (cor.); 2-hydroxy-3-carbo-

methoxynaphthobenzyl chloride, from $\alpha\text{-C}_{10}\text{H}_7\text{CO}_2\text{Me}$ (German Pat. 113,723, 1900-2), m. 164.5-6°. II. Monohaloacetylbenzylamines and their hexamethylenetetramonium salts. *Ibid* 685-94.—The chloroacetylaminos were prepd. by treating the amines with CH_2ClCOCl and KOH. These were then combined with (a). In some cases the Cl compds. failed to react, or the yield was poor. The I amine was then prepd. by treating with NaI. *Chloroacetylbenzylamine*, m. 93.5-4.5° (cor.); (a) derivative, m. 168-9°; *chloroacetyl-o-methylbenzylamine*, m. 107.5-8° (cor.); (a) compound, m. 152°; *p-acetylaminiodoacetylbenzylamine*, m. 205-6°; (a) compound, m. 165-6° (decompn.); *1-methyl-2-acetylaminochloroacetylbenzylamine*, m. 212.5-4°; *1-methyl-4-acetylaminochloroacetylbenzylamine*, m. incompletely 164-7°; resolidifies and m. 180-2°; (a) compound, m. 197-200°; *β -acetoxy- α -chloroacetylnaphthobenzylamine*, m. 169-70°; (a) compound, m. 175-6°; *β -acetoxy- α -iodoacetylnaphthobenzylamine*, m. 188-90° (cor.); (a) compound, m. 184-7° (decompn.); *2-acetoxy-5-nitrochloroacetylbenzylamine*, from the HO compd. and Ac_2O , m. 97.5-8° (cor.); *β -methoxy- α -chloroacetylnaphthobenzylamine* (a) compound, m. 112-20° (decompn.); *2-methoxy-5-nitrochloroacetylbenzylamine*, from the HO compd. and Me_2SO_4 , m. 120.5-1.5° (cor.); *1-acetyl-amino-4-ethoxy-chloroacetylbenzylamine* (a) compound, m. 169-70° (decompn.); *1,2-diacetoxychloroacetylbenzylamine*, from the di-HO compd. and Ac_2O , m. 86.5-7.5°; (a) compound, m. 174° (decompn.); *1,2-dimethoxychloroacetylbenzylamine*, from the di-HO compd. and Me_2SO_4 , m. 117-7.5° (cor.); (a) compound, m. 160-1° (decompn.); (a) compound of ethyl *m-chloroacetylaminomethylbenzoate*, m. 122-4°; ethyl *m-iodoacetylaminomethylbenzoate*, from the Cl compd. and NaI, m. 116-6.5° (cor.); *m-chloroacetylaminomethylbenzoyl chloride*, from the acid and PCl_5 , m. 78-9° (cor.); *diethylaminoethyl m-chloroacetylaminomethylbenzoate*, m. 69-70.5°; (a) compound, m. 125-30°; *chloroacetylaminomethylbenzamide*, m. 171-2.5° (cor.); (a) compound, m. 183° (decompn.). I. GREENWALD.

The Beckmann rearrangement. IV. Acyl derivatives of the substituted imido acids. MITSURU KUHARA AND KANOICHIRO SUITSU. *Mem. Coll. Sci. Kyoto Imp. Univ.* 1, 24-34 (1914); cf. *C. A.* 1, 2882; 5, 1278; 8, 2876.—In order to throw more light on the mechanism of the rearrangement, K. and S. have investigated several acyl derivs. of substituted NH-acids, e. g., PhC(OAc):NPh (a) may be considered, according to K. and S., as the intermediate compd. formed in the rearrangement of $\text{Ph}_2\text{C:NOH}$ to BzNHPh by the action of AcCl . *Phenylbensimidooacetate* (a) was prepd. by the action of AcOAg on PhCCl:NPh , in cold Et_2O . On evap. the Et_2O , after filtration from AgCl , a small amt. of BzNHPh first sepd., then some BzNACPh , and finally there remained a thick, yellow oil. This could not be obtained sufficiently pure for analysis on account of its instability, but was characterized as (a) by its chem. behavior. When treated in Et_2O with dry HCl , a yellow *hydrochloride* (b) was formed, which was soon decompd. by moisture into BzNHPh , PhNH_2 , and AcOH . (b) yielded BzNHPh at once, when heated in CHCl_3 at 60°. (a), however, showed no perceptible change even when heated for 2 hrs. at 160-170°. On hydrolysis (a) gave AcOH and BzNHPh . If PhCCl:NPh was treated with AcONa instead of AcOAg , none of (a) was formed, but entirely its isomer, BzNACPh . By the action of BzOAg on PhCCl:NPh a yellow oil, probably *phenylbensimidobenzoate*, PhC(OBz):NPh (c), and Bz_2NPh were obtained; the reaction thus took the same course as with AcOAg . Carefully purified PhCCl:NPh in Et_2O with AcSK gave entirely *phenylbensimidothioacetate*, PhC(SAc):NPh (d), amber-yellow monoclinic prisms from $\text{CHCl}_3\text{-Et}_2\text{O}$. When less carefully purified imido chloride was employed, (d) was mixed with varying quantities of its isomer *acetylphenylthiobenzamide*, PhCSNPhAc (e), deep orange-red needles, m. 78.5-9.5°. This isomer is probably formed under the influence of acid in the impure imido chloride for (d) may be readily converted into (e) by the action of POCl_3 , AcCl , BzCl or HCl . Both (d) and (e) on hydrolysis with dil. acids or alkalies are converted

into PhCSNHPH and AcOH . (*d*) was also obtained by treating the Na salt of PhCSNHPH , suspended in xylene, with AcCl , while (*e*) was formed when the Et_2O soln. of PhCSNHPH was treated with AcCl in the presence of K_2CO_3 . Both a yellow and red product resulted from the action of BzSK on PhCCl:NPh in petr. ether in the presence of anhydrous K_2CO_3 at ordinary temp. (1 month). The yellow product, assumed to be *phenylbenzimidothiobenzoate*, PhC(SBz):NPh , was not further described, but the red substance, *benzoylphenylthiobenamide*, PhCSNPhBz , was purified and analyzed; it m. $110-1^\circ$. V. The rearrangement of diphenyl ketoxime benzenesulfonyl ester and synthesis of phenylbenzimidobenzenesulfonate. MITSURA KUHARA, KAORU MATSUMIYA AND NAOHICO MATSUNAMI. *Ibid* 105-13.—*Diphenylketoximebenzenesulphonate*, $\text{Ph}_2\text{C:NO}_2\text{SPh}$ (*a*) is shown to undergo spontaneous mol. rearrangement into *phenylbenzimidobenzenesulphonate*, $\text{PhC(O}_2\text{SPh):NPh}$ (*b*), thus giving a possible explanation of the mechanism of the Beckmann rearrangement. $\text{Ph}_2\text{C:NONa}$, previously prepd. by Spiegler (*Ber.* 17, 812), was obtained in larger yield by treating $\text{Ph}_2\text{C:NOH}$ in Et_2O with Na. H was liberated with the production of a small amt. of Ph_2CHNH_2 , but the yield of Na salt was good. This salt, treated at ordinary temp. with PhSO_2Cl in abs. Et_2O , was converted into (*a*), which sepd. on evapn. of the Et_2O , in colorless crystals, m. 62° with some change, after recrystn. from Et_2O . By alc. KOH. (*a*) is hydrolyzed to $\text{Ph}_2\text{C:NOH}$ and PhSO_2K ; when heated above its m. p. rearrangement instantaneously takes place with explosive violence and hissing, with the formation of (*b*) as a thick yellow liquid. This change takes place slowly when (*a*) is allowed to stand in the solid state, in CHCl_3 soln., or on exposure to ultraviolet rays. Treated with H_2O , (*b*) decomp. into BzNHPh and PhSO_2H ; the same change takes place slowly when exposed to the air, but by the continued action of moisture further decompn. occurs with the formation of PhNH_2 , BzOH and PhSO_2H , the latter sepg. in needles as its PhNH_2 salt. The constitution of (*b*) was further proved by synthesis from PhCCl:NPh and PhSO_2Ag in petr. ether and the identity of this product with that obtained by the rearrangement of (*a*) proved by a comparison of the absorption spectra.

NORMAN A. SHEPARD.

The use of hydrochloric acid in the estimation of certain forms of organic nitrogen. W. A. DRUSHEL AND M. M. BRANDEGGER. *Yale Univ. Am. J. Sci.* 39, 398-404 (1915).—The N of aliphatic nitriles, amides, imides and CN-substituted esters may be quant. fixed as NH_4Cl by heating with an excess of HCl in sealed tubes for 2-3 hrs. at 200° ; 0.1-0.3 g. of the substance for analysis was introduced into a combustion tube, 2-5 cc. of HCl (d. 1.2) added and the tube sealed. After heating for 2-3 hrs. at 200° , the contents were evapd. on the H_2O bath and the last traces of HCl removed by heating the residue in the oven for 5 min. at 110° . Under these conditions the excess of HCl was completely removed and no measurable quantity of NH_4Cl was lost by volatilization. The N may then be estd. by titration with 0.1 N AgNO_3 , using $\text{K}_2\text{Cr}_2\text{O}_7$ as an indicator. The N values obtained agreed well with the theoretical amts. The N of glycocoll may be similarly estd., but a temp. of 200° must be maintained for 3-4 hrs.

NORMAN A. SHEPARD.

Mustard oils in cruciferae. J. J. BLANKSMA. *Pharm. Weekblad* 51, 1383-91 (1914); *Chem. Zentr.* 1915, I, 261-2.—The mustard oils in certain cruciferae have been isolated and identified by their reaction with PhNHNH_2 (cf. Busch, *C. A.* 4, 593). *Cochlearia officinalis*. The finely powdered plants were treated with H_2O and distd. with steam. 100 g. blossoms gave 62 mg. $\text{C}_4\text{H}_9\text{NCS}$; 100 g. leaves gave 9 mg.; 100 g. stems, 4 mg. and 100 g. of the whole plant, 30.5 mg. mustard oil. The distillate was *d*-rotatory and gave with alc. NH_3 *d*-sec.-butylthiourea, m. 137° ; with PhNHNH_2 in hot alc. is produced *d*-sec.-butylphenylthiosemicarbasine, $\text{PhNHNH.CS.NH.C}_4\text{H}_9$, crystals from benzine or dil. EtOH , m. 135° ; $[\alpha]_D^{20} = +20^\circ$ (in EtOH). With MePhN -

NH_2 is obtained *1-methylphenyl-4-d-sec.-butylthiosemicarbazine*, needles, m. 112° , $[\alpha]_D = +19.9^\circ$ (in EtOH). *Cochlearia danica*. The oil obtained by steam distn. consists chiefly of *d*-MeEtCHNCS; from 100 g. were obtained 6-7 mg. oil. *Cardamine pratensis*. The oil contains *d*-MeEtCHNCS. *Capsella bursa pastoris* gives no mustard oil, but a volatile compd. containing S; it gives with $\text{NH}_3\text{-AgNO}_3$ a black ppt.; on oxidation with HNO_3 , H_2SO_4 is produced; the content of fatty oil is 36.2% ($d_{44} 0.932$, $n_D^{16} 1.4798$, sapon. no. 190.4, acid no. 5.6, I no. 115; the fatty acid m. 26.4° ; mol. wt. of fatty acid 288). The seeds of *Tropaeolum majus* contain PhCH_2NCS ; with PhNHNH_2 this gives *1-phenyl-4-benzylthiosemicarbazine*, m. 158° , crystals. From the mother liquor of the alc. soln. was isolated a compd., m. 115° , which was apparently *4-NH_2NPhCSNHCH_2Ph* (cf. Dixon, *J. Chem. Soc.* 61, 1021). The distillates from *Lepidium campestre*, *Nasturtium amphybiun*, and *Draba verna* L. exert a strong retarding action on the growth of molds. The allyl mustard oil isolated from *Sinapis nigra* gives with PhNMeNH_2 *1-methylphenyl-4-allylthiosemicarbazine*, crystals from dil. EtOH, m. 90° . E. H.

The position of the organic chemical industry. WILLIAM H. PERKIN. *J. Chem. Soc.*, 107, 557-78(1915).—Presidential address before the British Chem. Soc. The address is with reference to the industry in Gt. Britain. E. J. C.

Synthesis of pentazole compounds. I. J. LIFSCHITZ. Univ. Zurich. *Ber.* 48, 410-20(1915).—Cyanotetrazole in 10 parts alc. cautiously warmed with 2 mols. $\text{N}_2\text{H}_4\text{-H}_2\text{O}$ until the violent boiling and evolution of NH_3 have ceased and the product has changed to a yellow cryst. mass quant. gives *pentazidoacetic hydrazidine* (a), $\text{N:N:N:NCH}_2\text{C}(\text{NH})\text{NHNH}_2$, light yellow threads insol. in all org. media, does

not m. 310° , deflagrates at higher temps. Boiled 6-8 hrs. in about 10 parts of 30-40% KOH it gives a light yellow K salt of *pentazidoacetic hydrazide*, $\text{N}_5\text{CH}_2\text{C}(\text{OH})\text{:NNH}_2$, obtained as a yellow ppt. by adding AcOH to the aq. soln. of the salt; it holds moisture tenaciously and drying at 110° seems to cause some decompn.; it suddenly decomp. without m. at a definite, quite high temp., gives CuO with boiling CuSO_4 ; with aq. BaCl_2 containing a little AcOH it gives a *barium salt*, $(\text{C}_2\text{H}_4\text{ON})_2\text{Ba}$, sepg. from H_2O in brown-yellow leaflets, exploding violently on heating. The K salt, treated with boiling KMnO_4 until the color persists for 1 min., freed of excess of KMnO_4 with alc., filtered, concd., cooled, acidified with HNO_3 treated with AgNO_3 , filtered, dissolved in boiling $\text{C}_6\text{H}_5\text{N}$ containing a little alc., cooled and covered with Et_2O , gives *silver pentazidoacetate*, $\text{C}_2\text{H}_5\text{O}_2\text{N}_5\text{Ag.EtOH}$, cryst. powder insol. in dil. acids, sol. in NH_3 . Small amts. of (a), suspended in a concd. soln. of a large excess of NaNO_2 and treated with concd. HCl, give a very moderate yield of *isonitrosopentazidoacetic hydrazide* (c), $\text{N}_5\text{C}(\text{:NOH})\text{CONHNH}_2$, crimson crystals from alc., detonates without m. on heating, also obtained from (a) with AmNO_2 in alc. and HCl and from (b) with HNO_3 , sol. in alc. and H_2O with crimson color and strong acid reaction, gives with aq. AgNO_3 a deep violet flocculent Ag salt and with boiling BaCl_2 a *triazolone barium salt*, $(\text{N}_5\text{C:N.NH.N:CO-})_2\text{Ba}$, orange cryst. powder, explodes violently on heating, re-

generating (c) with excess of acids. In dil. aq. alkali (c) dissolves with a red color which, however, quickly changes to yellow-green; alc. or aq. mineral acid solns. are also unstable, the former giving *isonitrosopentazidoacetic acid* (d), yellow leaflets with golden luster, reduces $\text{NH}_3\text{-AgNO}_3$ after a few min. boiling; a hot aq. suspension treated with HNO_3 and AgNO_3 gives a yellow flocculent ppt. (probably $\text{N}_5\text{C}(\text{:NOH})\text{CO}_2\text{Ag}$) which, on boiling under the soln., changes to a wine-red cryst. salt, $\text{N}_5\text{CH:NOAg}$ or $\text{N}_5\text{CO}_2\text{Ag}$, insol. in hot concd. NH_3 , explodes on heating, only slowly attacked by hot aq. KOH; on boiling, AgO is formed and the colorless filtrate with HNO_3 and AgNO_3 gives a white

flocculent ppt., apparently *silver pentasole*, AgN_3 . Alc. AgNO_3 likewise gives with (d) a yellow ppt. which, however, at once begins to turn brown. (d) dissolves in warm aq. KOH with dark yellow greenish color; on boiling a short time, acidifying with concd. HNO_3 and adding an excess of aq. AgNO_3 a voluminous flocculent salt, $\text{AgN}_3 \cdot \text{AgO}_2 \cdot \text{CCO}_2\text{H}$ is pptd. Apparently the KOH converts (d) into $\text{N}_3\text{COCO}_2\text{H}$ which is decompd. by the acid into N_3H and $(\text{CO}_2\text{H})_3$.

CHAS. A. ROUVILLER.

***o*-Aldehydehydophenylglycine. II. A new and rational indole synthesis.** W. GLUUD. Davy Faraday Lab., Roy. Inst., London. *Ber.* 48, 420-5 (1915); cf. *C. A.* 7, 3124.—It has now been found that *o*- $\text{OHCC}_6\text{H}_4\text{NHCH}_2\text{CO}_2\text{H}$ (a) can be obtained in good yield (about 9 g.) by boiling 15 g. of $\text{HON}:\text{CHC}_6\text{H}_4\text{NHCH}_2\text{CONH}_2$ (b) in 375 cc. H_2O for 3 hrs. with 75 g. NaHSO_3 , slowly adding 300 cc. of 5 *N* H_2SO_4 and boiling until the odor of SO_2 has almost disappeared, the (a) at once sepg. on cooling. It is also obtained in 9.7 g. yield from 12 g. $\text{HON}:\text{CHC}_6\text{H}_4\text{NHCH}_2\text{CO}_2\text{H}$ warmed on the H_2O bath with 200 cc. of cold satd. H_2SO_3 until just dissolved, treated with 100 cc. more H_2SO_3 , allowed to stand 3 hrs., filtered from the sepd. (a) (8 g.) and boiled to expel the SO_2 . Other oximes can be decompd. in the same way; *e. g.*, camphorquinone is obtained in 50% yield from 1 g. isonitrosocamphor allowed to stand loosely stoppered for 24 hrs. in 40 cc. cold satd. H_2SO_3 on the H_2O bath. From 10 g. freshly fused NaOAc , 20 cc. Ac_2O and 3 g. (a) warmed 1 min. on the H_2O bath, boiled 10 min. under a reflux condenser, cooled, treated with H_2O , then slowly with 100 cc. of 33% KOH and distd. with steam is obtained 1.5 g. indole. *o*-Aldehydehydophenylglycine phenylhydrazone, plates from MeOH, m. 217° (foaming). Calcium *o*-aldehydephenylamin oacetate, $\text{C}_{18}\text{H}_{16}\text{O}_4\text{N}_2\text{Ca} \cdot 3\text{H}_2\text{O}$, intensely yellow crystals. Copper salt, yellowish brown; cobalt salt, yellowish; mercury salt, yellowish to red-yellow; ferrous salt, light yellow; ferric salt, brownish; silver salt, intensely yellow but soon decolorizing; barium salt, intensely yellow. Acetyl-oxime, $\text{AcON}:\text{CHC}_6\text{H}_4\text{NHCH}_2\text{CO}_2\text{H}$, plates from H_2O , m. $149-50^\circ$ (foaming). III. A class of new derivatives of *o*-aldehydehydophenylglycine. *Ibid* 425-32.—When 2 g. (b) is warmed on the H_2O bath with 20 cc. of 40 vol.-% HCHO until just dissolved and at once poured upon ice there seps. 1.8 g. of anhydroformaldehydephenylglycinamide-*o*-aldoxime, $\text{CH}_2\text{CH}(\text{NO}) \cdot \text{C}_6\text{H}_4\text{NCH}_2\text{CONH}_2$, yellow plates or tables from alc., m.

$233-4^\circ$ (foaming), hydrolyzed by boiling *N* NaOH to the glycine-aldoxime, intensely yellow rectangular or quadratic plates or tables from alc., m. 210° (decompn.), sol. in cold NaHCO_3 . If H_2SO_3 is used instead of NaOH, the product of hydrolysis is (a). Anhydroacetaldehydephenylglycinamide-*o*-aldoxime, m. about 233° (0.2 g. yield from 0.5 g. (b)); glycine-aldoxime, in 0.9 g. yield from 2 g. (a) and 10 cc. AcH after 10 min., 4- or 6-sided tables from alc., m. about 190° (foaming), easily sol. in cold NaHCO_3 ; it is also obtained in 0.45 g. yield from 0.5 g. (a) and 6 cc. paraldehyde. Anhydropropionaldehydephenylglycine-*o*-aldoxime, in 0.6 g. yield from 1.5 g. (a) and 7 cc. EtCHO after 14 hrs., intensely yellow prisms, m. 175° (foaming). From 20 g. $(\text{CHO})_2 \cdot 2\text{NaHSO}_3$, H_2O boiled 10 min. with 150 cc. of *N* H_2SO_4 , then treated with 4 g. (b), boiled until almost all is dissolved, filtered hot and at once cooled with ice is obtained 3 g. of a condensation product, $\text{C}_{11}\text{H}_{11}\text{O}_2\text{N}_3$, intensely yellow 6-sided columns from H_2O , decolorizes about 205° , soon blackens completely and decomp. $218-25^\circ$, depending on the manner of heating, sol. in concd. H_2SO_4 . Anhydrobenzaldehydephenylglycine-*o*-aldoxime, in 2 g. yield from 1.5 g. (a) and 12 cc. BzH after 18 hrs., intensely yellow lancet-shaped crystals, m. $204-5^\circ$ (foaming), sol. in NaHCO_3 . Cinnamaldehyde compound, in 0.6 g. yield from 1 g. (a) and 6 cc. $\text{PhCH}:\text{CHCHO}$ after some hrs., yellow spears, m. $166-7^\circ$ (foaming). Furfural compound, in 2 g. yield from 1.5 g. (a) and 8 cc. furfural after 24 hrs., 4-sided plates from MeOH, m. $195-7^\circ$ (decompn.).

C. A. ROUVILLER.

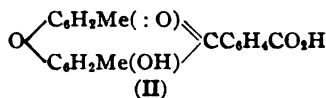
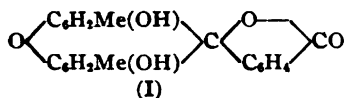
Note on the bromination of *o*-nitrotoluene and on *o*-nitrobenzylpyridinium chloride. WILHELM GLUUD. Davy Faraday Lab., London. *Ber.* 48, 432-5(1915).—In the presence of Fe as catalyst, a mol. of Br can easily be introduced into *o*-MeC₆H₄NO₂, a good yield being obtained of a mixt. of the isomeric MeBrC₆H₄NO₂, the chief constituent being 4,2-Br(O₂N)C₆H₃Me, probably mixed with the 6-Br compd. The former crysts. after several weeks from the middle fractions. With KMnO₄, the greater part of the mixt. remains unchanged, the KMnO₄ being used up at the expense of the Br(O₂N)C₆H₃CO₂H formed, but 2 cryst. derivs. were obtained from the small amt. of acids formed; *vis.*, 4,2-Br(O₂N)C₆H₃CO₂H, and a much more sol. acid, m. 178°, possibly 6-bromo-2-nitrobenzoic acid. MnO₂ in dil. H₂SO₄ also gives only a small amt. of the former acid; CrO₃ in concd. H₂SO₄ yields Br(O₂N)C₆H₃CHO which with alkali in acetone gives dibromindigo. From 137 g. *o*-O₂NC₆H₄Me, 200 g. Br and 20 g. Fe nails warmed 1-2 min. to incipient evolution of HBr, allowed to react 30-45 min., again warmed till the evolution of HBr is complete, shaken several times with H₂O, taken up in much petr. ether, washed with 2 *N* NaOH and H₂O, dried and distd. is obtained 155 g. b. 250-63°. Contrary to Lellmann and Pekrun, who describe *o*-nitrobenzylpyridinium chloride as wine-yellow and m. 76° (*Ann.* 259, 57), G. obtains the compd. from Kahlbaum's O₂NC₆H₄CH₂Cl as colorless crystals with 1 H₂O from alc.-Et₂O, m. 104-5° and (anhydrous) 203-4°. CHAS. A. ROUVIER.

The orcinolphthaleins, the orcinoltetrachlorophthaleins, and some of their derivatives. W. R. ORNDORFF AND E. R. ALLEN. Cornell Univ. *J. Am. Chem. Soc.* 37, 1201-58(1915).—Previous work on these compds. is reviewed at length. The present work was undertaken to det. the influence of introducing negative groups into phthalein mols., to observe to what extent these compds. and their derivs. exist in colored and colorless forms and whether they agree with our present theories of color, and to study the conditions affecting the formation of isomers and the methods of sepg. them. Pure anhydrous orcinol m. 107° (Hesse, *J. prakt. Chem.* [2] 57, 270, gives 100-1°). A number of expts. with concd. and fuming H₂SO₄, P₂O₅, HPO₃ and ZnCl₂ as condensing agents showed that as regards the crude yield and purity of the orcinolphthaleins, fuming H₂SO₄ gives the best results, then concd. acid and P₂O₅; the latter gives a relatively higher yield of the γ -phthalein (under the best conditions, 87 g. (=71.5%) crude product was obtained from 50 g. C₆H₄(CO)₂O, 87 g. orcinol and 90 g. P₂O₅ heated 2 hrs. at 180-90°; 50 g. of this product on purification yielded 5.7, 22.0, 14.0 and 1.5 g. of α -, β - and γ -phthaleins and tar, resp.). HPO₃ is nearly worthless; with ZnCl₂, the heating must be continued longer than 2 hrs. or carried to a temp. higher than 120°. When 20 g. C₆H₄(CO)₂O and 34 g. orcinol fused at 120° were treated with 18 cc. fuming H₂SO₄ (15% SO₃) the temp. rose to 200° but returned to 120° in 20 min.; it was kept at this point for 2 hrs., poured into H₂O, broken up, dissolved in alkali, pptd. with acid, filtered and dried. The crude product (47.5 g. =97.9%) gave 11.7, 25.0 and 6.0 g. of the α -, β - and γ -phthaleins, resp. To sep. the isomers, the cold alk. filtered soln. of the crude product is slowly poured into a large vol. of dil. mineral acid, the mixt. shaken with a large amt. of Et₂O, the Et₂O filtered, shaken with about 1/3 its vol. of *N* soda and the soda, which contains all but traces of the γ -, considerable β - and some α -compds., is shaken with fresh portions of Et₂O. The α - and β -compds. are sepd. by shaking the filtered Et₂O soln. with *N* soda; the soda soln. is shaken with a small portion of fresh Et₂O; the original Et₂O soln. is shaken with fresh soda and the 2nd soda soln. extd. with the same small portion of Et₂O used for the 2nd extn. of the 1st soda soln. The process is repeated until a fresh portion of the soda when shaken with the original Et₂O is only faintly colored and this color is at once removed when the soda soln. is shaken with the smaller portion of Et₂O. The α -compd. remains in the Et₂O, the β -compd. in the soda.

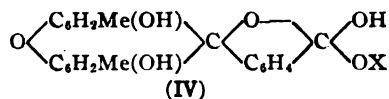
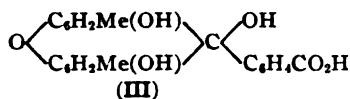
The soda ext. of the Et_2O soln. of the original crude product, containing the γ - and a little of the β -product, is acidified and the γ -compd. purified by Kehrman's HCl method (C. A. 7, 2555). The β -compd. is finally purified by K.'s alc. NH_3 method. The α -phthalein as obtained above is pptd. from alkalies by acids in pure white flocks and after crystn. from MeOH and glacial AcOH seps. from warm dil. EtOH or MeOH solns. on the addition of H_2O in nearly rectangular plates (from the alc. and AcOH it seps. with 1 mol. solvent). It dissolves easily in dil. alkalies with purplish red color, with difficulty in aq. NH_3 and only on warming in the alkali carbonates, these solns. being wine-red. Dry NH_3 and HCl do not attack it. In more concd. alkalies (50%) it is sol. with a pure blue color, and, when perfectly pure, in alc. NH_3 without color; on diln. with H_2O , the soln. becomes reddish violet and after a time the phthalein crystals out and the soln. becomes colorless. Boiled 1 hr. with 1 part NaOAc and 7 parts Ac_2O it gives a *diacetate*, prisms from alc. or AcOEt , shrinks above 230° , m. $246-7^\circ$; from C_6H_6 it seps. with 2.78% solvent of crystn.; it is insol. in alkalies. *Dibenzoate*, obtained by shaking with BzCl and dil. alkali until the mixt. is only slightly violet, needles from C_6H_6 or alc., m. 277° (Meyer, Ber. 29, 2627 (1896), gives 284°), insol. in alkalies, less easily hydrolyzed than the diacetate. The tetra-Br deriv. prepd. by M.'s method, when dissolved in boiling alkali (slightly stronger than N) loses some Br. Another prepn. (pale yellow microscopic prisms) when extd. with boiling C_6H_6 yielded a white product differing from M.'s tetra-Br compd. in that it dissolves with difficulty in cold aq. alkalies with pure blue color; on warming more dissolves and the color becomes intensely blue, fading on cooling but not becoming violet, and a white cryst. substance seps., presumably a salt of the carbinolcarboxylic acid. With dry NH_3 , the tetra-Br compd. forms a pale blue *diammonium salt*, $\text{C}_{22}\text{H}_{15}\text{O}_8\text{Br}_4(\text{NH}_3)_2$, quickly losing NH_3 in the air. *Tetrabromo- α -orcinolphthalein diacetate*, microscopic prisms from C_6H_6 , m. 297° (slight decompn.), insol. in alkalies. *α -Orcinolphthalein hydrochloride*, from the phthalein in alc. and dry HCl at 0° , dark red microscopic needles, losing its HCl and becoming colorless after 45 min. at 178° or on warming in H_2O ; it is also formed, without dissolving, when the phthalein is treated with fuming HCl but not with dry HCl gas. Colorless mono-K *α -orcinolphthaleincarbinolcarboxylate* (cf. Baeyer, C. A. 4, 2124), obtained from the phthalein in alc. slowly treated with 0.5 N alc. KOH , white cryst. powder, losing H_2O and alc. after 0.5 hr. at 120° in H and becoming markedly dark bluish wine-red; in the air it loses all the alc. and the resulting lavender compd. contains 1 H_2O ; the substance dried only 0.5 hr. is hygroscopic and again becomes nearly colorless on absorbing moisture; if the heating is continued 1.5 hrs. longer, the salt becomes slightly brownish and is no longer hygroscopic. The colorless salt dissolves with difficulty in H_2O with wine-red color; on boiling or long standing, the dil. soln. becomes colorless and the lactoid phthalein seps. When 5 g. of the phthalein in 50 cc. alc. is added to 5 g. K_2CO_3 in 250 cc. of boiling 50% alc. and allowed to stand 48 hrs. a *monopotassium salt*, $\text{C}_{22}\text{H}_{15}\text{O}_8\text{K} \cdot 2\text{H}_2\text{O}$, seps. in microscopic purplish red needles, partly sol. in H_2O with wine-red color; when dried, it shows no tendency to absorb moisture and becomes colorless. When boiled with a large amt. of H_2O , the wine-red soln. becomes colorless and the phthalein seps.; the colorless supernatant liquid contains free alkali, hence the decolorization is due to hydrolysis. This red salt is the one which Baeyer assumed to be the di-K salt. B.'s supposed tetra-K salt was obtained fairly pure by adding 5 g. phthalein in 100 cc. alc. to 75 cc. of 1:1 KOH dild. to 150 cc. with H_2O and heated to 85° , distg. off about 85 cc. and cooling; the blue crystals proved to be a *dipotassium salt* with 1 H_2O , sol. in H_2O with purplish red color; they are also obtained by pouring 2.5 g. of the pure phthalein diacetate in 900 cc. of hot alc. into 7.5 g. KOH in 100 cc. of boiling alc., boiling a short time, distg. off 0.5 of the alc. and allowing to stand overnight. On boiling in much H_2O , the salt behaves

like the 2 mono-K salts. The mother liquors from which it seps. yield the *tripotassium carbinolcarboxylate*, colorless needles with 8.56-8.83% H_2O , behaves like the other K salts in boiling H_2O . The β -phthalein is pptd. by H_2O from hot MeOH or EtOH in both colorless and colored needles, but from cold MeOH only in white needles containing 1 mol. MeOH or both MeOH and H_2O ; it attains const. wt. after 1 hr. at 120° without becoming colored, but after 0.5 hr. more at 185° it isomerizes into the yellow quinoid form, obtained in 6-sided plates by dissolving in boiling alc., adding an equal vol. of H_2O and continuing the boiling. The phthalein dissolves in NH_3 , alkalis and alkali carbonates with intense cherry-red color and in alc. NH_3 with red color changing to blood-red on addition of H_2O . Dry NH_3 does not act on the quinoid form but the dry lactoid form absorbs nearly 1 mol. of dry NH_3 gas, forming a colorless compd. which loses all of its NH_3 at 130° or after several weeks in the air, in the latter case forming the phthalein hydrate. The phthalein is pptd. from alk. solns. by AcOH in white, by mineral acids in yellow flocks, the color of the latter being due to the presence of a small amt. of a quinoid salt. The white ppt. with AcOH is the phthalein hydrate, which loses its H_2O at 150° and isomerizes into the yellow form at 185° . The pptd. hydrate probably contains a small amt. of AcOH; when boiled in aq. suspension, it slowly goes over into the yellow form, the solvent action of the small amt. of AcOH probably lowering the transition temp.; the change into the yellow form can also be effected by boiling the air-dried hydrate in C_6H_6 . The yellow ppt. obtained with mineral acids becomes colorless on standing or warming and consists of the lactoid phthalein and its hydrate. When boiled with glacial AcOH, the hydrate only partly dissolves, but both the part remaining undissolved and that sepg. from the hot soln. are found to consist of the quinoid phthalein, whereas the cold mother liquors on long standing deposit a white microcryst. compd., $\text{C}_{22}\text{H}_{16}\text{O}_5\cdot\text{AcOH}$, which gives the quinoid phthalein at 185° . β -Orcinolphthalein diacetate, needles from C_6H_6 , m. $226-7^\circ$. Dibenzoate, needles from C_6H_6 , m. $234-5^\circ$ (Meyer gives $244-5^\circ$). Tetrabromo- β -orcinolphthalein absorbs 3-4 mols. of dry NH_3 in 8 hrs., yielding an almost black, unstable salt. With $\text{Ac}_2\text{O}\cdot\text{NaOAc}$ is obtained the *diacetate*, $\text{C}_{22}\text{H}_{10}\text{O}_7\text{Br}_4\text{Ac}_2$, needles from AcOEt, m. $266-7^\circ$. β -Orcinolphthalein hydrochloride, bright red, microscopic, diamond-shaped plates, loses its HCl at 175° and becomes yellow. The purified γ -phthalein dissolves in alkalis with a clear yellow color and only faint fluorescence which is much increased by the addition of alc. Towards concd. alkalis it behaves like fluorescein; it dissolves in NH_3 and alkali carbonates and bicarbonates with evolution of CO_2 , in alc. NH_3 with red color and strong greenish fluorescence; the soln turns yellow and less fluorescent when dild. with H_2O . From the alcs. on addition of H_2O it seps. with 1 mol. of alc. (plates with EtOH, cubes with MeOH); these crystals become bright golden yellow when heated to const. wt. at 110° and then grayish white at 185° . Meyer's dark orange product from AcOH is obtained only with impure phthalein. Hydrate, from the phthalein in dil. soda and dil. AcOH, white flocks turning bright yellow when dehydrated at 70° or boiled with H_2O , giving rhomboidal plates in the latter case. Diacetate, needles from C_6H_6 , m. $206-7^\circ$. Dibenzoate, needles from C_6H_6 -alc., m. $284-5^\circ$ (slight carbonization). Tetra-Br deriv.; *diacetate*, rhomboidal plates from alc., turns pink above 240° , colorless above 270° , m. $282-3^\circ$. The phthalein absorbs 2 mols. dry NH_3 in 17 min., forming an unstable orange *diammonium salt*, while the tetra-Br compd. absorbs approx. 4 mols. in 3 hrs. and becomes dark red. The phthalein also combines with 1 mol. of dry HCl gas without much change in color. In the prepn. of the orcinoltetrachlorophthaleins from $\text{C}_6\text{Cl}_4(\text{CO}_2\text{H})_2$ and orcinol, ZnCl_2 at $160-70^\circ$ was found to be the best condensing agent (yield of crude product, 85%); this is dissolved in cold *N* alkali, pptd. with dil. mineral acid, extd. with a large vol. of Et_2O , the Et_2O shaken with $1/4$ its vol. of *N* soda, which removes the γ - and a small amt. of the β -phthalein; the

latter is removed by extg. with several portions of fresh Et_2O . From the Et_2O solns. the β -compd. is removed by several shakings with soda, the α -compd. by extg. with NaOH . α -Orcinol-tetrachlorophthalein after crystn. from AcOEt , MeOH and EtOH is still straw-colored and contains 1 mol. EtOH , dissolves in alks. with almost pure blue color, only slightly in aq. NH_3 and soda, in alc. NH_3 without color, the soln. turning blue on addition of H_2O and the colorless phthalein sepg. after several days. *Diacetate*, rhombs, m. 292° . β -Phthalein, becomes faintly pink at 150° , decomps. in hot alk. soln. with elimination of Cl and formation of a compd. sepg. on acidification in dark red flocks; the phthalein dissolves in alkalies with a smudgy red color and is pptd. by acids as the white *hydrate*; in alc. NH_3 it dissolves with a deep red color. *Diacetate*, m. 239° . γ -Phthalein, purified through the diacetate, seps. from $\text{MeOH-H}_2\text{O}$ in white flocks with $2\text{H}_2\text{O}$ or 1 MeOH ; its dil. alk. solns. are yellow with green fluorescence; the alc. NH_3 solns. are reddish yellow with greenish fluorescence. *Diacetate*, m. $252-3^\circ$, seps. from C_6H_6 in long flat needles. The absorption of the phthaleins in 4 mols. KOH (aq. in the case of the α -, alc. in that of the β - and γ -compds.) was detd.; the following are the wave lengths of the points of minimum transmission of the α -, β - and γ -compds., resp. Orcinol-phthaleins, 0.528, 0.536, 0.498; orcinol-tetrachlorophthaleins, 0.562, 0.554, 0.521; tetrabromo-orcinol-phthaleins, 0.572, 0.576, 0.529; γ -tetrabromo-orcinol-tetrachlorophthalein, 0.555. The transmission curves are reproduced. O. and A. conclude that the structures assigned by Meyer and by Baeyer to the isomeric orcinol-phthaleins are in accord with all the known facts. B.'s explanation of the changes of color undergone by the α -phthalein when treated with alkalies is untenable. O. and A. believe that the phthalein is a pseudo acid existing in tautomeric forms, (I)



colorless, stable, and (II), colored, labile. The violet color first observed on treatment with alkalies is due to the mono-K salt of (II); alc. destroys the color because it favors the conversion of the salt of (II) into the colorless mono-K salt of the carbinol acid (III); with more alkali, both of these salts give the blue di-K salt of (II), while with a large excess of alkali, the colorless tri-K salt of (III) is formed. Boiling H_2O hydrolyzes



all these salts to (II) which crysts. as the insol. (I). For the colored form of the β -phthalein, the p -quinoid structure is given the preference, because the α -phthalein exists only in the lactoid, the γ -compd. only in the quinoid form. Why the lactoid form of the β -phthalein absorbs NH_3 and the quinoid form does not (just the contrary of what would be expected from the resp. resemblance of the 2 forms to the α - and γ -phthaleins) it is not possible to say. The o -quinoid form assigned by Kehrmann to the γ -phthalein is probably erroneous in view of the resemblance of the compd. to fluorescein. The colorless hydrates, alcoholates and AcOH compds. are considered as derivs. of the lactoid form (IV) ($\text{X} = \text{H}, \text{Me}, \text{Et}, \text{OAc}$). The colored hydrochlorides are quinoid derivs., either oxonium (o - in the case of the α -, o - or p - in that of the β -, and p - in that of the γ -compd.) or carbonium. CHAS. A. ROUILLER.

o - and p -Chlorobenzoyl-lactic esters and some of their derivatives. LAMBERT THORP AND E. R. BRUNSKILL. *J. Am. Chem. Soc.* 37, 1258-64 (1915); cf. *C. A.* 7, 1492.—To 0.5 g. of a soln. of 20.7 g. Na in 320 cc. alc. is added 58.5 g. $\text{AcCH}_2\text{CO}_2\text{Et}$, cooled to 5° , slowly treated below 12° with 28.25 cc. of $o\text{-ClC}_6\text{H}_4\text{COCl}$, then after 0.5

hr. with 80 cc. more of the NaOEt soln. and 14.12 cc. of $\text{ClC}_6\text{H}_4\text{COCl}$ and the process repeated 3 more times, 0.5 of the remaining portion of the 2 reagents being used each time; after 24 hrs. in the cold there is obtained 123 g. of the white *sodium salt*, $\text{ClC}_6\text{H}_4\text{C(ONa):CacCO}_2\text{Et}$; 120 g. of this in 600 cc. H_2O is kept 2-3 hrs. at $40-50^\circ$ with 54 g. NH_4Cl and 60 cc. of concd. NH_3 and then extd. with Et_2O , giving 70 g. of *ethyl o-chlorobenzoyleacetate*, pale yellow viscous oil, $d_4^{25} > 1$, cannot be distd. even under 30 mm.; 54 g. boiled with 240 cc. H_2O and 60 cc. of concd. H_2SO_4 until the evolution of CO_2 ceases (10-2 hrs.), extd. with Et_2O , shaken with 10% KOH , washed with H_2O and dried, gives 80% of *o-chloroacetophenone*, b_m 227-8°, n_D^{25} 1.685, d_4^{25} 1.1884; *oxime*, silky needles from 50% alc., m. 103° . From 10 g. of the ketone slowly added to 100 g. HNO_3 (d. 1.52) below 5° , allowed to stand 3 hrs. in a freezing mixt. and poured upon 500 cc. of ice H_2O is obtained 85% of *2-chloro-5-nitroacetophenone*, prisms from alc., m. 62° . *Ethyl p-chlorobenzoyleacetate*, obtained like the *o*-compd. except that the $\text{ClC}_6\text{H}_4\text{COCl}$ was used in Et_2O soln. (the *sodium salt* is yellow), prisms from dil. alc., m. 38° , gives with 2 mols. of 10% KOH at room temp. the white *potassium salt*, crystals from alc., m. 265° (decompn.), while 3.5 g. allowed to stand 3 days with 2.4 g. KOH in 50 cc. H_2O , filtered, extd. with Et_2O to remove traces of ester and of ketone and acidified, gives *p-chlorobenzoyleacetic acid*, crystals from Et_2O -ligiro, decomp. into the ketone when heated slowly but m. 232° when heated quickly; 20 g. added to 2.05 g. Na in 35 cc. alc., cooled, treated slowly with 17.6 g. BzCH_2Br , warmed 15 min. on the H_2O bath, dild. with H_2O and extd. with Et_2O , gives 50% of *ethyl phenacyl-p-chlorobenzoyleacetate*, $\text{ClC}_6\text{H}_4\text{COCH(CH}_2\text{Bz)CO}_2\text{Et}$, prisms from dil. alc., m. 63° ; 35 g. boiled 2 hrs. with 13.6 g. KOH in 300 cc. H_2O and 100 cc. alc. gave a poor yield of *4-chlorodiphenacyl (a)*, pearly leaflets from alc., m. 114.5° . *Ethyl p-chlorophenacylbenzoyleacetate*, obtained in 75% yield from $\text{ClC}_6\text{H}_4\text{COCH}_2\text{Br}$, NaOEt and $\text{BzCH}_2\text{CO}_2\text{Et}$ after 0.5 hr. on the H_2O bath, needles from alc., m. 92° , yields 50% of (a) with alc. KOH . C. A. R.

A comparison of the optical rotatory powers of the alpha and beta forms of certain acetylated derivatives of glucose. C. S. HUDSON AND J. K. DALE. *J. Am. Chem. Soc.* 37, 1264-70(1915).—According to H.'s views (*C. A.* 3, 882) if the mol. rotations of α - and β -glucose penta-acetates are represented by $(A + B)$ and $(-A + B)$, A being the rotation due to the end asym. C atom and B that due to the rest of the mol., then $(A' + B)$ and $(-A' + B)$ will represent the rotations of α - and β -tetra-acetyl-methylglucosides, and the sum of the rotations of the 2 penta-acetates should equal that of the 2 methylglucosides. Schliephacke found that this was not the case in C_6H_6 (*C. A.* 5, 467), but the α -methylglucoside forms a cryst. compd. with C_6H_6 and has a greater sp. rotation (173°) in this solvent than in alc. (137°) (van Charante, *Rec. trav. chim.* 21, 42 (1902)) while the β -form has nearly identical rotations in the 2 solvents. The rotations of the 4 compds. were accordingly detd. in various solvents with the following resp. results (av. mol. rotations at 20° for Na light): C_6H_6 , 37,800, 1,100, 63,530, -8,290; CHCl_3 , 39,600, 1,500, 47,300, -6,600; 99.5% AcOH , 42,400, 1,600, 48,500, -7,100; 50% AcOH , 42,200, 1,200, 45,800, -8,130; MeOH , 40,800, 1,900, 49,200, -7,890; EtOH , 39,400, 740, 49,500, -8,910 (Tanret's value for the α -penta-acetate in C_6H_6 (*Bull. soc. chim.* [3] 13, 261 (1895)) is probably too high). In MeOH , EtOH and CHCl_3 , therefore, the sums of the rotations of the 2 pairs of isomers agree quite well. The difference between the mol. rotations of the α - and β -glucose penta-acetates ($2A$) in CHCl_3 is 38,100 while for the 2 cellose octa-acetates (Schliemann, *C. A.* 5, 1276) it is 33,200; this divergence from the theory suggests that the octa-acetates have not yet been obtained in a pure or fully sepd. condition. A repetition of the work of Behrend and Roth (*Ann.* 213, 369 (1904)) furnished an even more nearly quant. proof than their own of the correlation of α - and β -glucoses with the α - and β -penta-acetates; from 50 g. Ac_2O , 67 g. com. pyridine bases and 10 g. α -glucose kept

24 hrs. at 0° was obtained 19.8 g. penta-acetate with a sp. rotation of 94° in CHCl₃ while under the same conditions the β -compd. yields 20.5 g. penta-acetate with a rotation of 5.8°. ZnCl₂ can be used instead of C₂H₅N; to 4 g. ZnCl₂ in 40 cc. Ac₂O at 0°, 10 g. α -glucose is slowly added and the mixt. kept at this temp. 5 hrs. with occasional shaking; 2.85 g. sugar remains undissolved and the filtrate, on dropping into H₂O, soon deposits 7.15 g. penta-acetate with a rotation of 92° in C₆H₆; the mother liquors are extd. with CHCl₃, the CHCl₃ evapd. nearly to dryness and the residue poured into H₂O; 3.64 g. more acetate, with a rotation of 82°, is obtained; extn. of these 2nd mother liquors with CHCl₃ yields 2.26 g. of a very viscous syrup. If the time of reaction is increased to 45 hrs., only 0.33 g. glucose remains undissolved and there are obtained 15.20 and 3.03 g. of penta-acetates with rotations of 78° and 59°, resp., and 1.30 g. of syrup; during this long reaction period, some of the α - has evidently been converted into the β -acetate. As a rule, when the acetylation mixt. is constantly stirred for 8 hrs., 10 g. glucose will give 13 g. acetate with a rotation of 83°, from which the pure α -acetate can be readily prepd. by crystn. from alc. From 10 g. β -glucose under the same conditions are obtained, after 5 hrs., 2.73 g. undissolved sugar, 10.75 and 2.22 g. of acetate with rotations of 8.7° and 18°, and 1.06 g. syrup; after 24 hrs., 0.43 g. glucose, 15.10 and 3.43 g. acetate with rotations of 14° and 43°, and 1.20 g. syrup; after 8 hrs., 17 g. of acetate with a rotation of 17°. The pure α -penta-acetate m. 112-3°; the β -compd., 132°; α -tetra-acetylmethylglucoside m. 100-1°; the β -compd. m. 104-5° (all cor.).

CHAS. A. ROUVILLER.

Color and constitution (BALY) 2. The boiling points and critical temperatures of homologous compounds (FERGUSON) 2. The dielectric constant of some organic solvents at their melting or boiling points (CAUWOOD) 2. Apparatus for chlorination (MILLER) 1. Heats of formation of acrolein and metacrolein (VOISENET) 2. Electrolysis of salts of aromatic carboxylic acids (SCHALL) 4.

II. BIOLOGICAL CHEMISTRY.

WILLIAM J. GIES, PAUL E. HOWE, EDGAR G. MILLER, JR.

A. GENERAL.

FRANK P. UNDERHILL.

Oxaluria. E. PINCUSOHN. *Deut. med. Wochschr.* 41, 132-4(1915).—Dogs kept in N equil. received purines *per os*. The oxalic acid of the urine was slightly increased. After injection of eosin and exposure to intense illumination, the oxalic acid was increased without addition of purines to the diet; on addition of purines the increase was much more marked. On feeding xanthine under these conditions the oxalic acid was increased. Guanine *per os* did not lead to an increase of oxalic acid, but it seems that it was not resorbed. Uric acid *per os* with or without illumination did not give a definite result. Uric acid given intravenously increased the oxalic acid excretion without sensitization and illumination. Nucleic acid given subcutaneously did not give an increased oxalic acid excretion within the period of illumination, but did so during the following days.

S. AMBERG.

The influence of the hydrogen ion concentration upon the optimum temperature of a ferment. A. COMPTON. *Proc. Roy. Soc. London (B)* 88, 408-17(1915); cf. C. A. 8, 935; 9, 327.—Expts. on maltase show that the optimum temp. is dependent on the H⁺ conc. of the medium. Thus by increasing the H ion conc. from 10^{-7.3} to 10⁻⁵ it is possible to change the optimum temp. of the enzyme from +47° to +35.5°. Hence it is very important in stating the optimum temp. of an enzyme to state at the same time the H⁺ conc. of the medium serving to det. it.

A. T. CAMERON.

The organic phosphoric acid of wheat bran. IV. The occurrence of inositol triphosphate in wheat bran. R. J. ANDERSON. *J. Biol. Chem.* 20, 463-73(1915).—Pure wheat bran was extd. with 0.2% HCl and the ext. pptd. with Ba(OH)₂. After 6 pptns. from HCl soln. with Ba(OH)₂ and the same number of pptns. with EtOH, the substance was dried. Upon extn. with H₂O, a little over half went into soln. The insol. material was freed of Ba with H₂SO₄ and the filtrate pptd. with Cu(OAc)₂. The ppt. was filtered, washed and decompd. with H₂S. Upon addition of strychnine and concg., needle-shaped crystals sepd. These soften at 200° but do not melt completely at a much higher temp. The strychnine was pptd. from the soln. of this salt by NH₄OH and the residual strychnine extd. with CHCl₃. The Ba salt was then pptd. in the usual manner. Comp. apparently is C₆H₇O₁₈P₃Ba₃. This was dissolved in 1% HCl and pptd. with EtOH. Comp. of ppt. apparently is C₁₈H₂₄O₄₈P₃Ba₃. From this, by treatment with H₂SO₄, Cu(OAc)₂ and H₂S, was obtained the free *inositol triphosphate*, C₆H₁₅O₁₈P₃, a colorless syrup, sol. in H₂O and EtOH. It does not ppt. with NH₄ molybdate nor with AgNO₃ (unless neutralized with NH₄OH), and ppts. with egg albumen only very slowly.

I. GREENWALD.

The hydrolysis of phytin by the enzyme phytase contained in wheat bran. R. J. ANDERSON. *J. Biol. Chem.* 20, 475-81(1915).—The chief products of the hydrolysis of phytin by the phytase in wheat bran are inorganic phosphoric acid and certain intermediate compds. These are apparently identical with the inositol tri-, di-, and monophosphates isolated from exts. of wheat bran. (Cf. C. A. 8, 3310 and preceding abstr.) Since the soln. contained free inositol and no unchanged phytin, it is evident that a part of the phytin was completely hydrolyzed and that all was at least partially hydrolyzed.

I. GREENWALD.

The hydrolysis of the organic phosphorus compound of wheat bran by the enzyme phytase. R. J. ANDERSON. *J. Biol. Chem.* 20, 383-91(1915).—The max. activity of the phytase of wheat bran occurs in the presence of 0.1% HCl or of 0.2% HOAc. With increasing conc. of HCl, the activity rapidly diminishes and with 0.5% HCl there is practically no hydrolysis. The enzyme is destroyed by boiling H₂O or by short exposure to 0.5% HCl or to 0.25% NH₃. About 11% of the total sol. P of wheat bran is inorganic.

I. GREENWALD.

Phytin in wheat bran. R. J. ANDERSON. *J. Biol. Chem.* 20, 494-500(1915).—Using 1% HCl as the extg. fluid, A. succeeded in preparing from wheat bran cryst. Ba salts of the comp. C₆H₁₂O₂₄P₃Ba₃·8H₂O and (C₆H₁₁O₂₄P₃)₂Ba₇·14H₂O, identical with the tribarium and heptabarium phytates obtained from oats, corn, cottonseed meal and commercial phytin.

I. GREENWALD.

The auxo-lipase of serum. KWANJI TSUJI. King's College, London. *Biochem. J.* 9, 53-65(1915).—T. gives the name "auxo-lipase" to the substance in the serum which accelerates the fat-splitting power of pancreatic exts. The "auxo-lipase" not only accelerates the action of active lipase but also activates inactive lipase, and this to a greater degree than the coenzyme itself. It is quite stable, and is not destroyed at 60-100°. Boiling, or addition of alc. or colloidal Fe, ppts. the substance with the proteins. Dialysis alters its activity but slightly, thereby suggesting its colloidal nature. Unlike the inorg. constit. of the coenzyme of lipase, those of the serum not only fail to produce an accelerating effect but even inhibit lipoclastic activity, thus furnishing evidence against the identity of auxo-lipase and coenzyme. The fact that auxo-lipase is resistive to heat does not lend support to Mellanby and Woolley's theory (C. A. 8, 3584) that the increase of lipoclastic power on the addition of serum to pancreas exts. is due to the protection of the lipase from the action of trypsin by the antitrypsin contained in the serum.

B. HOROWITZ.

The specificity of caseinogens. A comparative study of the caseinogens of the cow and the sheep. H. W. DUDLEY AND H. E. WOODMAN. Leeds. *Biochem. J.* 9, 97-102(1915).—Evidence is produced in favor of the specificity of caseinogens by a study of the amino acids obtained from "racemized" caseinogen. If caseinogen is dissolved in dil. alkali and the soln. allowed to stand at 37° for about three weeks the value of the optical rotation falls practically to a const. The protein is then said to be "racemized," and the amino acids obtained on hydrolysis are either inactive, partially active, or fully active. Tyrosine obtained from "racemized" cow caseinogen is inactive, but that from "racemized" sheep caseinogen is active. Also, lysine from the protein of the cow is inactive, while that from the protein of sheep shows $\frac{2}{3}$ of its activity. According to Dakin (*C. A.* 7, 489) amino acids whose carboxyl groups are free and which therefore may occupy terminal positions at the ends of peptide chains, are incapable of racemization, while those whose carboxyl groups are united in actual peptide linkages, and are therefore probably situated within the chains, may undergo racemization. The optical activity or inactivity of the amino acids among the hydrolytic products of a "racemized" protein will therefore give some clue to the original position of these acids in the protein molecule.

B. HOROWITZ.

Colloidal swelling of wheat gluten. FRED W. UPSON AND J. W. CALVIN. *J. Am. Chem. Soc.* 37, 1295-304(1915).—The gluten was prepd. by washing the starch from flour with distd. H_2O , pressing between glass plates and cutting out disks; these were weighed to a cg., placed 2 hrs. in the soln. under investigation, drained on a Buchner funnel and weighed again. Solns. of lactic acid, AcOH and HCl, varying from 0 to 0.5 *N*, were used. The amts. of H_2O absorbed with increasing concn. of the acid are plotted in the form of curves. The absorption increases at first very rapidly, the max. being obtained at 0.01-0.02, 0.04 and 0.005 *N* concns. of the 3 acids, resp., then falls with further increase in the acid concn., quite rapidly in the case of HCl, more slowly in that of lactic acid and still more with AcOH. In 0.2 and 0.5 *N* HCl, moist gluten loses H_2O . Addition of salts (K tartrate, K_2HPO_4 , KCl, $CaCl_2$, $NH_4CH_2CO_2H$) to the lactic acid solns. greatly reduces the swelling, the decrease in H_2O absorption increasing with the concn. of the salt; in the more concd. phosphate and tartrate (0.02-0.04 molar) the gluten disks lose wt. For 0.02 molar concns. of the salts in 0.01 *N* lactic acid, the order of the salts as regards their effect in diminishing absorption is: chloride, tartrate, phosphate. The H_2O absorption is reversible; disks which in 0.002-0.5 *N* AcOH have absorbed H_2O not only reassume their original wt., but also their original appearance and physical properties (toughness, elasticity) in 0.1 *N* K_2HPO_4 . Rise in temp. increases the swelling in acids, the wts. of H_2O absorbed per g. moist gluten in H_2O , 0.01 *N* HCl, lactic acid and AcOH being 0.06, 1.47, 1.65 and 1.68 g. at 24° and 0.09, 2.01, 2.66 and 2.79 g. at 39°. H_2O exts. of flour and bran reduce the swelling of gluten in acids but not so markedly as neutral salts. Nonelectrolytes (cane sugar) have comparatively no effect except in high concns.

CHAS. A. ROUILLER.

Action of erepsin. FRANK E. RICE. *J. Am. Chem. Soc.* 37, 1319-33(1915).—Witte peptone was used as substrate, its hydrolysis being detd. by detg. the free amino N. The material contg. erepsin was prepd. by the Cohnheim method. The amt. of amino N split off from the peptone mol. by erepsin varies considerably with the initial concn. of the peptone soln. There seems to be no definite optimum degree of alkalinity for ereptic action, the addition of 1.7 to 4 cc. of 0.2 *N* NaOH per 60 cc. of digesting fluid accelerating the digestive action to about the same extent; more or less than these amts. of alkali diminish the activity; in R.'s expts. 2 cc. were used, this concn. of alkali producing no hydrolysis of the peptone. For about 10 hrs., the digestive action of erepsin is nearly proportional to the time, but after this there is less and less hydrolysis per unit of time. In studying digestions with varying amts. of erepsin,

enough concd. peptone soln. to contain 21 mg. of amino N, 2 cc. of 0.2 *N* NaOH, H₂O to 60 cc. and 8 drops toluene were digested 10 hrs. at 38°. The results obtained with erepsin from dog, horse, rabbit and cat intestines gave fairly const. values for $N/E^{3/4}$, where *N* is the amt. of amino N produced by *E*, the amt. of erepsin, provided there is no greater enzyme activity than would liberate more than 30 mg. of amino N under the given conditions. The value of the above ratio $\times 100$ (*N* and *E* expressed in mg.) is designated as the *ereptic power* of erepsin prepsns. Attempts to purify the erepsin prepsns. in various ways are described. Other things being equal, the longer the time of contact of the macerated mucous coat with the solvent, the more powerful are the erepsin solns. obtained; as a rule, however, very little is gained by prolonging the extn. more than 10 days. In very weakly alk. soln. (0.25 cc. of 0.2 *N* NaOH in 50 cc.) erepsin attacks conc. fibrin or fresh blood fibrin quite vigorously, but not when 1.5 cc. of NaOH is used. The action of erepsin on gelatin is very great. If the autolysis of the mucous coat of the small intestine can be measured by the amt. of amino N produced it takes place to the greatest extent in alk. soln. and where it takes place more actively more powerful erepsin prepsns. can be obtained. Erepsin prepsns. were generally preserved in 2 ways; the residue obtained from the pptn. of (NH₄)₂SO₄ is kept over H₂SO₄ in a desiccator, or a dialyzed neutral aq. soln. is kept at 10–5°; H₂O is better than dil. alc. When not enough preservative is present, there is very marked bacterial decompn., accompanied by the appearance of a tryptic enzyme.

CHAS. A. ROUILLER.

Digestive power of "pure pepsin." P. v. GRÜTZNER AND K. ZELLER. Tübingen. *Arch. ges. Physiol.* 161, 1–4 (1915); cf. *C. A.* 6, 2492.—A comparison of the digestive activity of pure pepsin (Pekelharing) and the extract of the pig stomach shows that the pepsin is from 20 to 30 times as active as the extract, as opposed to the earlier observations that the ext. was more active. The exts. of the stomachs of rabbits and cats are less active.

C. J. WEST.

Physiological activity of combined hydrochloric acid. J. H. LONG. *J. Am. Chem. Soc.* 37, 1333–47 (1915).—The digestive activity of HCl combined with certain NH₂ acids on the one hand and with complex proteins on the other was compared, digestion being measured by filtration and detn. of the sol. N in the filtrate, deducting, of course, the N furnished by the NH₂ acid and the pepsin. In this way, it was found that mixts. containing the coagulum from 1.5 g. egg albumen (1.06 g. protein), 15 mg. pepsin and amts. of betaine hydrochloride corresponding to 25, 50, 75, 100, 125 and 150 mg. HCl, made up to 60 cc. and digested 4 hrs. at 40°, gave amts. of sol. N corresponding to 0.3381, 0.3838, 0.7762, 0.9313, 0.9256, 0.9400 g., resp., of protein, while the values obtained with equiv. amts. of free HCl instead of the betaine salt were: —, 0.6125, 0.8887, 0.8812, 0.9538, 1.0112. The digestions with the free acid began somewhat earlier. The values obtained with fibrin (1.06 g. protein) and the betaine salt were: 0.2287, 0.8150, 0.9600, 0.9281, 0.9468, 0.9906. The salt evidently dissociates largely and that some of the HCl set free at once combines with the protein is indicated by the fact that when the coagulum from 1.5 g. egg powder is shaken 2 hrs. with 30 cc. of the salt soln. equiv. to 150 mg. HCl, filtered and washed with 30 cc. of H₂O, the filtrate requires 22.6 cc. of 0.1 *N* NaOH for neutralization with Me orange while the original salt soln. required 40.8 cc. The actual H ion concns. in betaine salt solns. of the above strength were found by potential measurements at 20° to be: 0.0085, 0.0135, 0.0176, 0.0220, 0.0256, 0.0292, while on the assumption that all the HCl was split off and completely dissociated the values would have been: 0.0114, 0.0228, 0.0343, 0.0456, 0.0571, 0.0686. Solns. (60 cc.) of the salt corresponding to 50 and 150 mg. HCl, allowed to stand 2 hrs. with frequent shaking with the coagulum from 1.5 g. egg and filtered, showed H ion concns. of 0.0055 and 0.0179, resp. Similar expts. with glutaminic acid hydrochloride gave 0.0625, 0.3254, 0.5769, —, 0.8051, 0.8244 g. for the amts.

d protein digested, and 0.0060, 0.0097, 0.0123, 0.0140, 0.0154, 0.0164, for the H ion concns. of salt solns. of the same strength; the lower H ion concns., as compared with those of the betaine salt solns., undoubtedly account for the lower digesting activity. An acid albumin prepd. by adding HCl to egg albumen, evapg. to dryness at a low temp. and adding more albumen powder to make the HCl content 5%, was found to be strongly acid in taste and only partly sol. in H_2O ; it contains 12.25% N, but when shaken with 50 parts H_2O and incubated 6 hrs. at 40° only about $\frac{1}{12}$ of the N is dissolved, and when 10 g. is shaken with 250 cc. H_2O and allowed to settle overnight and the filtrate is titrated, 100 mg. HCl is found with Me orange and 155 mg. with phenolph., showing that while some of the HCl dissolves in combination with the protein, about 20% of the original acid is present as free HCl. The H ion concn. of this filtrate is 0.00726, and when the treatment with 250 cc. H_2O is repeated 3 times, the H ion concns. of the successive solns. are 0.00517, 0.00483, 0.00352. In the presence of 50 mg. pepsin, about 60% of 2 g. of the above powder in 100 cc. H_2O digests in 6 hrs. at 40° but if increasing amts. of fibrin or egg albumen are added the digested fraction progressively diminishes, undoubtedly owing to the binding of the HCl. A series of expts. was carried out in which varying amts. of freshly coagulated egg albumen were digested in $N/15$ HCl, filtered and the filtrates titrated with Me orange, phenolph., HCHO and $AgNO_3$; H ion concns. were also detd. L. finds that in mixts. of protein and HCl the rate of digestion is slow when P_H is as low as 2.96 (e. g., when the wt. of the HCl is about 3.5% that of the egg albumen and 150 cc. of $N/15$ HCl is the liquid vol.) whereas when the wt. of the acid in 150 cc. of $N/15$ HCl is 10% that of the albumen ($P_H = 1.69$) digestion is very rapid. Dry preps. of protein and HCl about midway between these limits cease to be physiologically active.

CHAS. A. ROULLIER.

B. METHODS AND APPARATUS.

STANLEY R. BÉNÉDICT.

The Sames procedure for the preparation of serums low in albumin. W. NEBEL. *Sonderabdr. Med. Klinik* 1913, No. 23; *Chem. Zig.* 38, Rept. 3(1914).—Fresh serums or serums freed from preservatives are dild., Na_2CO_3 and $(NH_4)_2CO_3$ added, and the mass heated to $50-60^\circ$. The subsequent addition of Al acetate with simultaneous acidification produces a ppt., sepg. about 50% of the albumin from the serum. J. S. G.

A method for the decomposition of the proteins of the thyroid, with a description of certain constituents. E. C. KENDALL. Rochester, Minn. *J. Biol. Chem.* 20, 501-9(1915).—Fat-free, desiccated thyroid is added to 90% EtOH containing 1% NaOH in the proportion of 2.5 g. thyroid to 100 cc. EtOH. The EtOH is boiled, with reflux, for 48 hrs. About 8% of the total N is given off as NH_3 . The hot EtOH soln. is filtered. The residue contains about 9% of the total N, 80% of the P and 7% of the I. H_2O is added to the soln. until the concn. of the EtOH is 75% and the NaOH is neutralized with H_2SO_4 . The soln. is cooled until the Na_2SO_4 seps. and is then filtered. The EtOH is distd. off. The NaOH may also be neutralized with CO_2 ; the EtOH is then distd. off directly. After all the EtOH has been evapg., the soln. is dild. to 100 cc. for each 20-25 g. of thyroid used and 20% H_2SO_4 added to complete pptn. After standing in the cold for several hrs., the ppt. is filtered and washed. This is fraction A. After drying *in vacuo* over H_2SO_4 and extn. with petr. ether, it is dissolved in dil. NaOH and repptd. with H_2SO_4 . By warming the soln. after addition of the acid to about 60° and then cooling it to 10° , the ppt. is obtained in a sandy, finely divided form which filters readily. It is fat-free and amounts to about 5% of the total amt. of thyroid taken. Its % content of I is about 10 times as high as that of the original material and the total recovered in this fraction is about 50% of the total I. By partial extn. with EtOAc, 2 fractions are obtained. The more sol. portion contains 13-14% I, while the less sol. fraction contains only 1.5% I. The filtrate from A is neutralized

with Na_2CO_3 , evapd. to small vol. and the Na_2SO_4 pptd. with EtOH. After filtration, the EtOH is evapd. and the soln., *B*, dried or preserved as such for therapeutic use. It contains about 74% of the total N. All the constituents are readily dialyzable. Satn. with $(\text{NH}_4)_2\text{SO}_4$ produces a ppt. containing about 80% of the I in *B*, showing that the I is in organic combination. The filtrate from the $(\text{NH}_4)_2\text{SO}_4$ ppt. contains a substance that reduces alk. Hg and Ag salts. This compd. is called *R*. The I in *B* is largely pptd. by HgSO_4 and almost quant. by Ag_2SO_4 and MgO . A large amt. is also split off in this treatment. After the administration of *B* to a patient with hypothyroidism, the dry scaly skin becomes moist and normal; soreness of bones and joints and heat flashes disappear. Muscle cramps are relieved and prevented by *R*. The administration of *B*, intravenously, subcutaneously or by mouth, failed to produce toxic symptoms. In hypothyroidism, the administration of *A* was followed by increase of pulse rate and rise of body temp. to the normal, increase of nitrogenous metabolism, and brightening of mentality. Daily subcutaneous injections of *A* in animals are followed in 2 or 3 days by an increase in pulse rate, nervousness, tremor, loss of wt. and diarrhea. The pulse rate soon drops suddenly and is not to be increased by further injections. The other symptoms persist and are similar to those of hyperthyroidism.

I. GREENWALD.

Colorimetric estimation of uric acid in urine. STANLEY R. BENEDICT AND ETHEL H. HITCHCOCK. Cornell Univ. Med. Coll. *J. Biol. Chem.* 20, 619-27(1915).—The method for the detn. of uric acid described by Folin and Denis (*C. A.* 7, 1523) is discussed and a modification proposed. The standard soln. of uric acid in Li_2CO_3 rapidly deteriorates and the value of the uric acid-HCHO standard is markedly affected by changes in the temp. A soln. in dil. pyridine is much more permanent but the best standard appears to be the following: 9 g. $\text{Na}_2\text{HPO}_4 \cdot 12 \text{H}_2\text{O}$ and 1 g. $\text{Na}_2\text{HPO}_4 \cdot \text{H}_2\text{O}$ are dissolved in 200-300 cc. hot H_2O , filtered and dild. to about 500 cc. This is poured upon 200 mg. of uric acid in a few cc. of H_2O in a liter flask. The mixt. is agitated until the uric acid dissolves and is then cooled. Exactly 1.4 cc. glacial HOAc are then added and the contents of the flask dild. to the mark. 5 cc. CHCl_3 are added as a preservative. This soln. keeps unaltered for at least 2 months. (Though the soln. is acid to litmus, no uric acid seps.) If 0.5 cc. more glacial HOAc be added, uric acid separates within a few hours. The following procedure is recommended by B. and H.: 2 to 4 cc. of urine (containing 0.7 to 1.3 mg. uric acid) are measured into a centrifuge tube, dild. to about 5 cc. and treated with 15-20 drops of a $\text{NH}_4\text{-Ag-Mg}$ soln. (This is prepd. by mixing 70 cc. 3% Ag-lactate, 30 cc. magnesia mixt. and 100 cc. conc. NH_4OH . The slight turbidity that forms shortly after mixing is filtered off. The clear filtrate keeps indefinitely. The magnesia mixt. is made by dissolving 17.5 g. cryst. MgSO_4 and 35 g. NH_4Cl in 100 H_2O , adding 60 cc. conc. NH_4OH and dilg. to 200 cc.) The contents of the tube are mixed with a small stirring rod and the tube is then centrifuged. The supernatant fluid is poured off as completely as possible, the drop on the inside of the lip being removed with a towel or filter paper. There are then added, in the order named, with stirring after each addition, 2 drops of 5% KCN soln., 0.5 to 1 cc. H_2O , 2 cc. of the reagent of Folin and Denis, and 10 cc. 20% Na_2CO_3 (anhydrous) soln. After 30 sec. the mixt. is washed into a 50 cc. vol. flask and dild. to the mark. The soln. for comparison in the colorimeter is prepd. at the same time by treating 5 cc. of the standard uric acid soln. with 2 drops 5% KCN, 2 cc. of the uric acid reagent, 10 cc. 20% Na_2CO_3 and dilg. to 50 cc. after 30 sec. The standard is best set at 15 mm. The KCN serves to dissolve the ppt. and neither the Ag nor the CN interferes with the reaction. The presence of the KCN intensifies the color obtained by about 18%. This is probably due to the marked diminution in the rate of fading of the color. This procedure gives quant. results with uric acid solns. and with uric acid added to urine.

The results agree within a few per cent with those obtained by the Folin-Shaffer method and is regarded as being as accurate as this, if not more so. I. GREENWALD.

Colorimetric estimation of uric acid in blood. STANLEY R. BENEDICT. *J. Biol. Chem.* 20, 629-40(1915).—In the Folin-Denis procedure for the detn. of uric acid in blood (cf. *C. A.* 7, 1214), the protein that escapes pptn. by simple heat coagulation interferes with the detn. The addition of colloidal Fe soln. removes this protein and if the method of Benedict and Hitchcock (cf. preceding abstr.) be then employed the resulting solns. are never turbid and good results are readily obtainable. The procedure recommended is: 20 cc. of blood are added to 100 cc. boiling 0.01 *N* HOAc in a casserole, the mixt. is heated to boiling, removed from the flame, dild. with 200 cc. boiling H_2O and filtered. The residue is washed with 50 cc. boiling H_2O (heated in the same casserole) and the total filtrate rapidly boiled down in a casserole to about 25 cc. This is then poured into a flask, roughly marked at 50 cc. and the casserole thoroughly washed 2-3 times with hot H_2O . The turbid liquid is cooled and 2 cc. (occasionally a little more) of colloidal Fe soln. (Merck's dialyzed Fe, 5% soln.) are added while rotating the flask. The mixt. is then filtered into a 100 cc. Jena-Florence flask and the residue washed twice with H_2O . The filtrate should be clear and colorless. It is boiled down to a vol. of 1-2 cc. and transferred to a centrifuge tube, the flask being washed 3 times with 1-2 cc. boiling H_2O . The contents of the tube are then cooled and pptd. and subsequently treated as described in the preceding abstr. If the bulk of the Ag ppt. is small, 1 cc. of the reagent and 5 cc. Na_2CO_3 soln. are used and the mixt. is dild. to 25 cc. I. GREENWALD.

The estimation of fat. HELMAN ROSENTHAL AND P. F. TROWBRIDGE. *Univ. Missouri. J. Biol. Chem.* 20, 711-7(1915).—The sample is heated for 2 hrs. at 100° with 30 cc. of 20% NaOH. (With samples rich in fat, use EtOH soln. With blood, ext. with boiling EtOH and saponify the ext.) Transfer to separatory funnel, acidify with 35 cc. HCl (sp. gr. 1.1), cool and shake out with Et_2O . Filter the combined exts. and evap. on water bath to dryness, dissolve in 25 cc. petroleum ether, add 10-15 cc. 95% EtOH and titrate with 0.05 *N* alkali, using phenolphthalein as indicator. [Factor is not given but appears to be 1 cc. = 14.50 mg. fat. ABSTR.] Method gives good duplicates. I. GREENWALD.

A simple hydrogen electrode. HENDRIK PIETER BARENDRECHT. *Delft. Biochem. J.* 9, 66-70(1915).—In an improved Walpole electrometric titrating apparatus (cf. *C. A.* 3, 1799) special provision is made for allowing instantaneous and accurate estimations even in liquids which contain CO_2 and O. B. HOROWITZ.

The cause and significance of an abnormal reaction obtained in testing urine for sugars with Fehling solution. W. CRAMER. *Edinburgh. Biochem. J.* 9, 71-7(1915).—A reduction of cupric salts to metallic Cu can be brought about by concd. aq. solns. of the reducing sugars. It takes place even more readily when the reducing sugar is present in a urine having a normal concn. of the normal urinary constituents, being facilitated by the fact that some of the constituents of normal urine, among them creatinine (see Maclean, *Biochem. J.* 2, 156(1907)), are capable of holding Cu_2O in soln. Such a reaction may indicate a marked glucosuria unaccompanied by polyuria, and not a typical diabetes mellitus. B. HOROWITZ.

Detection of small amounts of sugar by the production of formaldehyde and the formaldehyde-forming substances of the urine. E. SALKOWSKI. *Univ. Berlin. Z. physiol. Chem.* 93, 432-46(1915).—Two cc. of a 1% sugar soln., heated with 5 cc. of an oxidation mixt. containing 30 cc. dil. H_2SO_4 (200 g. to 1 l.), 20 cc. 1% $KMnO_4$ and 50 cc. H_2O , give a positive test for HCHO (Leach). A 0.2% soln. gives a positive test if 2 cc. of the oxidation mixt. are used. Two cc. urine, as above, give a strong positive

test. Attempts to ppt. the substances which give HCHO were fruitless. The $\text{Pb}(\text{OAc})_2$ ppt. may be washed free of these substances by $(\text{NH}_4)_2\text{CO}_3$ soln. 0.2% sugar in urine may be detected by pptg. a given vol. of urine with $\text{Pb}(\text{OAc})_2$, treating the filtrate with $\text{Pb}(\text{OAc})_2$ and NH_4OH , washing the ppt. carefully, dissolving in hot AcOH and making up to the original vol., and oxidizing 2 cc. of this with 5 cc. of the oxidizing mixt. Creatinine does not interfere with this test to any degree. G. M. MEYER.

Xanthydrol or the Fosse reagent in the determination of urea. HUGOUNENQ AND MOREL. *Bull. commercial; Giorn. farm. chim.* 63, 118-9(1914).—The authors recommend the use of xanthydrol for the detn. of urea in the blood and other liquids of the animal organism; a compd., dioxanthylurea, insol. in H_2O , is formed. The following procedure for the detn. of urea in blood is proposed: Take 10 cc. blood serum, add 100 cc. 95% alc., acidify slightly with AcOH , filter, and wash the coagulum twice with 95% alc. Evap. the alc. soln. to approx. 5 cc. on a H_2O bath and add 50 cc. of a 8-10% alc. soln. of xanthydrol and 50 cc. glacial AcOH to the residue. Allow to stand for a period of several hrs. (not to exceed 15), collect the ppt. of xanthylurea, wash with 95% alc., dry at 100° and weigh; this wt. divided by 7 gives the wt. of urea. Ten cc. of normal serum contain 15-30 mg. urea, while, in cases of azotemia, values exceeding 100 mg. urea per 10 cc. may be obtained. The use of xanthydrol in this procedure (also modified in technic by Fréjacque) is advantageous from the point of view of specificity, precision and rapidity. H. S. PAINE.

Quantitative gravimetric determination of urea. R. FOSSE. *Bull. sci. pharmacolog.* 21, 502-4(1914); see C. A. 8, 3450. B. H. ST. JOHN.

The chemical activity of xanthydrol and its application to the determination of urea. R. FOSSE. *Bull. sci. pharmacolog.* 21, 504-7(1914); see C. A. 8, 3181. B. H. ST. JOHN.

Quantitative gravimetric determination of urea in the urine. R. FOSSE. *Bull. sci. pharmacolog.* 21, 507-9(1914); see C. A. 8, 3450. B. H. ST. JOHN.

Precipitant for ammonia (GRAVES) 7. Centrifuge 1. Estimation of lead (MEILLÈRE) 7. The preparation of anhydrous solids (ATKINS) 2.

U. S., 1,137,388, Apr. 27. G. H. EARP-THOMAS. Container for preserving and transporting aerobic bacteria, such as N-fixing bacteria from legumes, consists of a stoppered bottle, with a glass tube extending straight down through the center of the stopper. The tube terminates centrally within the bottle in a narrow curved mouth and contains several sepd. plugs of cotton or other fibrous filtering material. Cf. C. A. 8, 2772.

C. BACTERIOLOGY.

ERNEST D. CLARK.

The reducing properties of acetic bacteria. N. L. SÖHNGEN. *Folia mikrobiol.* 3, 4 pp.(1914); *Chem. Zentr.* 1915, I, 326.—The reducing action of acetic bacteria on organic compds. was studied. A yeast ext. containing organic compds. was used as medium. The aerobic reduction was studied with a thin layer of medium in the bottom of an Erlenmeyer flask. Under the surface the following processes take place: Glucose is oxidized to gluconic acid. Alc. and AcOH are formed. Aldehydes and ketones could not be detected. Under anaerobic conditions, glucose will decompose slightly to CO_2 and alc. Gluconic acid or its Ca salt in yeast ext. is decomposed by bacteria to dihydroxyacetone, CO_2 , H_2O and alc. In similar expts. with lactic, acetic, pyruvic and malic acids or the Ca salts, small amts. of alc. were formed when these acids were acted on by acetic bacteria. FRED W. TANNER.

The oxidation of hydrogen sulfide by bacteria. H. C. JACOBSEN. *Folia mikrobiol.* 3, 8 pp.(1914); *Chem. Zentr.* 1915, I, 324-5; cf. C. A. 8, 944.—J. describes an

app. in which oxidation of H_2S may take place. An Erlenmeyer flask is fitted by means of a rubber stopper with a bent glass tube and funnel. The culture medium is inoculated with 1-2 mg. of earth, etc., and incubated at 37° for 1-2 days until one is able to det. by the odor that the H_2S is completely oxidized. The second phase of the process, the oxidation to H_2SO_4 , requires a longer time. The process is quant. The energy needed by the bacteria comes from the oxidation processes. F. W. T.

D. BOTANY.

CARL L. ALSBERG.

The effect of shading on the transpiration and assimilation of the tobacco plant in Cuba. H. HASSELBRING. *Botan. Gaz.* 57, 257-86(1914); *Bull. Agr. Intelligence* 5, 1598-1600.—Plants grown in open ground transpired nearly 30% more than those grown under cheese cloth. The transpiration per unit area of leaf surface was nearly twice as great in the sun plants as in the shade plants. Shading did not seem to result in a diminished production of total plant substance by the shaded plants, as compared with other like plants not shaded. Owing to greater total area of leaf surface on the part of shaded plants, the quantity of plant material elaborated per unit of leaf area is greater in the plants grown in the open. While the total production of dry plant substance was not influenced in any marked degree by the shading, the distribution of this substance was affected to the extent that in shade grown plants relatively less material was deposited in the leaves and more in the stems than in the plants grown in open. No evident influence is exerted on the deposition of material in the roots.

B. E. BROWN.

Physiological studies on lactescence and caoutchouc. F. TOWLER. *Jahrb. Wiss. Botan.* 54, 265-307(1914).—Close relations were shown between quantity and quality of sap flow of *Manihot*, *Mascarenhasia*, etc., on the one hand, and stages of growth and such conditions as humidity, illumination, nutritive materials available, on the other. Secretions of the plants against snails were not proven. W. P. G.

Alfalfa laccase. H. H. BUNZEL. U. S. Dept. Agr. *J. Biol. Chem.* 20, 697-706 (1915).—"The effect of salts of strong bases with weak acids on the rate of oxidation of hydroquinone by atmospheric O is due entirely to the conc. of the OH ions in such solns. There is no hydroquinone-oxidizing oxidase 'laccase' in *Medicago sativa*. The accelerating effect of Euler and Bolin's 'laccase' prepd. from *M. sativa* on the rate of oxidation of hydroquinone by atmospheric O is due to the alkalinity of the solns. of the salts contained in their preps." Cf. *C. A.* 3, 1544, 2709; 4, 937; 8, 1971.

I. GREENWALD.

The value of the chemical factor in the study of plants. HENRY G. SMITH. *J. Proc. Roy. Soc. N. S. Wales* 48, 1-42(1914).—Presidential address. Emphasis is placed on the author's study of terpenes and related substances obtained from several species in the larger Australian genera.

B. HOROWITZ.

The relative chemotropic influence of salts of metals on radicles of *Lupinus albus*. T. M. PORODKO. *Ber. botan. Ges.* 32, 271-5(1914); *Exp. Sta. Rec.* 32, 128; cf. *C. A.* 8, 153.—All the salts tested gave negative tropism.

J. J. SKINNER.

Conditions of chemotropism in rootlets. T. M. PORODKO. *Ber. botan. Ges.* 32, 275-82(1914); *Exp. Sta. Rec.* 32, 128; cf. *C. A.* 8, 153.—The effect of the salts of metals on growth was studied. Both positive and negative tropism occur only with limited strengths of certain substances and chemotropic sensitivity is limited to about 1 to 2 mm. of the root tips.

J. J. SKINNER.

The protease of fruit juice. E. PANTANELLI. *Centr. Bakt. Parasitenk.* 42, 480-501(1914).—The juice of ripe wine grapes contains a proteolytic enzyme. The juice of unripe grapes does not contain it, but if the green fruit is allowed to stand for a long

while in the open air, the protease appears. This indicates the occurrence of a proenzyme in the unripe grapes. It comes down with the protein when pptd. The fruit protease can digest egg white but not fibrin and gelatin. It inhibits the action of pepsin and trypsin. The metabolic products of the cell life in grapes, as invert sugar and tartaric acid, inhibit the action of the protease and autolysis does not begin in grape juice until it is dild with H_2O . It takes place best in juice equiv. to 0.2 *N* acid. J. H. L.

Heat evolved in the germination of seeds. M. DARSIE, C. ELLIOT AND G. J. PEIRCE. *Botan. Gaz.* 58, 101-36(1914); *Bull. Agr. Intelligence* 5, 1432.—Using Dewar flasks, expts. made on barley, clover, maize, hemp, oats and wheat showed that the heat set free varied with the germinating power and the vigor. The older seeds evolved less heat. The av. daily increase of temp. produced by 10 g. of seeds in germination was 1.82° for hemp, 0.75° for clover, 0.73° for wheat, 0.55° for oats and 0.49° for maize. An abnormally high temp. denotes infection; an abnormally low, lessened vigor from old age.

M. X. SULLIVAN.

The formation of hydrocyanic acid in the germination of seeds. IV. CIRO RAVENNA. Univ. Bologna. *Atti accad. Lincei* 23, II, 302-6(1914); cf. C. A. 9, 1071.—The method of Bosshard (*Fittig's Jahresber.* 1883, 1608) for detg. NH_3 and Longi's modification (*Landwirt. Versuchsstat.* 29, 403(1883)) were tested out and found to give good results but they were somewhat lower than the calc. amt. The latter method consists in distilling the plant extracts with magnesia at reduced pressure and a temp. of 40°. Quantitative expts. on the seeds of *Phaseolus lunatus* in the quiet stage after 3 days, after 5 and after 7 days germination gave 0.015, 0.024, and 0.042% NH_3 by the latter method. The other methods gave almost identical results. As was stated previously *P. lunatus* is said to differ from other HCN-forming plants in that the HCN content diminishes up to the beginning of the germinative period. 31 analyses of seeds observed for 20 days in the dark and 36 days in the light are given. The HCN content increases during the 1st period of germination and then diminishes. *P. lunatus* is thus similar to other seeds in its behavior in this respect. E. J. WITZEMANN.

E. NUTRITION.

PHILIP B. HAWK.

NORMAL.

A working hypothesis of hemoglobin pigment metabolism. T. ADDIS. San Francisco. *Arch. Intern. Med.* 15, 413-37(1915).—The following hypothesis of the course of hematin metabolism is presented. The hemoglobin liberated from outworn erythrocytes is sepd. into pigment and protein. Within the liver cells, the pigment is converted into bilirubin. In the intestine this is reduced to urobilinogen. This is absorbed, carried to the liver and, in part at least, utilized in the synthesis of hemoglobin.

I. GREENWALD.

Animal calorimetry. IX. The influence of meat ingestion on the amino acid content of blood and muscle. MARY WISHART. Cornell Med. Coll. *J. Biol. Chem.* 20, 535-7(1915).—"Although the ingestion of 1000 g. of meat may increase the amt. of amino acids (as expressed by "residual N" or difference between total non-protein N and urea N) and of urea in the circulating blood, yet in the muscles the quantity of amino acids may show no positive increase though the urea content of the muscles rises." It is concluded that amino acids absorbed by muscle are immediately destroyed or synthesized into new protein and that the specific dynamic action of protein is due not to the action of certain amino acids in increased conc. but to the action of certain metabolites of these amino acids. X. The rate at which ingested glycocoll and alanine are metabolized. FRANK A. CSONKA. *Ibid* 539-54.—Repeated phlorrhizination has no effect upon the character of the glucosuria induced. The ingestion of 2

g. of ext. of beef by the phlorhizinized dog has no influence on the output of glucose. The rate of absorption and elimination of ingested glucose by the phlorhizinized dog is almost the same as the rate of absorption of iso-glucogenic quantities of glycine or alanine and of the elimination of the glucose produced from them. The amt. of extra glucose elimination in phlorhizin glucosuria appears to be a better index of the intensity of the hourly metabolism of these amino acids when given to a normal dog than does the N output under these circumstances. In the phlorhizinized dog, the latter lags a little behind the glucose excretion. After giving Et lactate to a phlorhizinized dog only 40% of the glucose which could have arisen from the lactic acid appeared in the urine. **XI. An investigation into the causes of the specific dynamic action of the foodstuffs.** GRAHAM LUSK. *Ibid* 555-617.—All the expts. were performed upon dogs. After prolonged confinement in a cage, though without loss of body wt., a dog may manifest a marked reduction in basal metabolism. Recovery is apparently achieved through exercise. Ingestion of a cold liquid causes an abstraction of heat for the purpose of warming it. With 210 cc. of H₂O or of a glucose soln. this is not entirely accomplished in 1 hr. and therefore causes a discrepancy in the measurement of heat by the direct and indirect methods, in expts. begun 1 hr. after such ingestion. This explains the disparity noted in a previous paper (cf. C. A. 7, 107). The explanation then given is withdrawn. The administration of glycine or of alanine increases the metabolism. If both are administered together, there is complete summation of their effects. The extra heat production after giving glycine is nearly equal to the energy content of the glycine; with alanine, it is only 53% of the energy content of the alanine. The quantity of extra heat is not proportional to the amt. of glucose that may be formed from glycine or alanine but is apparently the same for 1 mol. of glycine as for 1 of alanine. When carbohydrate is transformed into fat there is a small elimination of heat, for which allowance can be made. The administration of glucose with either glycine or alanine produces an increase in metabolism almost as great as the sum of the increases due to the two given separately. (This nullifies the opinion previously expressed (cf. C. A. 7, 363).) The influence of the metabolites of carbohydrates upon metabolism is much less than that of the metabolites of iso-glucogenetic amts. of glycine or alanine. The influence upon heat production of 50 g. of glucose, sucrose and fructose increases in the order named. After giving 50 g. of lactose there was no, and after 50 g. of galactose very little, increase in metabolism or in the respiratory quotient. A part of these sugars appeared in the urine. Ethyl glycolate is poisonous. Small amts. of EtOH (5.8 and 9.4 g.) increase metabolism and do not merely replace isodynamic quantities of fat. The effect on heat production of glucose and EtOH ingested together is nearly equivalent to the sum of the increases produced by each alone. The lactic acid from the administration of Et lactate probably increases metabolism. The administration of phlorhizin may increase metabolism as much as 70% above its basal value. Glucose or fructose given to phlorhizinized dogs does not increase the metabolism. The administration of glycine or of alanine under the same conditions does increase metabolism, although their energy content is eliminated in the urine in the form of glucose and urea. Since amino acids absorbed by muscle are immediately catabolized or synthesized into new protein (cf. Wishart, above) and since the period of max. heat production almost coincides with the period of max. metabolism of amino acids (the increase in metabolism may outlast the stimulus), L. concludes that not the amino acids themselves but certain intermediate products, such as glycollic or lactic acids, provide the stimulus. The specific dynamic action of protein is thus considered to be due to the action of the metabolites of certain of the amino acids in the protein. "Since metabolism in human diabetes is increased only 5 or 10% in the presence of severe acidosis, while the metabolism in depancreatized dogs is increased 40% when acidosis is only

slightly above the normal, and by 70% during the very mild acidosis of phlorhizin glucosuria, it is evident that the increase in metabolism in the diabetic state is in no way proportional to the intensity of the acidosis, and hence the acidosis cannot be the etiological factor of the increased metabolism. A much more plausible explanation lies in the 3- to 5-fold increase above the normal in the quantity of amino acids metabolized in phlorhizin glucosuria, although there may be still other contributing factors."

I. GREENWALD.

Nutrition with purified food substances. E. V. MCCOLLUM AND MARGUERITE DAVIS. Univ. Wisc. *J. Biol. Chem.* 20, 641-58(1915).—See preceding papers by McCollum and Davis (*C. A.* 7, 3354; 8, 3673; 9, 1497) and by Osborne and Mendel (*C. A.* 7, 107, 364, 635, 3355; 8, 730, 1978, 2561, 2565, 3318; 9, 1497). Rats were kept on a diet of pure casein, dextrin (prepd. in lab.), lactose, agar-agar and reagent salts, with and without certain additions. The rats ate a certain amt. of wood (from the cages) but this is considered unobjectionable since the fragments of wood did not appear to disintegrate. The above diet was incomplete, the rats growing for about 6 months, then rapidly losing wt. Addition of 5% of olive oil did not prolong the growth period but addition of 5% of butter fat or of 3% of the ether ext. of cod testicle or of pig kidney maintained normal growth. On the diet containing butter, rats gave birth to 2 and 3 litters of young, some of which have been kept for a long time on the same diet as the mother. The expts. of Osborne and Mendel in which natural "protein-free" milk was used are criticized. Such preps. contain 0.7% N, which, though not protein, may very well be present as products of protein hydrolysis, for there are proteolytic enzymes in milk. Such "split-products" would be as efficient as milk proteins in maintaining growth. Expts. by McC. and D. indicate that the N of "protein-free" milk is nearly, if not quite, as effective as the N of milk protein in maintaining body wt. If the N of "protein-free" milk is derived from protein, it is equivalent to a content of 4.37% protein in the prep. Of this, Osborne and Mendel used 28% in their diets; that is, 1.22% of the diet might consist of "split-products" from milk protein. McC. and D. have shown (cf. *C. A.* 9, 1497) that a content of 3% of milk protein as the sole protein in the diet serves to maintain rats in body wt. In other words, over 0.33 of the maintenance requirement of milk protein may have been present in the "protein-free" milk used by Osborne and Mendel. .

I. GREENWALD.

Cholesterol content of the tissues of growing rats when under various diets. PERCY E. LANDER. London. *Biochem. J.* 9, 78-96(1915).—No growth occurs when rats are fed on a pure synthetic diet containing no cholesterol, the content of the latter in the tissues showing neither an increase nor decrease. The replacement of half of the pure caseinogen used in the synthetic diet by cholesterol-free protein obtained from bull testicles, to which lecithin is added, gives a similar result. If 20 cc. milk *per diem* is added to the synthetic diet the rats increase in weight by 66% in 23 days. The quantity of cholesterol found in the organism can be accounted for by that contained in the milk: there is no evidence of any synthesis. By giving only 10 cc. milk, and in addition 2% cholesterol, growth is much less during 23 days. About 0.1 of the cholesterol ingested is stored. The addition of cholesterol and cholesterol esters to a synthetic diet, together with lecithin and lemco, does not cause growth. A diet of bread and oatmeal which had been imperfectly extd. with ether, together with 2% cholesterol, produces slight growth. The expts. do not show that cholesterol can be manufactured by the living organism.

B. HOROWITZ.

Energy requirement of newborn. H. C. BAILEY AND J. R. MURLIN. New York. *Am. J. Obstetrics and Dis. of Women and Children* 71, No. 3(1915); *J. Am. Med. Assoc.* 64, 1272-3; cf. *C. A.* 9, 1191.—The analyses reported show that human colostrum on the 2nd and 3rd days of the puerperium has the following comp.: Protein 2.3, fat 2.9,

milk sugar 7.1%, making a physiologic heat value of 650 cal. per liter. It is not until the 5th day that there is sufficient breast secretion to supply the requirement of the newborn for combustion alone, ignoring growth. Studies by the authors show that supplementary feeding of newborn infants from the 1st day onward with food somewhat resembling colostrum in comp., diminishes the initial loss of wt., accelerates the return to birth wt., and has no unfavorable effects. The respiratory quotients of 2 infants 6 hrs. old indicate that the child at birth has some carbohydrate available for combustion. By the end of the first 24 hrs. this supply is exhausted and the child has reached a pure fat combustion. If food is not supplied soon after this a starvation acidosis is likely to develop. The energy requirement of the newborn when comfortably warm and sleeping is from 1.7 to 2.0 per kg. an hr., the lower figure being for a fat child and the higher for a thin child. Vigorous crying does not raise these figures more than 40%.

L. W. RIGGS.

Gastrointestinal studies. VII. The utilization of ingested protein as influenced by undermastication (bolting) and overmastication (fletcherizing). L. F. FOSTER AND P. B. HAWK. *J. Am. Chem. Soc.* 37, 1347-61 (1915).—The expts. were conducted upon 2 lab. assistants, 22 and 24 yrs. old, weighing 58.3 and 63 kg., resp., and were divided into a preliminary normal period of 3 days, a bolting period of 7 days in which the meat was swallowed without mastication, a period of 7 days in which the food was chewed thoroughly (fletcherized) and a final normal period of 7 days. A uniform diet, with 16.603 and 19.184 g. N, was fed throughout to the 2 resp. subjects; the major portion of the protein (11.207 and 13.025 g. N) was in the form of meat (round steak freed from all visible fat and connective tissue). During the bolting period, macroscopic meat residues in the stools were separately analyzed for N. Both subjects worked hard on research problems during the expts. and every day took a brisk 2.5 mile walk or a 20 min. swim. The av. daily fecal N outputs of the 2 subjects for the 4 periods were: 0.759, 1.306; 0.948, 1.266; 0.726, 0.906; 0.765, 0.919 g.; % utilizations: 95.43, 93.19; 94.29, 93.41; 95.63, 95.32; 95.39, 95.21. Every stool during the bolting period contained macroscopic meat residues. Av. daily N excretions in the urine: 16.369, 18.827; 16.229, 17.990; 16.697, 20.118; 16.639, 19.703. The method of Mendel and Fine (C. A. 6, 879) was used to det. the portion of the total fecal N due to metabolic products; at the close of the final period, a N-free diet of equal calorific value to that previously ingested (consisting of butter, sugar, agar-agar, H₂O and NaCl) was chosen, the feces analyzed for total N, corrections applied for the N of the unutilized butter, carmine (used to sep. the feces of the different periods) and a gelatin capsule and the resultant value subtracted from the av. daily N output of each period. The difference was assumed to be the N due to unabsorbed residues of meat. The av. daily N content of the feces of the 2 subjects was 0.500 and 0.552 g. but this value is doubtless too high, especially in the 1st case, as the vol. of the feces during this period was much greater than in the other periods and an increase in metabolic N would be expected with an increase in bulk of the material in the intestine. By calcg. the metabolic N for the other periods on the tacit assumption that the content is proportional to the vol. of the feces, these values become 0.268 and 0.432 g. These are probably too low, but the actual output undoubtedly lies between the 2 limits. The lower values were applied as corrections to the above % utilizations and more accurate data thus obtained. F. and H. conclude that their work does not support the claims of Fletcher and his followers and does not demonstrate the harmfulness of food-bolting to the organism.

CHAS. A. ROULLER.

Research on the transformation of energy in the domestic fowl. H. GERHARTZ. *Landw. Jahrb.* 46, 797-814 (1914); *Bull. Agr. Intelligence* 5, 1623; cf. C. A. 8, 1968. —The transformation of energy in fasting fowls is less than in normally fed ones. The

formation of the egg in the hen is accompanied by a considerable expenditure of energy. For other details and conclusion see original article.

J. J. SKINNER.

Net energy values of feeding stuffs for cattle. H. P. ARMSBY AND J. A. FRIES. *J. Agr. Res.* 3, 435-91(1915).—There are reported the results of 76 expts. in the respiratory calorimeter upon 9 steers in which the balance of matter and of energy was detd. The losses of energy from the animals are of 2 classes: (1) Losses of unused chem. energy in the feces, urine and methane; and (2) losses in the form of heat due to increased metabolism consequent upon the ingestion of feed. The losses of energy in methane and urine were relatively greater on light than on moderately heavy rations. Neither the losses of energy in the feces nor the total losses showed a distinct relation to the amt. of feed consumed. Individual differences between animals had no material influence on the losses of chem. energy. Energy loss in methane may be computed approx. from the amt. of total carbohydrates digested. The metabolizable energy per kg. of digested org. matter showed but slight variations within the same class of feeding stuffs. The heat production is notably greater during standing than during lying, and the difference is greater on heavy than on light rations. The increment of heat production during standing is affected by the individuality of the animal and the kind of feed. The av. energy expenditure consequent upon the consumption of 1 kg. of dry matter is reported for 11 diff. feeding stuffs. The expenditure of energy arising from the consumption of the coarse feeds is not on the whole much greater than in the case of the concentrates. The increased muscular work of the digestive organs appears to be a relatively small factor of the increased heat production. A scrub steer showed a somewhat greater increment of metabolism from feed consumption than did a pure-bred beef animal. A summary of the av. net energy values obtained in the expts. for 11 diff. feeding stuffs is given. A simple method is outlined for computing net energy values, in the absence of direct detns., from metabolism expts. or from the data of ordinary feeding tables.

M. X. SULLIVAN.

Studies in uric acid metabolism. I. The uric acid in ox and in chicken blood. STANLEY R. BENEDICT. Cornell Univ. Med. Coll. *J. Biol. Chem.* 20, 633-40(1915); cf. Benedict and Hitchcock (*C. A.* 9, 1626).—It was found that if the pptn. with $\text{NH}_4\text{-Ag-Mg}$ soln. was omitted in the detn. of uric acid in ox blood very high values were obtained (4 mg. per 100 cc. or 800% of that obtained in the usual detns.). In chicken blood the excess was only 20%. Upon investigation, the difference was found to be due to the presence in ox blood of a combined form of uric acid. This combination is quite stable and, apparently, cannot be hydrolyzed with HCl without at the same time destroying some of the uric acid. The uric acid is slowly liberated spontaneously when the blood is allowed to stand. The addition of 2 cc. of conc. HCl before the concn. results in the yield of at least 90% of the value obtained by an estn. of the "free" uric acid after the blood has been allowed to stand 2 weeks. Three attempts to isolate the uric acid, as such, from 100 cc. of ox blood were all successful. From one specimen giving by analysis 7.0 mg. of "total" uric acid per 100 cc. there were isolated 6.7 mg. of uric acid, identified by cryst. appearance, solubility, murexide test, colorimetric value and N content. In ox blood the uric acid, both "free" and "combined," is present exclusively in the cells; in chicken blood, on the other hand, the uric acid is found entirely, or nearly so, in the serum.

I. GREENWALD.

ABNORMAL.

Karamose (Merck) for diabetics and children. F. UMBER. *Deut. med. Wochschr.* 41, 181-2(1915).—Karamose (Merck) is caramelized glucose containing but traces of the original sugar. It can be given in various forms and is tolerated well in doses of 100 g. *per diem*, whereby 90% or more is resorbed. Larger doses are likely to cause diarrhea. One g. water-free karamose yields 4.3-4.5 cal. In lighter cases of diabetes

it does not increase the excretion of sugar in the urine, but acts as a protein-sparing agent. It may be of value in severe cases of diabetes, although under these conditions it may lead to increase of sugar excretion. In severe cases with acidosis it does not seem to counteract the latter. In children 5 g. proved to be a good laxative. S. A.

Studies of the basal metabolism in obesity and pituitary disease. J. H. MEANS. Harvard Univ. *J. Med. Res.* 32, 121-58(1915).—Basal metabolism, body surface (by Meeh's and by Dubois' formulas), and creatinine detns. are given in 2 cases of simple obesity, 2 cases of obesity in hypopituitarism, and 1 case of acromegaly. It was found that estns. of the body surface by Meeh's formula might be 30% (or more) higher than Dubois' in obese persons. The Dubois formula is unquestionably the more accurate. The basal metabolism in the 2 cases of simple obesity per sq. m. and hr. using the Dubois area was normal. In 1 case of undoubted hypopituitarism there was increased basal metabolism; in 2 other cases thought to be hypopituitary, 1 with a low and 1 with a high sugar tolerance, both showed a low metabolism. The creatinine coeff. is lower than normal in all the cases studied. The administration of thyroid ext. in a case of simple obesity gave an increase in the basal metabolism, this increase being met by an increased katabolism of protein, but more particularly of carbohydrate and not at all by fat. Apparently thyroid increased the utilization of carbohydrate, which is burned instead of being stored as fat.

GEO. T. CALDWELL.

Metabolism study of a case of congenital hemolytic jaundice with splenomegaly. JAMES P. MCKELVEY AND JACOB ROSENBLOOM. Pittsburgh. *Arch. Intern. Med.* 15, 227-38(1915).—A metabolism expt. of 5 days, during which there was a loss of N, S, Ca, Mg, and Fe and slight retention of P, disclosed a normal N partition in the urine, except for a rather high uric acid excretion. The absorption of N was normal. The S partition was normal, except for a high ethereal sulfate excretion on the first and last days. The loss of Fe was pronounced. Fat metabolism was normal. Urobilin and urobilinogen were present in urine and feces; bilirubin and hemoglobin were absent. Cf. C. A. 9, 933.

I. GREENWALD.

Prevention of beriberi among "Philippine scouts" by means of modifications in the diet. WESTON P. CHAMBERLAIN. U. S. Army. *J. Am. Med. Assoc.* 64, 1215-20(1915); cf. C. A. 5, 3484.—On a diet consisting of 12 oz. of fresh beef or its equiv. in bacon, canned meat or fish, 20 oz. of polished rice, 8 oz. of flour or bread, 8 oz. of potatoes or onions, and the usual condiments, the cases of beriberi reached a total in the years 1908 and 1909 of 618 and 558, respectively, in a force of about 5200 men. In 1910 the dietary was changed by a reduction of the rice to 16 oz. and using the undermilled or unpolished variety, and the introduction of 8 oz. of camotes (similar to sweet potatoes), and 4 oz. of mongos (a kind of beans), when the cases of beriberi dropped to 50. In 1911 the ration was further modified by the compulsory consumption of 1.6 oz. of ordinary navy beans, for which mongos could be substituted, and the omission of camotes. In the years 1911 to June 1914 but 6 cases of the disease occurred. From C.'s observations it appears that the daily consumption of 1.6 oz. of beans with not more than 16 oz. of polished rice, or 16 oz. of unpolished rice without the beans, are sufficient to prevent neuritis. Many articles of diet other than rice are relatively deficient in neuritis-preventing vitamins, and these vitamins may be decomposed by exposing food to temps. above a certain point.

L. W. RIGGS.

F. PHYSIOLOGY.

ANDREW HUNTER.

The urea content of the human spinal fluid and blood. G. E. CULLEN AND A. W. M. ELLIS. Rockefeller Inst. *J. Biol. Chem.* 20, 511-2(1915).—Urea was detd. in spinal fluid and in blood taken from the same patient within a few min. of each other.

The values found were from 20 to 42 and from 22 to 46 mg. of urea per 100 cc. of spinal fluid and blood, resp. In 63% of the cases, the difference between the urea content of the blood and of the spinal fluid was less than 2 mg. per 100 cc. The greatest difference was 11 mg. per 100 cc. Such occasional differences are probably due to the rapid rise and fall of the urea content of the blood in different stages of protein digestion. The urea content of the spinal fluid probably lags a little behind this. I. GREENWALD.

Presence of iodine in the human fetal thyroid gland. FREDERIC FENGER. *J. Biol. Chem.* 20, 695-6(1915).—Both enlarged and normal sized human fetal thyroids contain I at least during the last three months of intra-uterine life. Normal sized fetal glands contain relatively more I and less P than enlarged fetal glands. These conditions are analogous to those existing in the fetal and adult thyroids from cattle, hogs and sheep. (Cf. *C. A.* 7, 2241.) I. GREENWALD.

Gastric digestibility of milk. E. FILIPPI. Florence. *Lo sper.* 72, 203-30; *Zentr. Biochem. Biophys.* 17, 432(1914).—F. has studied the effect of colloids on the activity of rennin and has attempted to ascertain whether the ingestion of foreign substances as an aid to the digestion of milk is advisable in view of the fact that the voluminous coagulum which is produced on the entrance of milk into the stomach contributes to gastric affections which are characterized by deficiency of pepsin. Numerous viscosimetric measurements indicated that coffee (as an infusion) is the only common substance which is capable of preventing the coagulation of milk by rennin and which at the same time is harmless to the organism and is also not repugnant (as are albumin, gum and starch); coffee infusion inhibits peptic digestion, however, as well as coagulation by rennin. Tea retards rennin coagulation to a less extent than coffee, but has the advantage of promoting the peptic digestion of casein. The latter action experiences a slight retardation in a pronounced viscous medium; when the colloid conc. is decreased an optimum is reached at which digestion is again retarded. H. S. PAINE.

Behavior of the interstitial cells of the testicle in general affections of the organism and their content of fats and lipoids. CARLO GAMNA. Turin. *Arch. sci. med.* 37, 443-79; *Zentr. Biochem. Biophys.* 17, 442-3(1914).—G. investigated the fat of the interstitial cells by means of various microchem. methods and found that fatty substances were constantly present as products of physiol. metabolism. These substances consisted of true fats and lipoids, the greater portion of the former being neutral fats of various kinds. The lipoids in the interstitial cells of the testicle were usually present in the form of solid granules; less often they were present as the result of general inhibition. These lipoids were generally diminished in acute febrile affections.

H. S. PAINE.

Cultivation of human tissue in vitro. J. R. LOSEE AND A. H. EBELING. Brooklyn. *Bul. Lying in Hospital, N. Y. City* 10, No. 1(1915); *J. Am. Med. Assoc.* 64, 1273.—A strain of human connective tissue was kept in a condition of active life *in vitro* for more than 2 months. The culture medium consisted of human blood plasma, ext. of adult or fetal tissues and Ringer soln. L. W. RIGGS.

Effect of various procedures on the passage of liquids from the stomach. C. H. NELSON AND S. T. LIPSITZ. St. Louis. *J. Am. Med. Assoc.* 64, 1052-5(1915).—Expts. with healthy young men show that water is emptied from the stomach more rapidly during exercise than when the subject remains quiet. Lying on the right side causes a more rapid evacuation than in any other position, and lying on the left side has the opposite effect. Lying on the back causes a more rapid emptying than in the upright position. Water taken at 45° leaves the stomach more rapidly than if taken at 10°. Normal acidity causes a more rapid emptying than hyperacidity produced artificially by adding HCl to the stomach contents. Artificial alkalinity produced

by adding NaHCO_3 to the stomach contents causes the stomach to empty slightly less rapidly than under normal conditions, but more so than during hyperacidity.

L. W. RIGGS.

Uric acid content of the blood of children. E. LIEFMANN. Dresden. *Z. Kinderheilk.* 12, 227-38(1915).—The blood of normal infants, fed with a purine-free diet, contains 1.3-1.7 mg. uric acid per 100 cc. In the growing child this slowly increases until it reaches the well-known value of 2-4 mg. for adults. With diets containing purine the value increases rapidly and then decreases slowly to the normal. High uric acid values indicate severe general disturbances of the organism. Atophan causes a decrease and protoioduret an increase in the uric acid content of the blood. The uric acid content of the blood in different diseases was studied. C. J. WEST.

Chemical and physico-chemical properties of muscles and muscle juice. V. The water, extractive nitrogen and total nitrogen content of white and red striated muscles. G. QUAGLIARIELLO. Univ. Naples. *Atti accad. Lincei* 23, II, 634-8 (1914).—The animals used were the turkey cock (*Meleagris gallopavo*), the domestic cock (*Gallus gallorum*) and the rabbit (*Lepus cuniculus*). The dry residue and total and extractive N of both kinds of muscle were detd. The general conclusions from the analytical data (cf. tables in the original) are: (1) The dry residue of white muscles in birds is constantly and appreciably greater than in the red muscles; in the rabbit they are nearly equal. This result is in harmony with the results of Costantino (*C. A.* 6, 390). (2) The total N content of white muscles is constantly higher than that of red muscles either in birds or in the rabbit; the difference seems greater in rabbits. This difference in the N appears whether the N is referred to the fresh muscle or to the dry residue. (3) The extractive N in the birds and rabbit is more abundant in the white muscles than in the red; this difference exists not only in the absolute values of the extractive N referred to the fresh muscle or to the dry residue but persists when the values are referred to the total N. These results are in agreement with those of Rinaldi (*C. A.* 6, 2450) and Cabella (*C. A.* 7, 2241). The extractive N of white or red muscles of rabbit considered either in abs. values or in relation to the total N, exceed that contained in the corresponding muscles in the birds. E. J. WITZEMANN.

Human milk. ALFRED W. BOSWORTH. *J. Biol. Chem.* 20, 707-9(1915).—The following arrangement is offered as representing the probable condition in which the constituents are present in human milk of av. comp. In %: fat 3.30, milk sugar 6.50, proteins combined with Ca 1.50, CaCl_2 0.059, KH_2PO_4 0.069, Na citrate 0.055, K citrate 0.103, $\text{MgH}_2\text{P}_2\text{O}_7$ 0.027. (Cf. Van Slyke and Bosworth, *C. A.* 9, 1068). J. G.

Lipase studies. I. The ester-splitting faculty of normal tissues. C. QUINAN. *J. Med. Res.* 32, 45-71(1915).—Ester-splitting, lipolytic enzymes are contained in the liver, kidney and muscle tissue of normal guinea pigs. The enzyme conc. per g. of tissue is characteristic of and const. for each organ. The conc. of the 3 tissues, liver, kidneys and muscle, in terms of ethyl butyrate per unit of tissue in unit of time, may be expressed by the respective numbers 44.3, 25.5 and 13.5. It is suggested that the relationship between these tissues may be proportional to their cellularity. Chlorides, CHCl_3 , fresh bile and Na glycocholate exert an inhibiting action on these tissues *in vitro*. Na acetate accelerates the hydrolysis of ethyl butyrate by the lipolytic enzymes of these tissues. It is probably the same enzyme which is present in all these tissues. II. Experimental chloroform necrosis of the liver. *Ibid* 73-93. CHCl_3 induces central necrosis of the liver in guinea pigs. The morphological change known as necrosis is preceded by a loss of the lipolytic enzyme, which loss may amt. to nearly 38%. The figures for the lipolytic activity of both the kidney and muscle tissue show at the same time, a corresponding increase. CHCl_3 intoxication does not affect the autolytic activity of the liver cells. GEO. T. CALDWELL.

G. PATHOLOGY.

H. G. WELLS.

A peculiar case of anaphylaxis to fly sting. WEBER. *Münch. med. Wochschr.* 62, 151 (1915).—A non-alcoholic, apparently healthy, 40 years old man was stung on the finger by a fly, probably *Haematopta pluvialis* Linn. Following the sting he became dizzy and was brought to the hospital cyanotic, dyspneic and nearly pulseless. The patient recovered slowly during the next 24 hrs. Two days after the sting there was an urticular bleb on the finger. Six years previously he had a similar attack after a sting through the glove. S. AMBERG.

Rapid intoxication of rabbits by certain bacterial products. W. J. PENFOLD AND H. VIOLLE. *Ann. inst. Pasteur* 28, 930-42 (1914); cf. *C. A.* 8, 1824.—Rabbits are sensitized to certain bacterial products by the injection of amts. of distd. H_2O equal to 1-30 of the body wt. of the animal. This sensitization was observed equally with cholera organisms and cholera toxin when all the living organisms were excluded. In either case the reaction is acute and death may follow immediately. This sudden death occurs equally if the culture or the cholera toxin has been given first and the distd. H_2O afterward. The cholera toxin may be injected by other than the intravenous route. A previous injection of conc. saline soln. has only a slight effect in counteracting this intoxication. The augmentation of the toxic effect by the addition of dist. H_2O was observed also with *Proteus vulgaris*, *B. pyocyaneus*, *B. dysenteriae* (Shiga), *B. prodigiosus* and also, but feebly, with tuberculin; it was not observed with mineral poisons such as HCN, and the alkaloids such as strychnine. The injection of a small quantity of hemolyzed blood and a sub-lethal dose of cholera culture produced acute death. The lysis of the red blood cells seemed to be the most important factor in producing this effect. The authors propose the name "toxohematolysis" for this phenomenon produced by the coördination of the 2 factors. GEO. T. CALDWELL.

Studies in anaphylaxis. XIII. The activation of antibody by the cell. RICHARD WELLS. New York. *J. Med. Res.* 32, 107-20 (1915).—When a guinea pig is passively sensitized by the action of an alien immune serum (rabbit versus horse serum), two separate and distinct processes take place. First, the body cells appropriate and anchor the immune body, abstracting it from the circulating blood. Second, the body cells produce an alteration, or activation, of the anchored antibody. This activation consists (1) in a very much increased avidity of the antibody for antigen, and (2) in the acquired property of inducing a physiological cellular response (such as muscular contraction in the case of the uterus) when the intracellular antibody is brought into contact with antigen. These changes occupy the so-called "latent period" of passive sensitization. During the latent period the anchored antibody can react with antigen, but the reaction induces no muscular contraction. When the cells have activated the anchored antibody, the latent period is concluded, and a muscular contraction characterizes the reaction of uterine antibody with antigen. Cellular activation of antibody is therefore the basis of the anaphylactic reaction. The anchored antibody differs from circulating antibody in the possession of an increased avidity for antigen; moreover, it has the property of inducing a cellular response upon uniting with antigen, a feature which is entirely lacking in the circulating antibody. Thus, the cell lends peculiar, and essential, characteristics to its antibody in active, as in passive, anaphylaxis. GEO. T. CALDWELL.

The relation between amylase retention and excretion and non-protein nitrogen retention in experimental uranium nephritis. R. FRIZ. Boston. *Arch. Intern. Med.* 15, 524-42 (1915).—In acute U nephritis in rabbits there is an accumulation of non-protein N in the blood and a diminished amt. of amylase in the urine. As the kidney recovers, both return to the normal amt. The amylase test, like the phenolsulfone-

phthalein test, indicates the renal function at the time; the amt. of non-protein N in the blood is influenced by the duration of the condition. The amylase test is less satisfactory than the phenolsulfonephthalein test.

I. GREENWALD.

Further studies of renal function in renal, cardiorenal and cardiac diseases. I. G. ROWNTREE, E. K. MARSHALL, JR. AND W. A. BAETJER. Johns Hopkins Univ. *Arch. Intern. Med.* 15, 543-54(1915).—The estn. of diastatic activity in the urine showed low values in the majority of cases of nephritis, while in cardiac and cardiorenal cases the results were very irregular. Normal values were frequently found in cases in which there was considerable, or even grave, renal functional involvement. Also, low values were obtained in cases in which, judged by the clinical aspect and by other functional tests, the renal function was not seriously impaired. The test has, therefore, little diagnostic or prognostic value. The detn. of the amt. of non-protein N or of urea in the blood appears to be more valuable than a detn. of the depression of the f. p., since it was found that the latter was lacking in several instances in which there was definite N retention. The phenolsulfonephthalein test is the most valuable single test. If the excretion is decreased, though only slightly, the non-protein N or urea of the blood should also be detd.

I. GREENWALD.

Studies in pancreatic disease. I. Duodenal content analyses as an index of disease and functional activity of the pancreas. II. Observations on fat and nitrogen metabolism in diseases of the pancreas. BURRELL B. CROHN. Mt. Sinai Hosp., New York. *Arch. Intern. Med.* 15, 581-607(1915).—Diminution in the enzymic activity of the duodenal contents is a reliable indication of organic disease of the pancreas. Only rarely does a diminution occur as a symptom of advanced organic disease elsewhere. The absorption of fat and of N appears to be independent of the character of the secretion of the pancreas. Absorption tests indicate the functional activity of the gland, not its organic condition.

I. GREENWALD.

Investigation of the blood enzymes in the albumin and globulin fractions of the serum. G. SATTA. Torino. *Arch. sci. med.* 39, 46-50(1915).—The albumin fraction contains all the tributyrinase, amylase, and glycyl-L-tyrosinase. The enzymes thus show a marked difference from complement, which may be divided between the 2 protein fractions.

M. HEIDELBERGER.

The excretion of antigen. AGNES E. PORTER. London. *Biochem. J.* 9, 1-8 (1915).—Egg white introduced parenterally into a rabbit is excreted unchanged in chem. properties, but may be in three possible variations as regards specificity: (1) It may retain partial properties as antigen, binding complement in the presence of anti-egg serum, not causing pptn. but capable of exercising an influence over an antibody so as to prevent it pptg. with fresh antigen; (2) it may be excreted in a non-specific form completely indifferent as antigen; (3) it may retain full antigen properties. This variation in specificity of excreted albumin points to a physical rather than a chem. explanation of the precipitin reaction.

B. H.

Experiences with the Abderhalden reaction. EBELER AND LOHNBERG. *Berl. klin. Wochschr.* 52, 319-21(1915).—Twelve normal women failed to give a positive Abderhalden reaction with placental tissue. Of 11 cases of extra-uterine pregnancy, 6 gave a positive reaction and 5 a negative reaction. In 39 cases of normal pregnancy, only 1 did not give the reaction; in 61 gynecologic cases, without pregnancy, the reaction was positive 12 times. These 12 positive cases had either a fever or a tumor. In 37 cases of uterine carcinoma, the reaction with normal placenta was positive in 9 instances. In 28 cases of carcinoma of various organs, the reaction was positive with carcinoma tissue 23 times. In 13 of these cases that had been treated with X-rays and Ra emanations, the reaction was negative in 2 and weakly positive in the remaining.

JULIAN H. LEWIS.

Preliminary report on the study of protective enzymes of blood by the Abderhalden method after transplantation of organs. C. GOODMAN. New York. *Annals Surg.* 61, No. 2(1915); *J. Am. Med. Assoc.* 64, 1030.—Working with the thyroid it was found possible in 8 out of 14 specimens to demonstrate the presence in the blood of a protective enzyme capable of digesting suprarenal tissue. L. W. RIGGS.

H. PHARMACOLOGY.

ALFRED N. RICHARDS.

The effect of sodium salicylate on various types of experimental arthritis. DAVID J. DAVIS. Chicago. *Arch. Intern. Med.* 15, 555-7(1915).—The administration of Na salicylate to rabbits inoculated with various types of streptococci had no effect on the course of the infection. I. GREENWALD.

Action on the blood and the hematopoietic organs of benzene and its side-chain homologs. GUIBERTO BIANCHI. Siena. *Arch. sci. med.* 39, 1-45(1915).—Toluene, xylene, and cymene, injected into rabbits in doses of 1-2 cc. per kg. (the max. tolerated) produced a moderate leucocytosis and a notable hyperplasia of the leucogenetic elements, especially the bone-marrow; there also occurred a reduction of about 20% in the erythrocytes and a marked and persistent increase in the blood-platelets. Benzene, on the other hand, while affecting the erythrocytes similarly, causes an almost complete disappearance of the blood-platelets. This would seem to argue against the view that the platelets are genetically related to the erythrocytes. M. HENSELMEIER.

Quantitative researches on acetylation processes in the animal organism. II. Influence of acetic, pyroracemic and acetoacetic acids upon the formation of *p*-acetylaminobenzoic acids. MARIE HENSEL. Königsberg i/Br. *Z. physiol. Chem.* 93, 401-31(1915); cf. *C. A.* 9, 328.—The amt. of *p*-acetylaminobenzoic acid excreted by rabbits is increased 61.11% by the injection of AcONa, 32% by pyroracemic acid and 18% by Et acetoacetate, while AcH did not cause any increase. This indicates that pyroracemic and acetoacetic acids are decompd. with AcOH₂ as an intermediate step. The same results were obtained (differing in degree) with *p*-aminobenzaldehyde. Some of the expts. with this compd. indicate that the body stores the substances yielding AcOH, since the amt. of Ac deriv. is larger in the after-period than during the main part of the expt. G. M. MEYER.

Action of several indifferent narcotics upon the permeability of red blood corpuscles. ARTHUR JOEL. Univ. Kiel. *Arch. ges. Physiol.* 161, 5-44(1915).—Indifferent narcotics, when used in sufficiently small concn., produce a lowering of the increased permeability of red blood cells, artificially produced by other substances, thus retarding hemolysis. In higher concns. the indifferent narcotics are themselves hemolyzing. The importance of the surface tension and inner friction of narcotics for narcosis is discussed. The action of small amts. of narcotics upon permeability is reversible. C. J. WEST.

Morphine as an analgesic (BERTRAND) 17. Poisonous woods (MATTHES) 17.

12. FOODS.

W. D. BIGELOW AND F. F. FITZGERALD.

Mate tea. A comparative study of stimulants. R. BRIEGER. *Pharm. Zentral-halle* 55, 975-8(1914).—Mate tea is prepd. from the leaves of *Ilex paraguariensis* and several other species of *Ilex*, indigenous to S. America. It yields a pleasant beverage that is considerably less astringent than ordinary tea. One sample yielded 2.5% caffeine, while a coffee gave 2.66%, a green tea 4.3%, and a black tea 4.6%. C. O. E.

A maximum stem content standard for tea. A. A. BESSON. Basel. *Chem. Ztg.* 39, 82(1915).—In the revision of the Schweiz. Lebensmittelbuch, it is proposed to limit the admissible content of stems in tea to a max. of 22%. B.'s investigations indicate that Chinese teas all have less than 22% stem content, Ceylon teas contain over 70%, India teas 60%, and those from Java 50%, of stems. Since the amt. of stems in any variety of tea depends upon the particular method of gathering and has no effect upon the quality of the tea, it is not advisable to have a max. stem standard for tea.

H. S. BAILEY.

The destruction of bacteria in milk by ultraviolet rays. S. H. AYERS AND W. T. JOHNSON. Washington. *Centr. Bakt. Parasitenk. Abt. II* 40, 109-13(1914).—It is shown that ultraviolet rays may markedly reduce the bacterial content of milk, but they have no effect on vegetative cells. This method of sterilizing milk could not replace pasteurization because there would be no assurance of the destruction of pathogenic bacteria. Ultraviolet rays impart to milk a disagreeable odor and taste which would render it unsalable.

JULIAN H. LEWIS.

The routine detection and estimation of boric acid in butter. HERBERT HAWLEY. *Analyst* 40, 150-2(1915).—*Turmeric reagent*: A mixt. of 5 g. powdered turmeric root and 5 g. tartaric acid is digested with 3 successive portions of 150 cc. warm alc. (industrial methylated spirits is satisfactory). Each digestion should continue for not less than 1 hr. and each successive portion should be filtered, and the vol. finally made up to 500 cc. with alc. The reagent should be kept in the dark. The *method*, which is rapid and approximate, is as follows: Place 20 g. of butter in a 40-50 cc. beaker, melt on a Cu tray over a water bath or steam oven, and keep warm until the curd and aq. layer have sepd., leaving the fat clear. Pour off the fat as far as possible onto a filter paper placed in a small beaker (taking care that none of the aq. layer is poured onto the filter), and det. the const. of the filtered fat in the usual manner. To the aq. residue in the beaker add 18 cc. dil. HCl (20 cc. conc. HCl per l.), stir, and keep warm for a few min. Allowing 2 cc. for the water in the butter, the 20 cc. of acid soln. contains the H_3BO_3 present in the butter, together with curd and a little fat. Remove 10 cc. of the fat-free liquid by means of a pipet dipped to the bottom of the liquid, and reject the liquid remaining in the beaker. Return the 10 cc. portion to the beaker. This portion is opalescent and almost free from fat, but contains a little curd. Allow the beaker to cool, and add 5 cc. of the turmeric reagent. The samples containing H_3BO_3 slowly develop a reddish brown color, the intensity varying with the amt. Approx. estimates may be made by comparison with standards containing 0.5 cc. milk plus varying amts. of a standard H_3BO_3 soln. (1 g. H_3BO_3 in 100 cc. dil. HCl (20 cc. conc. HCl per l.)), the mixt. being dild. to 10 cc. with the dil. HCl. Milk may be preserved with HCHO for the purpose. Add 5 cc. of the turmeric reagent to each standard and make comparisons not less than 1.5 or more than 3 hrs. after the addition. An unmistakable color is developed in the presence of 0.05% H_3BO_3 , and up to 0.5% can be estd. to the nearest 0.1%. The method is not recommended for samples containing more than 0.5% H_3BO_3 . A simple device for rapidly measuring approx. 20 g. samples of butter consists of a 6 in. glass tube having a $7/8$ in. bore. A plunger is made by boring a hole nearly through a solid rubber stopper which will just slide into the tube. A piece of narrow glass tubing with a bulb at the end is inserted in the hole and string tied tightly around the narrow end of the stopper. The plunger is raised and the tube pressed into the butter. The plunger is then pressed down to the mark which is adjusted so that the tube then contains 20 g., and the butter pressed out into the beaker.

P. B. DUNBAR.

The bacterial flora of Liptau cheese and its influence on the ripening and sharp flavor. O. GRATZ AND K. VAS. *Centr. Bakt. Parasitenk. Abt. II* 41, 481-545(1914);

Chem. Zentr. 1915, I, 492-3.—The lactic acid bacteria represented mainly by *B. casei* are most abundant in Liptau cheese. The accidental flora is the first to vanish. Only the *B. putrificus* group is able to do any harm by bad tastes and odors. Ripening is due specifically to the enzymes protease and lipase, and the mold *Oidium lactis*. The sharp flavor of Liptau cheese is due to the enzymes from fat-splitting bacteria or molds. If not due to these, it may be caused by a butyric acid fermentation.

FRED W. TANNER.

The application of hardened fats in the food industry. H. THOMS AND FRANZ MULLER. Berlin. *Arch. Hyg.* 84, 56-77(1915).—An extensive study was made of the chem. and physical properties and physiological action of peanut oil, pine oil, and cottonseed oil which have been altered by a patented process so that they have a higher m. p. Feeding expts. on man and animals indicate that they are harmless and are to be considered as useful articles of diet.

JULIAN H. LEWIS.

Pure bread and flour. ANON. *Chem. News* 111, 176-7(1915).—A memorial to the President of the Local Govt. Board (Eng.) and suggestions made by the Council of the Bread and Food Reform League thereon. The Board is urged to prevent the abstraction from whole meal, wheat meal, etc., of the "germ" and the strong gluten found in "Patent" flours. Also if bleaching and the use of so-called "improvers" cannot be prohibited, it is urged that places selling bread made from bleached flours be required to display a notice to the effect that such flours are used. Numerous publications relative to the value of whole wheat flours and the minute quantities of certain substances, "vitamines," are quoted. In England, only 70 tons of white flour are made from 100 tons of wheat, while 88 tons of better and more nutritious flour can be made.

H. S. BAILEY.

Note on the determination of sulfates in flour. G. D. ELSDON. *Analyst* 40, 142-3(1915).—The following method is recommended in the case of self-raising flours containing CaHPO_4 : Add 10 g. flour to 25 cc. conc. HCl in a 250 cc. beaker. Warm gently on a water bath for a few min. until all the flour has been attacked and the liquid is a deep purple color. Finally heat on a hot water bath for about 1 hr. without allowing the beaker to come in contact with the steam. Add 100 cc. water, and after standing a few min. filter the liquid and wash the filter once with cold water. Heat the filtrate to boiling, add BaCl_2 and weigh the pptd. BaSO_4 . When detg. sulfates in a phosphatic self-raising or an "improved" flour, 0.025% CaSO_4 should be allowed as that due to the sulfate normally present in flour.

P. B. DUNBAR.

The ash content of black bread. K. SCHERINGA. *Pharm. Weekblad* 51, 1419 (1914); *Chem. Zentr.* 1915, I, 268.—According to the codex, black bread with more than 1% ash is not suitable for use. This is an error, since the flour used in making this bread may contain more ash.

E. H.

The influence of temperature on the microflora of hay; lactic and butyric hays. C. GORINI. *Rend. r. accad. Lincei* [5] 33, I, No. 12(1914); *Bull. Agr. Intelligence* 5, 1626-7.—G. applied the methods of silo research (C. A. 9, 1442) to hay. The results confirm those obtained in the case of the silos. Normal hay may be classified as lactic or butyric according to the predominant microflora. During the first 3-5 days of fermentation with a temp. of 50-55° the hay was prevailingly lactic. As the temp. gradually rose to 60-65° the mass tended to become more butyric. Most hay is of the butyric type and consequently less favorable to the intestinal functions of live stock and to the sanitary condition of milk and its products. To obtain lactic hay care should be taken in stacking to expel as much air as possible and to maintain a temp. of about 50°.

M. X. SULLIVAN.

The preparation of ensilage. F. SAMARANI. *Boll. ministero agric.* 13, Nos. 8-12, pp. 87-103; through *Bull. Agr. Intelligence* 5, 1625(1914).—During the first

few days after the grass has been put into the silo, an acetic and a lactic fermentation of the sugars and cell-sap takes place. The sugars, in an almost complete absence of O, are first converted into EtOH and CO₂; then by chem. or physiological, certainly not by bacterial, action the EtOH is changed to AcOH. The 2nd process, due to bacilli, is an ordinary lactic acid fermentation. About 70% of the total free acid is AcOH, 20% lactic and 10% butyric. If sufficient acidity is not soon attained, a putrefactive fermentation sets in. This is best prevented by adding dil. lactose to the ensilage. To make good ensilage it is necessary to avoid overheating, to limit the AcOH production and leave the sugars, also, for the lactic fermentation. This can be done by applying mechanical pressure as soon as the silo is full, thus forcing out the air. Where pressure is used the fodder contains 70% lactic and 20% acetic acid, while with the ordinary silo these proportions are reversed.

H. S. BAILEY.

Determination of tartaric acid (KLING) (ASTRUC) 16. Hardened fats as food (THOMS) 11E. Sweet sorghum as fodder (ANNETT) 28. Colloidal swelling of wheat gluten (URSON) 11A. Detection of cinnamic acid (SCHENK) 7. Test for sesame oil in olive oil (SAGE) 27. Weeds as feed (KLING) 15.

U. S., 1,137,265, Apr. 27. R. HÜBNER. Making "coffee tablets" by extg. ground coffee successively with alc. (or alc. and ether) and with H₂O, treating the first ext. with MgO or NaOH to saponify the fatty constituents and removing the latter, and then combining the 2 exts., evapg., mixing with sugar of milk, molding into tablets and coating the latter with gelatin or vegetable albumin.

U. S., 1,138,097, May 4. H. FELDMEIER and C. B. DALZELL. Pasteurizing milk and cooling it while flowing in a continuous stream through the app. used. Cf. C. A. 8, 3605.

U. S., 1,138,380, May 4. G. D. HARRIS and J. S. POLLARD. Forming a soluble dry milk powder by heating the milk to about 37° and treating it in the form of a fine spray with dehydrated air at about the same temp.

U. S., 1,138,602, May 4. H. GOSLAR. Conserving fish, blood, animal glands, juices of fruits and vegetables, etc., by mixing with fibrin and cereal flour, forming the mixt. into thin sheets and quickly drying at a low temp.

U. S., 1,138,769, May 11. J. C. MACLACHLAN. Apparatus for desiccating milk or other liquids.

U. S., 1,138,887, May 11. H. E. PLUNKETT. Preserving bananas by steaming the peeled fruit until it is cooked and the stain from the peel is removed, partly drying to form a superficial crust and leave the interior of the fruit soft, and packing in sirup or otherwise excluding air.

U. S., 1,138,888, May 11. H. E. PLUNKETT. Making a food from bananas by soaking pulped banana meat in H₂O and drying *in vacuo* at a low temp. for about 10 hrs. The treatment removes the stain from the fruit, which may then be granulated.

U. S., 1,139,031, May 11. F. GÖSSGL. "Artificial milk." See Ger., 268,606 (C. A. 8, 1629).

Brit., 212, Jan. 2, 1914. J. FRIEDMAN. Soy beans are treated to remove the unpleasant flavor by decorticating, grinding, and then heating with dry heat, with continuous stirring, to drive off the moisture, which carries off the flavor. The product is employed in making bread, chocolate, and other confectionery, soup, etc.

Brit., 216, Jan. 3, 1914. A. RUTTER. Sterilizing milk and cream. See Can., 154,674 (C. A. 8, 1842).

14. WATER, SEWAGE AND SANITATION.

EDWARD BARTOW.

Contributions of the chemist to the potable water industry. W. P. MASON. *J. Ind. Eng. Chem.* 7, 289-90(1915). ISADOR MILLER.

Contribution to water analysis. Rapid determination of magnesium by titration in the presence of calcium. VICTOR FROBOESE. Berlin. *Z. anorg. Chem.* 89, 370-6 (1914).—In the detn. of hardness in water analysis, Blacher's method (*C. A.* 7, 1938) is used for total hardness. Ca is pptd. as CaC_2O_4 , and Mg is titrated with K palmitate soln., without removing the ppt. Ca is detd. by difference. 200 cc. (samples up to 1 l. may be used) of the water are heated to boiling; 1 drop methyl orange is added; then an excess conc. $\text{H}_2\text{C}_2\text{O}_4$ soln.; then enough 50% KOH just to give the yellow color (an excess is to be avoided). The soln. on cooling should regain a slightly reddish tint. To the cooled soln. add 5 drops phenolph. and just enough 0.1 N KOH to give a weak rose tint, then titrate with 0.1 N K palmitate. The results given are good. In the Winkler method (*C. A.* 8, 2912) instead of taking the end point as the rather indefinite "permanent lather," F. titrates until the sound of the bubbles breaking can no longer be detected when holding the titrating flask close to the ear. G. W. M.

Colorimetric determination of nitrous acid. G. ROMIJN. *Chem. Weekblad* 11, 115-6(1914).—For the detn. of HNO_2 in drinking water, the ordinary colorimetric method with α -naphthylamine and sulfanilic acid is modified by adding the reagent in the form of a dry powder containing α -naphthylamine 1, sulfanilic acid 10 and tartaric acid 89 parts. The chief disadvantage of the method is caused by the fact that when the sample contains more than 0.15 mg. NO_2 per l. the pigment of the indicator ppts. This may be recognized by the rapid production of a too intense color, and remedied by diln. and addition of more reagent. The formation of a yellow color indicates too little reagent. The best procedure in case large amts. HNO_2 are present is to add NH_4OH as soon as the color becomes too strong, thereby forming sol. NH_4NO_2 (the addition should be continued until the red color changes to yellow). The soln. is dild., acidified with AcOH , and more of the above reagent is added. G. W. M.

The distillation of sea water to render it potable. ERNST GOLZ. *Chem. App.* 2, 5-7, 17-19(1915).—Five cuts show details of an app. which it is claimed will yield 100-240 lbs. H_2O per lb. coal, and 1 cut shows an app. at Baku for 1,800,000 l. daily. J. H. MOORE.

The normal chlorine content of surface waters of Western Florida and a comparison of volumetric methods of chlorine analysis. C. A. BRAUTLECHT AND B. N. LANGLEY. *J. Ind. Eng. Chem.* 7, 357-8(1915).—Comparing the Volhard and Mohr methods, using 0.1 N solns., the former gives more satisfactory, concordant and accurate results but takes longer. Both 0.01 N NH_4CNS and 0.01 N AgNO_3 are too dil. to give sharp endpoints but careful manipulation of a 0.1 N soln. gives as accurate results as the use of more dil. solns. ISADOR MILLER.

Feed water and its treatment. WILLIAM BARROWMAN. *Iron Coal Trades Rev.* 89, 180-2(1914).—A review of methods. H. L. OLIN.

Description of Navy standard boiler water-testing outfit. ANON. *U. S. Navy Dept. Circ.* 12 pp. R. S. MCBRIDE.

Air-bound filters. JAMES M. CAIRD. *J. Am. W. W. Assoc.* 2, 103-6(1915).—Air-bound filters are caused by the release of air from the water during cold weather, particularly when the temp. of the water is below 50° F. The released air collects in the voids of the gravel, and in rapid sand filters perforates the sand beds. In slow

sand mits the wt. of the sand holds the air in the gravel and prevents the water passing through the bed. C. advises back washing the beds to overcome the trouble.

S. T. POWELL.

Collapseable hypo plant packed in a trunk. H. A. WHITTAKER. *U. S. Public Health Rept.*, Feb. 26, 1915; *Eng. Record* 71, 373(1915).

F. BACHMANN.

Philadelphia water filter operations in 1914. C. E. DAVIS. *Eng. News* 73, 576-7(1915).—Tables show costs, method of operation and physical, bacterial and chem. analyses. Av. turbidity is 20.2 p. p. m. for raw water, 9.5 p. p. m. for applied water. Bacteria in raw water average 16,800 per cc. and in filtered water 51 per cc. Gelatin counts (20°) are from 4 to 8 times as high as agar counts at 37°. Cost per mil. gals. ranges from \$2.23 to \$5.10 in different plants.

LANGDON PEARSE.

Toronto test of drifting sand filters. G. D. NASMITH AND FRED ADAMS. *Can. Eng.* 28, 433-8(1915); *Eng. News* 73, 680-1(1915); *Eng. Rec.* 71, 464-5(1915); *Eng. Contr.* 43, 351-2(1915).—This describes a test of a 500,000 gal. filter in which the sand is constantly being removed, washed and replaced by mixing with raw water. A coagulant, $Al_2(SO_4)_3$, is used, but no coagulating basin is provided. In a 36-day test 99.0% of bacteria were removed (agar 37°). In washing, 2% raw and 1% filtered water are used. Av. rate of filtration was 149 mil. Imp. gal. per acre per day. The initial loss of head was 7 ft. and the final loss 14 ft.

LANGDON PEARSE.

Water supply treatment of Council Grove, Kansas. L. L. TRIBUS. *J. Am. W. W. Assoc.* 2, 83-102(1915).—A description of a remodeled mechanical filter plant operated in connection with sedimentation basins. During test periods the dose of alum used was as high as 20 grains per gal. It was later reduced to from 4 to 6 grains, and in cold weather 0.5 grain has been successful. A detailed report of the results obtained during the test of the plant is given. The use of $Ca(OCl)_2$ at a rate of 8 to 10 lbs. per mil. gals. of water is advised.

S. T. POWELL.

Chemical composition of waters in German cities of more than 10,000 population. BUNTE. *J. Gasbel.* 58, 76-9(1915).—A table gives comp. of water supplies of 309 cities.

ARTHUR LEDERER.

Water supply of Bayreuth (Germany). BRUNNER. *J. Gasbel.* 58, 113-5(1915).—A description of the plant. A deep well supply is used.

ARTHUR LEDERER.

The water supply of Würzburg (Germany). K. ZIMPELL. *J. Gasbel.* 58, 53-7, 65-7(1915).—A technical description of the plant, which uses a deep well water.

ARTHUR LEDERER.

Two years' tests indicate best treatment for Chicago stock yards wastes. GEORGE M. WISNER AND LANGDON PEARSE. *Eng. Record* 71, 266-8(1915).—See C. A. 9, 677.

FRANK BACHMANN.

English experiments on sewage aeration reviewed as preliminary to Baltimore tests. LESLIE C. FRANK. *Eng. Record* 71, 288-9(1915).—F. enumerates features of the activated sludge process at Manchester and Salford as described by Arden and Lockett (C. A. 8, 2207, 2766). A continuous flow tank will supersede draw and fill methods.

FRANK BACHMANN.

The Milwaukee sewage tests. ANON. *Eng. News* 73, 650-1(1915).—The sewage testing station includes coarse screening ($1\frac{1}{4}$ in. openings in bar, or 16-mesh), grit chamber, Imhoff tank, chemical pptn., colloid or slate tank with forced aeration sprinkling filters, and liquid Cl. The slate tank is but little more effective than an Imhoff tank.

LANGDON PEARSE.

Garbage and rubbish incinerator recommended for Albany, N. Y. RUDOLPH HERRING AND JOHN H. GREGORY. *Eng. News* 73, 565(1915).—A high temp. garbage

and rubbish incinerator is recommended, with the use of steam to pump sewage, and the use of clinker for concrete pavement foundation. A capital outlay of \$199,650 for disposal and \$35,420 for collection equipment is required. LANGDON PEARSE.

The sludge disposal plant at Frankfort a/M. H. SCHAEFER. *Gesundh. Ing.* 38, 97-108, 109-118(1915).—The av. comp. of the sewage sludge is: sp. gr. 1.02, H_2O 90, org. volatile matter 65, fixed matter 35, org. N 2-3 and fats 10-15%. The last 4 constituents are calcd. on a dry basis. Expts. were made with simple drainage on sand and utilization of sludge as fertilizer, mixing the sludge with garbage, drying it in a centrifuge, filter pressing, and prepg. briquettes. None of these processes has been found to be economical. The extn. of fat likewise has not proved economical. Expts. on mfg. illuminating gas failed on account of inability to obtain sufficient quantities of the dry sludge. The yield of gas, however, came up to expectations. A number of other procedures which had for their object improvement in the sludge drainage proved too costly. Among these are the electro-osmotic process and the lime process. After centrifuging, the sludge had a H_2O content of 60-70%. Expts. carried on over several years proved the practicability of sludge drying by the use of the centrifuge, and a large plant was installed. A complete technical description of the plant is given. The centrifuged sludge is mixed with garbage and incinerated. Previous to incineration the sludge is still further dried in drums by utilizing the excess heat of the garbage incineration plant. Throughout the entire process the sludge is not touched by hand. All conduits, conveyers, and app. are enclosed. The heat resulting from the incineration of the sludge and garbage is converted into steam and elec. current. Preliminary figures seem to indicate that the cost is almost covered by the sale of elec. current. The plant is the first one on the continent which has solved the sludge problem in a thoroughly satisfactory manner.

ARTHUR LEDERER.

Sewage treatment at Hagen (Westphalia). ENDRIS. *Der Städtische Tiefbau* 5, 57-66, 69-76(1914); *Wasser u. Abwasser* 9, 161-3(1915).—The effluent discharges into the Ruhr. For the present the plant takes care of a population of 60,000. The sewage is roughly screened, after which it passes into a grit chamber at a velocity of 0.1 m. per sec. and into Emscher settling tanks, of which there are 16. The flow in the tank is 120 l. per sec. for 2 hours. The sludge is drained and dried on sand. The installation of trickling filters is contemplated when necessity arises. A. L.

Portable disinfection apparatus in warfare. F. A. EBERT. *Gesundh. Ing.* 38, 87-9(1915); illus.—Description of an app. which can be used for steam disinfection at a temp. of 100-110° as well as for formaldehyde-steam disinfection at 60-65°. The latter is employed for more sensitive material, such as furs and leather goods. The technical features and mode of operation are discussed.

ARTHUR LEDERER.

Substitute for Nessler's reagent (GRAVES) 7.

U. S., 1,137,005, Apr. 27. A. JACOBSON. **Coagulant for water purification** formed of equimol. proportions of $FeSO_4$ and $Al_2(OH)_2(SO_4)_2$. It is made by passing an aq. soln. of $Al_2(SO_4)_3$ over metallic Fe.

U. S., 1,137,581, Apr. 27. M. COLE. **Filter for purifying water.**

U. S., 1,138,202, May 4. G. ERLWEIN and C. KNIPS. **Apparatus for purifying water by treatment with ozone.**

U. S., 1,138,634, May 11. J. M. DAVIDSON. **Separating detritus from sewage or other liquids.** The mixt. is run onto a granular filter bed through which only the liquid can pass and is continually agitated by air which is passed upward through the

filter. The flow of liquid and air is stopped intermittently and the detritus on the filter dried by heated gas.

U. S., 1,139,024, May 11. L. C. FRANK. Purifying sewage by agitating and oxidizing a flowing stream at one point in its path by injection of jets of air, allowing the sediment to settle at another point in the path of flow and returning the sediment to the point of oxidation for further treatment.

U. S., 1,139,378, May 11. K. SCHREMPF. Softening water by heating under pressure and then drawing off into a chamber where the pressure is lower and in which the insol. carbonates are allowed to ppt.

U. S., 1,139,402, May 11. J. M. DAVIDSON. Apparatus for straining and filtering sewage and recovering the solid constituents.

Brit., 30,048, Dec. 31, 1913. L. GIOMMI. In app. for sterilizing liquids in bottles, etc., of the kind specified in 9,912, 1912, a central heating and cooling chamber is provided, and either the bottles are placed in rotary drums or the heating and cooling jacket is divided into compartments, the lower of which are at higher temps., so that the pressure fluid is uniformly heated.

Fr., 464,670, Nov. 8, 1913. MASCHINEN- UND WAGGONBAU-FABRIK AKT.-GES. In water purification, before elec. sterilization the H_2O is passed through a filter of fibrous material of like bodies of small wt., and then through a sand or clay filter. Cf. C. A. 9, 1214.

Fr., 468,047, Feb. 4, 1914. K. SCHREMPF. Softening water. See U. S., 1,139,378 (*supra*).

Fr., 468,242, Feb. 9, 1914. C. P. LANDRETH. Electrochemical purification of back waters. A portion of the water (to which in certain cases salts are added) is electrolyzed in an app. containing Al, or the like, which yields the hydroxide, and this portion is then added to the remainder of the impure water.

Fr., 468,277, Feb. 10, 1914. C. P. LANDRETH. Electrochemical purification of back waters. Alkalies (CaO, KOH, etc.) are added to the H_2O containing the dye and organic matter, and the water is then subjected to oxidation by means of Fe electrodes. Cf. C. A. 9, 1083.

Ger., 279,353, Dec. 15, 1912. B. BLEICKEN. App. for distilling water by vaporization under reduced pressure.

Ger., 279,978, Jan. 28, 1913. Addition to 275,379 (C. A. 9, 497). E. MANN & Co. App. for clarifying back waters of paper-, cellulose-, and like factories, differentiated from the app. specified in the principal patent in that the water is introduced from below through a vertical tube.

Ger., 280,691, Sept. 4, 1912. PERMUTIT-AKT. GES. Softening water by means of a product obtained by heating alkali silicate solns. with H_2O -sol. salts of the alkalies or alk. earths. If hard H_2O is shaken up with such products, a test of hardness (Ca and Mg salts) shows these salts to be greatly reduced in amt. or entirely removed. The used material may be regenerated by means of NaCl.

Ger., 280,864, June 28, 1912. Addition to 277,701 (C. A. 9, 945). A. KANNENBERG. In a closed app. for removing iron from water, air, for oxidation, is introduced, by means of a hand pump, into the aerating chamber periodically, *e. g.*, daily, whereby the exhausted air is removed.

Ger., 280,866, Mar. 10, 1914. MASCHINENFABRIK BUCKAU. Screen for removing suspended matter from back waters.

Ger., 280,907, Sept. 2, 1913. H. HERZBRUCH. Device for removing water from slime chambers.

Ger., 280,997, Feb. 24, 1914. H. LAUBACH, MASCHINEN- UND ARMATUREN-FABRIK. Regulating devices for use in connection with app. for the production of carbonated water.

Ger., 280,998, Oct. 28, 1913. M. RIEGEL. Sterilization of potable water at the ordinary temp. (or at 40°). The employment of H_2O_2 is open to the objection that a comparatively large amt. of it is necessary. The addition, however, of HCl materially increases the bactericidal action of the H_2O_2 . After destruction of the bacteria, the free acid is neutralized by NaHCO_3 . E. g., 100 l. of filtered Berlin conduit water are mixed with 200 g. 25% HCl, and then with 200 cc. 3% H_2O_2 . After 24 hrs., 112 g. NaHCO_3 (pure) are added. Any excess of H_2O_2 present is removed catalytically. The resulting sterile water is characterized by a pleasant, fresh taste. The time of sterilization is shortened by heating the H_2O to 40° .

Ger., 281,000, Oct. 18, 1913. F. W. SCHRANK. Constructional details of an app. for purifying back waters.

Ger., 281,080, Aug. 2, 1913. W. LOEBEL. App. for the settling suspended matter from liquids, especially back waters.

15. SOILS AND FERTILIZERS.

M. X. SULLIVAN.

The atmosphere of the soil, its composition and the cause of variation. E. J. RUSSELL AND A. APPELYARD. *J. Agr. Sci.* 7, 1-44 (1915).—The free air in the pores of the soil to a depth of 6 inches is very similar in comp. to the atm. air but differs in 2 respects: (a) It contains more CO_2 and correspondingly less O_2 , the av. in 100 vol. being 0.25 vol. CO_2 and 20.6 of O_2 against 0.03 vol. CO_2 and 20.96 O_2 in atm. air. (b) It shows greater fluctuations in comp. Usually the sum of the CO_2 and O_2 is only slightly less than in atm. air but at periods when nitrates rapidly increase there is a falling off of O_2 , and a still greater one in water-logged soils. Besides this free air there is another atmosphere dissolved in the water and colloids of the soil. This consists mainly of CO_2 and N and has practically no O_2 . The fluctuations in comp. of the free soil air are mainly due to fluctuations in the rate of biochem. change in the soil, the curve being similar to those showing the amt. of nitrate and the bacterial counts as far as they were taken. The rate of biochem. activity attains a max. value in late spring and again in autumn, and min. values in summer and winter. In autumn the bacteria increase first, then the CO_2 rises, and finally the nitrate increases. From Nov. to May the curves closely follow those for the soil temp. which thus appears to be the dominant factor; from May to Nov. they follow the rainfall and to a less extent the soil moisture curves. The difference between rainfall and soil moisture indicates that rainfall does something more than add H_2O to the soil. It is shown that the dissolved O_2 brought in is probably a factor of considerable importance in renewing the dissolved soil atm. and facilitating biochem. change. Grass land usually contains more CO_2 and less O_2 than arable land. This difference cannot be attributed to the crop owing to the larger differences in soil comp. and conditions. No evidence could be obtained that the growing crop markedly increases the amt. of CO_2 in the soil air and if it gives rise to any great evolution of CO_2 in the soil it apparently exercises a corresponding depressing effect on the activities of soil bacteria. Such weather conditions as barometric pressure, wind velocity, variations in temp. from the mean, small rainfall, etc., seem to have but little effect on the soil atmosphere. M. X. SULLIVAN.

The fertility relations in different strata of a soil profile. A. F. v. NOSTITZ. *Landw. Jahrb.* 47, 113-52 (1914); *Chem. Zentr.* 1915, I, 214-5.—Pot expts. were carried

out on 3 different soil types to det. the vegetative relations existing between the soil and subsoil at various depths as well as the causes responsible for the poorer productivity of the subsoil. The results are summed up as follows: the productivity of the soil becomes less with increasing depth. The differences in the plant yields were diminished by the use of fertilizers but they were not eliminated entirely. The mineral content of the separate crop products did not decrease at the same rate as the crop yield; there may be even a higher % in the lower strata. As causes for the lower soil fertility of the soils in the deeper strata, the following are given: (1) lower bacterial content, (2) lower humus content, (3) lower N content and (4) smaller amt. of available P_2O_5 .
C. F. MILLER.

The origin of "nitre spots" in certain western soils. R. STEWART. *J. Am. Soc. Agron.* 6, 241-8 (1914).—The nitrates of the nitre spots of Colorado, Utah, and Wyoming are derived by concn. from the original rocks contributing to the soil formation. The color of the spots is the direct result of the solvent and decomposing action of the $NaNO_3$ or KNO_3 upon the organic matter of the soil. The nitre spots are not characteristic of irrigated, cultivated soils, but are also produced in uncultivated areas whenever the ground water conditions are favorable for their formation. M. X. S.

Relation of chemical composition to soil fertility. G. S. FRAPS. *J. Am. Soc. Agron.* 7, 33-6 (1915).—Three methods given for detg. soil fertility are field expts., pot tests and chem. analyses. An average of a large number of pot expts. at the Texas Exp. Sta. shows that the active P_2O_5 and K and the total N are directly related to the soil deficiencies brought out by the plant's growth.
J. J. S.

Petrography of various soils derived from volcanic ejecta. W. H. FRY. *J. Am. Soc. Agron.* 6, 164-71 (1914).—Mechanical and mineralogical analyses of a number of soils from the U. S. and Hawaiian Islands, known to be of volcanic origin, are reported. It is stated that the presence of glassy material in a soil is generally an indication that it is of volcanic origin. The soils examd. fall into 3 groups: (1) very silicious soils containing much quartz and material of low refractive index, (2) soils containing little or no quartz and large amts. of material of higher refractive index and also much olivine, and (3) soils characterized especially by the presence of well developed lime soda feldspars.
C. F. MILLER.

Study of methods used in alkali determinations. A. E. VINSON AND C. N. CATLIN. *Aris. Sta. Rpt.* 1913, 274-7.—Comparative tests of the Calif., Montana, Bur. of Soils, Texas, N. Mexico, Utah and Arizona methods on a very black alk. soil, a moderately black alk. soil, and a gypsum soil, showed that the Arizona method gave high results for all detns. except chlorides. A large proportion of water to soil and long digestion are required to ext. the max. of solids.
WM. P. GARRETY.

The partial sterilization of soils. E. J. RUSSELL. *Nature* 94, 308-11 (1914).—A summary of the results of investigations on the effect of partial sterilization of soil by means of heat, lime, and volatile antiseptics on the growth of plants and on the relation of protozoa thereto.
B. E. B.

Antagonism between anions as affecting soil bacteria. CHARLES B. LIPMAN AND PAUL S. BURGESS. *Centr. Bakt. Parasitenk. Abt. II* 42, 502-9 (1914).—Very slight, perhaps questionable antagonism between anions occurs for the N-fixing flora of sandy soil from Anaheim, Cal., when Na_2CO_3 and $NaCl$ are mixed, whether one or the other is used as a constant toxic factor. The same is true when $NaCl$ and Na_2SO_4 are combined provided the first named salt is the const. toxic factor. It is not true when Na_2SO_4 is used as the const. toxic factor. No antagonism is obtained between Na_2CO_3 and Na_2SO_4 , no matter which of them is used as the const. toxic factor. The concs. at which N fixation ceases are lower when the salts are mixed than when they are used singly.

The N-fixing flora differ totally in respect to antagonism between anions from the ammonifying and nitrifying flora of the same soil. The resistance of these N-fixing flora, however, to the effects of salt is far greater than that of the other flora named.

JULIAN H. LEWIS.

Notes on some methods for the examination of soil protozoa. C. H. MARTIN AND K. R. LEWIN. *J. Agr. Sci.* 7, 106-18(1915).—It is pointed out that the protozoan population of any soil should be studied for the detection of active fauna, active fauna in fresh fixed films and for cultural fauna. Soils of different types including some from the Rothamstead exptl. field were examd. and protozoa were found present in all unproductive samples. Protozoa may be added to soils in farmyard manure and if conditions of culture are such as to necessitate high water and manure content they develop and produce harmful effects. The dominant active fauna of the soils examd. consists mostly of amebae, thecamebae and small flagellates. Large flagellates and ciliates are relatively rare. The character of the soil, water content and cultural method det. the development of the species.

J. J. SKINNER.

Studies on soil protozoa. A. CUNNINGHAM. *J. Agr. Sci.* 7, 49-74(1915); see C. A. 9, 1361.

M. X. S.

Proof of the origin of smoke acids in rain-water flowing down tree trunks by means of an automatic separator and the influence of these acids on the soil. R. GERLACH. *Samml. Abhandl. Abgase u. Rauchschäden* No. 9, 47 pp.(1914); *Expt. Sta. Record* 32, 422.—The app. permits the sep. collection of rain-waters from diff. smoke sections and the detn. of their acidity. Cropping expts. were conducted. Germination, particularly that of fruit trees, vetch and beans was noticeably retarded by the so-called smoke-sickness of the soil. By substituting pure rain-water for the water contg. smoke acids the more hardy grasses recovered and continued to develop. Analyses of certain soils showed them to be acid, owing to lime exhaustion by the smoke acids in the rain-water. Smooth bark trees were more injured than rough bark trees, and deciduous trees were more injured than evergreen trees.

B. E. BROWN.

Moisture relations of Texas soils. G. S. FRAPS. *J. Am. Soc. Agron.* 7, 31-3 (1915).—It is shown that the application of manure and cultivation of clays and clay loams cause only a little saving of moisture under Texas conditions, while the same treatments of sands and sandy loams cause a decided gain in the conservation of moisture.

J. J. S.

Some unusual soils that occur in Oregon. M. M. MCCOOL. *J. Am. Soc. Agron.* 6, 159-64(1914).—Soils in central Oregon where a great deal of pumice has been deposited are described. Mineralogical exam. showed the presence of material derived from basic as well as acidic rock. The amt. of K, Ca and Mg is abnormally high, the total salts being low. The sub-soil contains more sol. material than the surface. These soils have but little agricultural value unless fertilizer and organic matter are added.

J. J. SKINNER.

Soils of Massachusetts and Connecticut with special reference to apples and peaches. H. J. WILDER. U. S. Dept. Agr., *Bull.* 140(1915).—The principle soil types suitable for various kinds of apples and peaches in these states are described and methods of development discussed.

J. J. SKINNER.

Mutual influences of certain crops in relation to nitrogen. K. F. KELLERMAN AND R. C. WRIGHT. *J. Am. Soc. Agron.* 6, 204-10(1914).—Legumes and non-legumes when grown together both showed an increase in % of N. A reduction in the % of N of the soil occurred by the growth of peas, vetch, barley, rye, and beans in one of the soils experimented with, while the reduction in N of another soil used was not as marked. In the case of non-legumes, especially barley, an actual loss of soil N occurred

above that utilized by the plants. The effect of a given crop upon 2 different soils may be very different both in regard to its effect upon the total soil N and upon the nitrifying power of the 2 soils.
J. J. SKINNER.

Percentage of protein in non-legumes and legumes when grown alone and in association in field mixture. J. M. WESTGATE AND R. A. OAKLEY. *J. Am. Soc. Agron.* 6, 210-15 (1914).—Analyses of 19 samples of non-legumes from fields of typical fertility in several different states and under conditions typical of the surrounding sections, when grown with legumes, showed variations in protein content from 2.02% above to 2.61% below that when grown alone. The protein in the associated legume may also be decreased. It is concluded that the phenomenon of increased protein content in the non-legume because of association with the legume is not so universally true as to make it safe to advocate the method unreservedly as a means of increasing the production of protein.
M. X. S.

The composition and quality of wheat grown in mixtures with oats. C. H. BAILEY. *J. Am. Soc. Agron.* 6, 215-17 (1914).—Expts. carried on at the Minnesota Station showed that wheat grown in mixt. with oats did not vary in comp. and quality from that grown alone.
M. X. S.

Observations on the efficiency of the most important nitrogenous fertilizers. S. OSWALD AND W. WEBER. *Landw. Jahrb.* 47, 79-106 (1914); through *Chem. Zentr.* 1915, I, 215.—Expts. carried out with $(\text{NH}_4)_2\text{SO}_4$, Chile saltpeter, blood meal and CaCN_2 , led to the conclusion that the relative efficiency of the different N fertilizers cannot be expressed by rigid values. A certain advantage of the Chile saltpeter over the other substances is accounted for by the following reasons: (1) Since, in contrast to that of the other materials, its N is in the form required by plants, it is less dependent on certain prescribed conditions; (2) it is nearly entirely available the first year, whereas in the other cases considerable time is required for the conversion of N to NO_3 . $(\text{NH}_4)_2\text{SO}_4$ proved to be on a par with the saltpeter, as did CaCN_2 when used on rape and potatoes. Mixts. of CaCN_2 and saltpeter also gave good results with beets and sugar beets.
C. F. MILLER.

Combined nitrogen for fertilizer. WALTHER HEMPEL. *Z. angew. Chem.* 28, I, 145-7 (1915).—A discussion of urine and excrement as sources of combined N.
W. H. FRY.

Perchlorate in Chile saltpeter. J. G. MASCHHAUPT. *Direktie van dem Landbouw.* 1914, 1-17; *Chem. Zentr.* 1914, II, 1466.—The perchlorate disease of corn is caused by KClO_4 in Chile saltpeter. The av. sample contains about 1.5% KClO_4 . The amt. of injury depends on the kind of grain and the amt. of KClO_4 in the saltpeter. Fertilizer expts. with Chile saltpeter with and without KClO_4 gave irregular results.
E. H. WALTERS.

Fertilizer and oil manufactured from dog fish. E. E. YOUNG. *Daily Cons. and Trade Rpts. (U. S.)* 17, 1373 (1914); *Exp. Sta. Record*, 32, 424 (1915).—An account is given of the production by Nova Scotia and New Brunswick factories of fertilizer and oil from dog fish.
J. J. S.

Dog fish and how it is made into fertilizer. L. B. MARTELL. *Ann. Fertilizer* 42, No. 8, 34-8 (1915).—The process of coking, pressing and drying dog fish for fertilizers is described. It yields a fish scrap high in N.
J. J. S.

Flue dust (from iron works) as fertilizer. *J. Board Agr.* 21, 1043-6 (1915); *J. Soc. Chem. Ind.* 34, 369.—A sample of flue dust from iron works contained nearly 6% K_2O (about $\frac{1}{2}$ was sol. in H_2O) together with about 7% CaO as gypsum. No substance directly injurious to plants was present and the water-sol. Mg was only

0.29%. It is doubtful whether the K could be extd. profitably but the material could be used locally as fertilizer.

M. X. S.

Composition and use of some of the new fertilizer materials. Fertilizing value of some local by-products. H. D. HASKINS. Mass. Agr. Expt. Sta., *Bull.* 155, 173-81 (1914).—The comp. and use of such materials as sheep manure, wool waste, wool waste free of grease, whale guano, rock weed and other recently introduced fertilizers are considered. General information concerning home-mixing, etc., is given.

B. E. BROWN.

Fertilizing materials. F. T. SHUTT. *Canada Exp. Farms Rpt.* 1913, 245-59; *Exp. Sta. Rec.* 32, 424 (1915).—Analyses of marl, limestones, lime-kiln ashes, gypsum, wood ashes, K residue from $O-C_2H_2$ plants, marsh, river and oyster muds, mucks, fish scraps and $Ca(NO_3)_2$ are given and discussed

J. J. S.

The chemical composition of several weeds as well as their value as feed and fertilizer. M. KLING. *Landw. Vers. Stat.* 85, 433-69 (1914); *Chem. Zentr.* 1915, 1, 215.—Analyses of the weeds occurring most abundantly in Rhenish Bavaria show that they remove large amts. of nourishment from the soil. The following proved suitable as green forage plants: cornbind, common goose foot, horse thistle, chickweed, and sow thistle. All of the weeds investigated have an appreciable value as fertilizers due to their high plant-food content.

C. F. MILLER.

Salton sea water. A. E. VINSON AND C. N. CATLIN. *Aris. Sta. Rpt.* 1913, 272-4.—In one year, 1912-3, total solids increased from 846.55 to 1,002.56 parts per 100,000, and the water is now about 1% brine. Ca is decreasing and K is disappearing rapidly. In 1911 the ratio of K to Na to total solids was 1:59.8:188; in 1912 it was 1:71.1:222; and in 1913 it was 1:94:288.

WM. P. GARRETY.

The relation of sulfur to soil fertility. O. M. SHEDD. Ky. Agr. Expt. Sta., *Bull.* No. 188, 35 pp. (1914).—Tables are presented showing total S content of different plants and, in addition, the % of S and P in type samples of Ky. tobacco. The av. P content of this tobacco was 0.458% and S 0.302%. Sulfur or sulfates benefited the following crop plants: Soy beans, turnips, tobacco (Graves Co. soil). Clover was not benefited by the addition of S compds., K_2SO_4 alone being of value, due to the K. Of the sulfates of Fe, Ni, Cu, Co, Cr, Mn, Li, etc., using cabbage as test crop, only two (which two not stated by S.) proved beneficial, a few had no effect, while several were harmful to the plant. The results with mustard were better in that several of the sulfates gave higher yields than the checks. The results with radishes were irregular. Fertile soil oxidized S to sulfate more rapidly than did poor soil. The org. S of horse manure was found to be slowly changed to sulfate.

B. E. BROWN.

Observations and investigations of injury to vegetation, as well as fertilizer experiments in Ratibor-planina. R. OTTO. *Jahresber. Kgl. Lehran. Gart. Proskau* 1913, 116-118.—A plot of ground subjected to the tar oil fumes from the Plania factory, was divided into 6 parts, 5 of which were treated with one of more of the following fertilizer materials: $CaCO_3$, $(NH_4)_2SO_4$, superphosphate, and potash salt, the 6th being used as a control. None of the materials used either separately or in combinations exerted a protecting influence on the plants which showed the same typical injuries as the check plot and other vegetation in the neighborhood.

C. F. MILLER.

Studies on the lime requirement of soils. H. B. HUTCHINSON AND K. MACLENNAN. *J. Agr. Sci.* 7, 75-105 (1915); see C. A. 8, 3340.

J. J. SKINNER.

Is the doctrine of the lime factor an hypothesis or a proved theory? E. HASELHOFF. *Landw. Jahrb.* 47, 107-8 (1914).—Remarks upon Loew's article in (C. A. 8, 3701).

Is the doctrine of the lime factor an hypothesis or a proved theory? O. LOEW. *Landw. Jahrb.* 47, 109-11(1914).—An answer to Haselhoff (cf. preceding abstr.).

M. X. S.

A new theory regarding the feeding power of plants. E. TRUOG. *Science* 41, 616-18(1915).—The hypothesis is: "Plants containing a relatively high CaO content have a relatively high feeding power for the P in raw rock phosphate. For plants containing a relatively low CaO content the converse of the above is true." CaO content of less than 1% is relatively low; in this class fall corn, oats, rye, wheat and millet. CaO content in excess of 1% is relatively high; in this class belong peas, clover, alfalfa, etc. The above is explained by means of the laws of mass action and chem. equil. The P in raw rock phosphate is made available in accordance with the following reaction: $\text{Ca}_3(\text{PO}_4)_2 + 2\text{H}_2\text{CO}_3 \rightleftharpoons \text{Ca}_2\text{H}_2(\text{PO}_4)_2 + \text{CaH}_2(\text{CO}_3)_2$. Equil. is attained if none of the products to the right of the reaction are removed from soln. Plants which remove considerable lime will enable the reaction to proceed much farther than where little lime is removed. This difference in the lime-absorbing power of different plants causes a variation in the solubility of raw rock phosphate in carbonated water. "The feeding power of a plant for an insol. substance depends primarily upon 2 conditions, viz., (1) the solubility of that substance in carbonated water and, (2) whether or not the plant removes from soln. all the products of the solubility reaction in the proper proportions, so as to allow the solubility reaction to continue indefinitely."

B. E. B.

Field tests with a toxic soil constituent; salicylaldehyde. O. SCHREINER AND J. J. SKINNER. *J. Am. Soc. Agron.* 6, 108-12(1914); cf. *C. A.* 8, 3478.—In field expts. on a heavy silt clay loam low in organic matter, the application of 105 lbs. of salicylaldehyde in 3 equal applications decreased the growth of garden peas, cowpeas, and string beans in the order given, the string beans least. Aldehyde was found in the soil 6-7 mos. after the last application. In pot culture the soil was still harmful to wheat and to garden peas, cowpeas, and string beans. The relative toxicity to the last three crops was of the same order as in the field.

M. X. S.

Action of radioactive fertilizers on sugar beets. J. CROCHETTELE. *J. agr. prat.* 28, 344-6(1915).—In a field expt. with radioactive fertilizer the % of sugar in beets was slightly decreased, the quality of sugar improved, and the green matter of the plant increased. The compn. of the fertilizer is not given.

J. J. S.

Employment of sulfuric acid in fields of cereals. H. HITIER. *J. agr. prat.* 28, 347-8(1915).—The results of expts. with H_2SO_4 in eradicating weeds from cereals were presented to the National Agr. Soc.; they show that 5-10% H_2SO_4 is more effective than FeSO_4 or CuSO_4 . The undesirable herbs killed were mustard, wallflower, crow foot, bluet, wall poppy, vetches and grasses. No harmful effects were produced on the wheat. An increased growth was observed, due to utilization of sulfates or liberation of nutrients in the soil. The wheat remained free from disease and produced full grains.

J. J. SKINNER.

Green manuring. *Bol. agr. (Sao Paulo)* 15, 525-7(1914); *Exp. Sta. Record* 32, 423.—Analyses of 5 green manures are given. From the point of view of the amt. of N and organic matter they stand in the following order: *Canavalia gladiata*, *Arachis prostrata*, cowpeas, velvet beans and peanuts.

J. J. S.

Lime and the American vine. G. DE ANGELIS D'OSSAT. *Staz. sper. agrar. ital.* 47, 603-20(1914); through *Chem. Zentr.* 1915, I, 392.—Chlorosis of vine depends not so much on the abs. amt. of CaO in the soil as on the greater or less solubility of the CaO. App. for the detn. of this solubility is described. The crystal system to which the CaO compd. belongs influences the solubility, calcite dissolving considerably

more easily than aragonite. Clay and humus of the soil also influence the solubility.
W. H. FRY.

Arsenic and lead in agriculture. A. CUTOLO. *Boll. chim. farm.* 53, 692-6(1914); *J. Chem. Soc.* 108, I, 204.—Spraying with solns. or suspensions of As, such as lead arsenate, for the purpose of destroying parasitic organisms, nearly always results in the presence of As and Pb in the foodstuffs obtained. Extended use of such sprays may lead to poisoning and the necessity of prohibiting or regulating their employment is indicated.
M. X. S.

Potato spraying. DUKE OF BEDFORD AND S. U. PICKERING. *Woburn Expt. Fruit Farm Rpt.* 14, 1-32(1914); *Gard. Chron.* 56, 461(1914).—Woburn Bordeaux paste was found as efficient as ordinary Bordeaux mixt. containing 5 or 6 times as much Cu. The paste is made by pptg. a soln. of CuSO_4 with clear lime water enough to make the mixt. slightly alk. The ppt. is mixed with water. Soda Bordeaux was found to be much less efficient than either of the other mixts., even with very large amts. of Cu.
WM. P. GARRETY.

Linseed as a farm crop (EYRE) 27.

U. S., 1,137,065, Apr. 27. W. S. LANDIS. **Rendering phosphate rock available as a fertilizer** (citrate-sol.) by heating finely divided phosphate rock 100 with Na_2SO_4 20 and C 15 parts, to about 1000° to eliminate the sulfate radical, and then raising the temp. to cause incipient fusion or clinkering of the mixt. The product, if finely ground, shows 90% of the P_2O_5 present in citrate-sol. form. Cf. C. A. 8, 3093.

U. S., 1,137,531, Apr. 27. G. L. PRATT. **Making acid-phosphate fertilizer.** A viscous mass of mixed phosphatic dust and acid is allowed to partially cure in a curing den and the dry friable partially cured material is carried on a horizontal conveyor and dumped into another den at a lower level, for final curing. This mode of handling avoids any rubbing or pressing of the mass which might convert it into a sticky or gummy condition.

U. S., 1,137,844, May 4. R. M. CHAPIN. **A concentrated animal dip** is formed by dissolving 4 lbs. of NaOH and 10 lbs. As_2O_3 in 1 gal. H_2O , adding 10 lbs. Na_2CO_3 and sufficient cool H_2O to bring the vol. up to 5 gals., further dilg. the soln. as desired and then adding a mixt. formed from NaOH 8 oz., pine tar 1 gal. and H_2O 1 qt.

U. S., 1,138,348, May 4. E. BOHON. **Forming soluble foods (or fertilizers)** from fresh (or spoiled) meat or fish by dissolving in a boiling 5% soln. of caustic alkali, removing the oils and fats which rise to the surface, neutralizing with an excess of HCl or H_3PO_4 and then neutralizing the excess of acid with NaHCO_3 and concg. the soln. Old leather, hair, whales, dauphins, etc., may be similarly treated to make a fertilizer.

Brit., 202, Jan. 3, 1914. F. W. BAKEMA. **Construction of an app. for emptying superphosphate dens**, comprizing a rotating knife of the grass-cutting machine type carried by an endless-band portable conveyer.

16. FERMENTED AND DISTILLED LIQUORS.

ROBERT WAHL.

Detailed analysis of wine. W. I. BARAGIOLA. *Schweiz. Apoth. Ztg.* 53, 117-9 (1915); cf. C. A. 8, 1636, 3480.—Results obtained by Mensio and Garino-Canina (cf. C. A. 8, 3835) in the analyses of 4 samples of wine are quoted in 2 tables. Table 1 shows the close agreement in the sum of all organic acids of 2 wines as obtained on one

head by indirect detn. and calcn., on the other, by direct detn. Table 2 shows excellent agreement in the % and the nos. expressing the mode of combination in wine of tartaric, malic, lactic, succinic, acetic and tannic acids, when calcd. by the 2 entirely different methods of A. Quartaroli (cf. *C. A.* 5, 3316, 7, 1948) and of P. Dutoit and M. Duboux (cf. *C. A.* 7, 2082).

S. WALDBOTT.

Chemical analytical investigations on the ripening of grapes and on the formation of wine from them. W. I. BARAGIOLA AND CH. GODET. *Landw. Jahrb.* 47, 249-302 (1914).—A study was made in detail of the chem. changes which occurred during the ripening of grapes and in wine formation from the grapes. The results are given in tables and outlined graphically.

M. X. S.

The quantitative determination of lactic acid in wine. A. GASPARINI. *Stas. sper. agrar. ital.* 47, 752-73 (1914); *Chem. Zentr.* 1915, I, 509-10.—From an exhaustive study of the literature and on his own expts., G. draws the conclusion that lactic acid is a cleavage product of the malic acid present in normal wines and that, therefore, there must be a const. relation between the ext. content and the lactic acid content. The lactic acid results through the abnormal fermentation of the ext. substances under the influence of certain bacteria. The method of Möslinger was found most suitable for the quant. detn. of lactic acid in wines. This method is described in detail.

C. F. MILLER.

Rapid determination of total tartaric acid and of potassium in wines. A. KLING AND A. LASSIEUR. *Ann. fals.* 7, 410-6 (1914); through *J. Soc. Chem. Ind.* 34, 242 (1915).—Tartaric acid may be detd. by the following modifications of the racemate method (cf. *C. A.* 5, 2381; 6, 3382): 25 cc. of the wine are treated with 10 cc. of 2% NH_4 *l*-tartrate soln. and 20 cc. of a soln. of Ca acetate (16 g. CaCO_3 plus 120 cc. glacial AcOH per l.); after standing 30 min., the ppt. is collected on a filter, washed, dissolved in dil. H_2SO_4 , and the soln. titrated with KMnO_4 soln. The result is calc. to g. KH tartrate per l. of wine; 0.2 g. per l. is deducted from the amt. found as a correction for the *l*-tartrate occluded by the ppt. K is detd. by the perchlorate method. Under the conditions given, this method detcs. the K present as salts of organic acids and also as sulfate. The ash of the wine is treated with 10 drops of water and 10 drops of HClO_4 (56° Bé., d. 1.615), evapd. at 110° until most, but not all, of the HClO_4 has been driven off, the moist residue when cold is treated with 6 cc. 97% alc. containing 0.2% HClO_4 , the ppt. is collected on a filter, washed with 95% alc., washed into a crucible with alc.; the latter is evapd., and the residue heated to dull redness for 12 min. with 3 g. Na_2CO_3 , whereby the KClO_4 is converted into chloride. The mixt. is dissolved in water, 10 cc. 0.1 *N* AgNO_3 is added, followed by 5 cc. HNO_3 (36° Bé., d. 1.324), and 0.5 cc. ferric alum soln., and the excess of Ag titrated with 0.05 *N* thiocyanate soln. During the titration the sediment of AgCl should be disturbed as little as possible, since AgCl reacts to some extent with $\text{Fe}(\text{CNS})_3$.

P. B. DUNBAR.

The determination of potassium hydrogen tartrate and tartaric acid. H. ASTRUC. *Ann. fals.* 7, 416-7 (1914); through *J. Soc. Chem. Ind.* 34, 242 (1915).—The Kling racemate method (see preceding abst.) has been found to be the most trustworthy method known at present for the detn. of tartaric acid and its salts in a. drinks, fruit juices, etc. A detn. may be made in less than 1 hr. Its chief disadvantage is the cost of the reagent, NH_4 *l*-tartrate.

P. B. DUNBAR.

The alcohol-acid number and the judgment of wines. N. ZACHARIADES AND J. CZAK. *Z. landw. Versw.* 17, 869-85 (1914).—501 Austrian wines were analyzed and the alcohol-acid numbers according to Gautier and to Jeanprêtre calcd. and tabulated. Either calcn. gives results of much value, taken together with other tests, in the detection of diln.

L. J. GILLISPIE.

The limit numbers of the Swiss food code for minimum contents of non-volatile acids in wines. W. I. BARAGIOLA. *Schweiz. Apoth. Ztg.* 53, 166-7(1915).—N. Zachariades and J. Czak (preceding abstr.) applied the Swiss limits (Jeanprêtre nos.) to the analysis of 500 Austrian wines. With few exceptions, these nos. as well as the Gautier nos. were exceeded; hence these nos. do not seem to be too strict (except that the Gautier nos. are too high in certain cases and too low in others). Wines high in tartaric acid, *e. g.*, those of Styria, are favored by the Jeanprêtre nos. These nos. in connection with other data, furnish a good basis for the judging of wines in respect to the addition of H_2O . S. WALDBOTT.

Results of the official wine statistics of period 1912-1913. A. GÜNTHER. *Arb. Kais. Gesundheits.* 49, 1-467(1914); through *Chem. Zentr.* 1915, I, 444-7.—Unfavorable weather conditions and vegetable and animal pests were detrimental to the quality and quantity of the crop. Satisfactory results are reported in combating caterpillar of *Conchylis ambiguella*, with a soln. consisting of 0.75 kg. cottonseed oil soap and 1.5 kg. 10% nicotine soln., and also with a mixture of 0.75 kg. $CuSO_4$ -lime suspension and 1.5 kg. 10% nicotine soln. The total quantity (in the whole empire) of grape must was 1,004,947 hl. 995 wines and 5088 musts were examd. Results on sugaring wines were very favorable and confirmed the previously observed fact that the acid degradation in sugared wines mostly starts earlier than with natural wines, the reason apparently being due to slower settlement of yeast in sugared wines and to the reduction of acidity on diln. with sugar water. High acidity seems to retard acid retrogression. Numerous expts. proved that by proper cellar treatment (as warm storage, deacidification, re-fermentation, fining by isinglass) must from poor, nearly frozen grapes, yield a sound product, marketable without any admixture of higher grade wines. The widespread opinion that warm storing influences "Moselwines" unfavorably could not be verified. As to the proper time of deacidification, there are conflicting views of different investigators. In general it was found more satisfactory to effect deacidification (by means of pure $CaCO_3$) after fermentation. Among 509 white wines, 71% contained up to 0.11 g., 22% 0.12-0.16 g. and 6% 0.17 g. and more volatile acids. Red wines yielded more volatile acids; of 1893 examd., 93% contained up to 0.16 g., 3% 0.17-0.20 g. and 4% 0.21 g. and more. Among 662 foreign sweet wines, 88% contained up to 0.19 g. and 12% 0.20 g. and more volatile acids. For sulfuring wine barrels, solns. of SO_2 are preferred, insuring uniformity in the SO_2 content of wines, as well as for cellar-technical reasons. The great number of available data shows that growth of bacteria and the reproduction of molds and certain apiculatus-yeasts is sufficiently hindered by SO_2 . It is, however, not able to suppress the development of other ferments (*saccharomycodes* and *torulae*). The action of SO_2 is advantageously supported by an addition of pure culture yeast acclimatized to SO_2 . The H_2SO_4 content of wines is materially increased by storing in excessively sulfured and insufficiently washed vessels. There are different opinions as to the form in which H_2SO_4 is present in wine. According to physicochem. views, it is present in the form of secondary sulfates. Small amts. of H_2SO_4 are able to change greatly the character of a wine. It is demanded that native wines (white as well as red wines) are to be objected to if their H_2SO_4 content exceeds 2 g. K_2SO_4 per l. In a great number of 1912 wines the presence of citric acid was verified. Denigé's reaction for citric acid has only the value of a preliminary test, as a positive is not conclusive. Stahre's reaction (*C. A.* 9, 687) and also the identification of citric acid by means of its Ca salt are recommended as reliable. As to malt wines they show the following compn: 5-7.5 g. alc., 1.5-2.2 g. ext., 0.1-0.2 g. sugar and 0.3-0.6 g. acids per 100 cc. They resemble German white wines in their compn., but are easily distinguished by their dextrin content and the absence of tartaric acid.

I. W. HAAS.

Photomicrography applied to biometry with special reference to differentiation between yeasts employed in practice. P. LINDNER. *Wochschr. Brau* 31, 469-71 (1914).—Mensuration of dimensions of microorganisms by means of the micrometer is a tedious task; furthermore, the results are only approximate estns. in case of continually moving organisms. With more convenience and a higher degree of accuracy measures may be taken from photomicrographs provided they have been taken at definite enlargements. It was found that a photomicrograph of slowly moving cells is obtained sufficiently sharp for a linear enlargement of 500, if the time of exposure is 0.02 sec. (using intense light). L. succeeded in finding a more simple expression for the size of yeast cells. Instead of measuring a large number of single cells to obtain av. values, the cells are counted out which are required to fill completely a definite surface taken as unity. For a successful application of this biometric method the mounting of the slide plays an important role. The cells have to lie in one plane filling all interstices as completely as possible. Yeasts having sticky cell membranes must be made "dusty" by means of dil. acid or NaOH. The latter is to be added gradually in the presence of sufficient water and under rapid stirring to avoid changes in the structure of the cells. It is advisable to surround the cover glass by a ring of vaseline or wax to prevent flows in the liquid. A convenient linear enlargement for taking photomicrographs of yeast cells was found to be 500 (for bacteria 1000) and as a unit of surface is suggested the customary glass slide (26 by 76 mm.). L. proposes the term "surface number" (Flächenzahl) for the number of single cells contained in the area taken as unity. This surface number is rather characteristic for the different types of yeast (yeast D gave 136, y.U = 156, y.M = 180, y.K = 206) and with the same type deterioration due to changes in the nutrient medium may easily be detected.

L. W. HAAS.

Investigations on hops. V. On the aroma of hops. J. SCHMIDT. *Compt. rend. Lab. Carlsberg* 11, 149-63 (1915).—In all districts where the male hops have not been entirely eradicated, large stocks of hops will, in the long run become adulterated. Among the hop plants cultivated in the exptl. garden of the Carlsberg Laboratory, there were in 1911 two American plants ("Oregon Cluster" and "New York Spaulding English Cluster"), the hops of which exhibited a very peculiar, turpentine-like aroma, so widely different from that of all European varieties, that a single hop could at once be recognized by the smell among hundreds of others. Cultivation expts. made during 1911-4 showed that this aroma remained apparently constant in the foreign climate in these two plants and their cones. Crossing expts. with the two American plants and Danish males showed that the turpentine-like aroma was transmitted to between 0.5 to 0.75 of the offspring plants. From these expts. (and several others) it would seem that the aroma of hops is not so "volatile" a character or so entirely due to purely local conditions as has generally been believed.

L. W. HAAS.

Use of sugar in the brewery. E. JALOWETZ. *Brau.-Malsind.* 16, 59-61 (1915).—If beet sugar is to be used as partial malt adjunct, J. recommends (in order to be independent of variations in the activity of invertase) its use as invert sugar, which can easily be prepd. in the brewery as follows: Dissolve the required amt. of sucrose in a corresponding quantity of water (400 l. per 200 kg. sugar) at 60-65°, add to this soln. (the temp. of which should not exceed 55°) the requisite quantity of yeast (8 kg. thick yeast per 200 kg. sugar), and allow to stand for 4 hrs. at 50-5° with occasional stirring. This invert sugar soln. together with the yeast is directly added to the b. wort.

L. W. HAAS.

Quantitative determination of resins in hops. Ö. WINGE AND J. P. H. JANSSEN. *Wochschr. Brau* 32, 12-4 (1915); see C. A, 9, 688.

L. W. H.

Ferments of rum. E. KAYSER. *Compt. rend.* 160, 408-11 (1915).—The compn. of rum (and tafia) depends upon the nature of the raw material (sugar cane juice and its derivs.), mode of fermentation and distn. and especially on the microorganisms which effect the transformation of the saccharin matter. The difference in the action of bottom-fermenting yeasts and schizosaccharomyces may be more accentuated by an addition of wine to the molasses soln. to be fermented. Characteristic for the latter organisms when acting in a sterilized medium, is a depression of the production of volatile acids, aldehydes and higher alcs., reducing the non-alc. coeff. by 50%. Addition of mineral or amino N favors especially the schizosaccharomyces, at the same time diminishing their capacity of producing volatile acids, while the reverse takes place with bottom-fermenting yeasts. When sterilized molasses-must was fermented by a rum yeast alone and by the same yeast in association with a microbe isolated from the must, the non-alc. coeff. was doubled in the latter case, due to an enormous increase of volatile acids under simultaneous feeble aldehydification. Addition of weak wine, yeast ext., or leucine augmented the non-alc. coeff. while diln. of the must diminished it; furthermore, the type of yeast employed causes notable variations. A remarkable result was obtained by the combined action of a bottom-fermenting and a film-forming yeast frequently met with in sugar cane sap. The non-alc. coeff. was about 5 times that attained with the former yeast alone. All components were augmented, notably the esters (from 55.4 to 1320 mg. per 100 g. abs. alc.). The judicious application of pure yeasts, therefore, will procure rum products of const. compn. and enable the manufacturer to produce more or less ethereal products to satisfy the demand.

L. W. HAAS.

The spirits and spirits preparations industries in the year 1913. A correction. H. RÜDIGER. *Chem. Ind.* 38, 121 (1915).—A correction of a reference given in complete report (cf. *C. A.* 9, 1221).

F. W. SMITHER.

Laboratory experiments in relation to employment of sucrose in distilleries. W. BÜCHLER. *Z. Spiritusind* 38, 98 (1915).—B.'s expts. show the possibility of satisfactory final fermentation of mashes, the fermentable exts. of which are derived at about equal parts from potato mash and cane sugar, resp., provided that such compound mashes receive an addition of yeast nutrient. A good nutrient is thick brewers' yeast-waste liquefied by heating it to 56-62°, followed by short boiling. A still better nutrient is obtained by protein degradation. Brewers' yeast is warmed in a wooden vessel to about 60° for 1 hr., then 5 cc. com. HCl per l. yeast added, the mixt. kept at 60° for 12 hrs., finally warmed up to 81°, cooled and 10-15 cc. CH₂O per l. added. If kept under air-tight closure, this nutritive ext. is very stable.

L. W. HAAS.

Nipa palm swamps in the Philippines as sources of alcohol. *Chem. Trade J.* 56, 169 (1915).—There are over 100,000 acres of Nipa palm swamp available, of which about 90% has never been touched. It is estd. that the Nipa sap available would yield 50,000,000 gal. of alc. fuel every season (at a cost of about 14 c. per gal., if a modern distg. plant is installed). The total production of alc. in the Philippines is approx. 2,500,000 gal. per season, 0.9 of which is made from Nipa sap. Only 2% of the alc. now produced is denatured for com. use.

L. W. HAAS.

U. S., 1,137,149, Apr. 27. O. M. LAMSENS. Charging beer with gases. See Brit., 11,189, 1913 (*C. A.* 8, 3483).

U. S., 1,138,251, May 4. J. SCHAEFER. Filter-plate for filtering wort from brewers' grain, etc. Cf. *C. A.* 8, 350.

Brit., 29,314, Dec. 19, 1913. K. KROUPA. A mixt. of beer and beer wort is heated to expel the alc. and the residue is impregnated with CO₂, to prepare a non-alcoholic beer.

17. PHARMACEUTICAL CHEMISTRY.

M. I. WILBERT.

The essential oil of *Scherungulu tubers*. ANON. *Bull. Imp. Inst.* 13, 15-6 (1915).—Tubers of *Kaempferia ethalae*, J. M. Wood, yielded 2% of (1) a light volatile oil (d_{15}^{25} 0.9437, $[\alpha]_D^{25}$ +19° 47', acid no. 2.3, ester no. 5.0, ester no. after acetylation 47.6), contg. terpenes, linalol, esters and a new ketone (not described), and (2) a heavy oil consisting of the ketone found in the light oil and liquid constituents, probably sesquiterpenes.

L. G. C.

Investigations of vegetable drugs and poisonous plants. ANON. *Bull. Imp. Inst.* 13, 28-65 (1915).—The article gives results of the chem. investigation and the value as sources of drugs of a number of plants from various countries. Those of importance are *Podophyllum emodi* from India and the Egyptian *Hyoscyamus muticus*, a valuable source of atropine.

L. G. C.

Lime and lemon as sources of citric acid and essential oils. W. R. DUNLOP. *Bull. Imp. Inst.* 13, 66-87 (1915).—Methods of cultivation, yields, profits and chem. compn. of the two are compared. The figures indicate that the lime is richer in juice, citric and phosphoric acids and possesses anti-scorbutic properties, while the lemon contains more essential oil. Lemons may be regarded as yielding 634 lb. of citric acid and 88 lb. of essential oils per acre as against 914 lb. and 65 lb., resp., for limes.

L. G. C.

Liquor kalii arsenicosi. O. RICHTER. *Apoth. Ztg.* 29, 962-3 (1914).—A slight change in detail is suggested in the Ger. Pharm. procedure, namely, the heating of the aq. soln. of KHCO_3 for some time prior to the addition of As_2O_3 .

W. O. E.

Bolus alba sterilisata. ERNST RICHTER. *Apoth. Ztg.* 29, 978.—Suggestions are made for improving the Ger. Pharm. requirements for this product.

W. O. E.

The examination of tablets. J. HERZOG. *Apoth. Ztg.* 30, 19-20, 24-5 (1915).—Four samples were examd., morph. hydrochloride, bromum compositum, phenacetinum compositum and ext. cascarae sagradae. The procedures followed were: (1) *Morph. hydrochloricum*. Triturate 20 tablets in a mortar and wash the powder quantitatively into a flask with hot alc. Ext. repeatedly with boiling abs. alc., filter and evap. to dryness. Dissolve the residue in about 5 cc. hot H_2O and transfer quantitatively by means of an additional 5 cc. H_2O to a 100 cc. glass-stoppered Erlenmeyer, add 3 drops 10% NH_4OH , shake vigorously 10 min. and set aside 12 hrs. Pass the liquid through a small, smooth suction filter, allowing the flask to drain completely, then dry both flask and filter at 100°. Dissolve the morphine crystals in 10 cc. 0.1 N HCl , pour the soln. into a 200 cc. flask, carefully rinsing with H_2O the filter and glass vessels used, then increase the vol. of liquid to about 100 cc. and titrate under a layer of Et_2O with 0.1 N KOH , using iodoeosin as indicator. Very satisfactory results were obtained by this method. (2) *Bromum compositum*. After weighing several tablets, dissolve one with H_2O in a 250 cc. tared flask, fill to mark and apply a portion of the liquid to tests for sulfates and carbonates. In a 50 cc. aliquot det. the Br volumetrically in accordance with the Ger. Pharm. procedure, using K_2CrO_4 as indicator. In a 2nd aliquot, det. the halogen gravimetrically by pptn. with AgNO_3 . Results are good. (3) *Phenacetinum compositum*. Weigh out an amt. of the powdered sample equal to 4 tablets and ext. repeatedly with boiling abs. alc., receiving the solvent in an evapg. dish and evapg. to dryness. After disintegrating the residue with a glass rod, moisten with very little H_2O , then add 30 g. H_2O and stir for some time. Transfer the mixt. to a small, smooth filter, washing with four 5 cc. portions H_2O . Dissolve the residual phenacetin remaining in the dish and on the filter in hot alc. Evap. to dryness and

weigh as phenacetin (major portion). Transfer the aq. liquid to a separatory funnel, render slightly acid and ext. with about 30 cc. Et_2O . The ethereal soln. yields on evapn. an additional quantity (minor portion) of phenacetin. After rendering the aq. liquid alk., ext. repeatedly with CHCl_3 in order to recover the caffeine. (4) *Ext. cascarae sagradae*. Heat 1 tablet in 100 g. H_2O until the extractives are dissolved and the inert excipients subsided. Pass through a filter and ext. 10 cc. in a test tube with 10 cc. Et_2O for a period of 2 min. Pour off 3 cc. of the clear (should be intensely yellow) supernatant liquid into a second test tube and add an equal vol. of 5% NH_3 , shaking the mixt. thoroughly, whereupon a deep coral-red color should appear (so-called emodin test). Dil. 2 pts. of the original aq. soln. with 18 pts. H_2O and treat 10 cc. of the resulting liquid in exactly the same manner as above, whereupon the Et_2O soln. should be faintly yellow and the ammoniacal soln. distinctly coral-red after shaking. This method is applicable to sugar-coated tablets as well.

W. O. E.

Papayans bell. C. MANNICH. Univ. Goettingen. *Apoth. Ztg.* 30, 37-8(1915).—According to the analytical findings, the prep. consists of 0.022 g. charcoal of low adsorption capacity, 0.278 g. NaHCO_3 per tablet in addition to oil of gaultheria. No proteolytic enzyme of the nature of papain could be detected.

W. O. E.

Papayans bell. L. LEWIN. *Apoth. Ztg.* 30, 38(1915).—Comments are made on the results obtained by M. (cf. preceding abstr.). Attention is directed to the fact that papain under certain conditions suffers deterioration very rapidly, from which the inference is clear that the sample under investigation may originally have contained the enzyme in appreciable quantity.

W. O. E.

Salicol. C. MANNICH. Univ. Goettingen. *Apoth. Ztg.* 30, 43(1915); cf. C. A. 8, 1639, 3094.—According to M., this prep. is a mixt. of 85% acetoxybenzoic acid, 14.5% decompn. products of acetoxybenzoic acid and 0.5% citric acid, in contradiction to the mfrg.'s claims that the prep. consists of "Acid aceto-citrylo-salicylic."

W. O. E.

Applied plant microchemistry. X. The microchemical detection of lapachol. O. TUNMANN. *Apoth. Ztg.* 30, 50-2(1915).—The easy and certain detection of lapachol is shown by means of the sublimation method.

W. O. E.

Preparation of alkoxymethyl ethers of morphine. C. MANNICH. *Apoth. Ztg.* 30, 56 (cf. D. R. P. 280,972).—The process consists essentially of interaction between the alkali compds. of morphine and halogenated methyl alkyl ethers of the general formula: XCH_2OR . It is claimed for the methoxymethyl ether of morphine, for example, that it deadens the sense of pain more than the known ethers of morphine but less than morphine itself; that it possesses the advantage of not being a habit-forming drug; that the active and toxic doses lie very far apart.

W. O. E.

Determination of silver in colloidal silver preparations. P. W. DANCKWORTT. Univ. Breslau. *Arch. Pharm.* 252, 497-501(1914).—In the case of collargol and similar preps. containing chlorides, the method of Lehmann (C. A. 8, 2217) was found reliable, while that of Stoecker (C. A. 8, 3613) gave unsatisfactory results. In the present paper, the following procedure is recommended for protargol. Dissolve 1 g. of the sample in 10 cc. cold H_2O contained in an Erlenmeyer, to which is added, under constant agitation, a mixt. of 5 cc. perhydrol and 15 cc. 25% HNO_3 (the mixt. employed by Jannasch, i. e., equal vols. of a 15% H_2O_2 and HNO_3 of sp. gr. 1.4 is equally effective). Warm the flask $\frac{1}{2}$ - $\frac{3}{4}$ hr. on the water bath under the hood, agitating the mixt. from time to time, until only about 5 cc. liquid remains. Dil. with H_2O to 100 cc. and titrate the yellowish soln., after adding 10 cc. Fe NH_4 sulfate soln., with NH_4CNS . This method is not applicable to collargol and other preps. containing chlorides in appreciable amt.

W. O. E.

Poisonous woods. H. MATTHES AND E. SCHREIBER. Univ. Jena. *Ber. pharm.* Ges. 24, 385-444 (1914).—The investigation was confined to the following woods: Royal teak or Moah wood (*Illipe longifolia* or *I. latifolia*); Teak (*Tectonia grandis*); Teak (*Flindersia australis*); Lapacho wood (*Tecoma araliacea*) and Greenheart wood (*Bignonia leucoxylon*). (1) Royal teak or Moah Wood contains 0.7% lapachonone, $C_{18}H_{16}O_4$, m. 61.5°, heretofore reported only in lapacho wood by Crosa and Manuelli (*Atti accad. Lincei* (5) 4, II, 250-35 (1893)). It yields the *picrate*, $C_{18}H_{16}O_4 \cdot C_6H_5O_7N_3$, m. 133°. Further, yellow crystals of lapachol, $C_{18}H_{14}O_4$, to the amt. of 0.1%, heretofore reported only in lapacho wood by Paterno (*Gazz. chim. ital.* 1882), also by Stein (*Jahresb. d. Chem.* 1866) in greenheart wood. In addition, 3 resins were isolated: an Et_2O -sol. variety (a) 0.76%, I no. 62.51, sapon. no. 122, acid no. 86.00, ester no. 39.20; $CHCl_3$ -sol. (b) 1.03%, I no. 82.71, sapon. no. 126, acid no. 49, ester no. 77; and alc.-sol. (c) 3.35%, I no. 73.04, sapon. no. 92.40, acid no. 42, ester no. 50.40. The poisonous effects are due neither to lapachol nor lapachonone but rather to the resins, of which the alc.-sol. variety is the least toxic. No glucoside, glucosin or alkaloid was detected in this wood. The following tests were applied in the recognition of Moah wood: (a) *Lapachol test*: On the application of about 0.1 N KOH, small cherry-red dots appear on the surface; (b) *Lapachonone test*: If one of the colorless crystals from the woody tissues be placed on conc. H_2SO_4 , an intense indigo blue color results. (2) *Tectonia grandis* (Teak wood, Djati): While Romanis (*Chem. Soc.* 51, 1887) reports the presence of tectoquinone in this wood, none was found in the present instance. In addition to a little oil and a hydrocarbon of the formula $C_{24}H_{28}$ —2, 3 resins were isolated by fractional treatment with solvents, characterized as follows: Et_2O -sol. (a) 0.55%; $CHCl_3$ -sol. (b) 1.15%, Huebl I no. 136.5, sapon. no. 243.5, acid no. 109.6, ester no. 133.9; alc.-sol. (c) 2.93%, I no. 60.7, sapon. no. 106.4, acid no. 90.7, ester no. 15.7. All 3 resins produce dermatitis accompanied at intervals by intense itching. Lapachol and lapachonone were not detected. (3) *Flindersia australis* (native teak, Moah wood not identical with that first described) contains, in addition to a resinous oil, resins separable by fractional extn. Resin oil 6.07%, I no. 34.93, sapon. no. 78.40, acid no. 0.00, ester no. 78.40; Et_2O -sol. resin 7.40%, I no. 38.70, sapon. no. 95.20, acid no. 50.80, ester no. 44.40; $CHCl_3$ -sol. resin 3.36%, I no. 90.61, sapon. no. 95.20, acid no. 13.48, ester no. 81.72; alc.-sol. resin 2.83%, I no. 93.10, sapon. no. 78.40, acid no. 29.79, ester no. 48.61. An alkaloid *flindersine*, $C_{22}H_{28}O_7N_3$, m. 182–3°, was obtained. It is insol. in H_2O , sol. in $CHCl_3$, a.c., C_6H_6 , AcOH, HCl, H_2SO_4 , caustic alkalies, glycerol, paraffin and fatty oils, difficultly so in petroleum benzene. It is optically inactive, unites with Br to yield the *addition-product*, $C_{22}H_{28}O_7N_3Br_2$; with picric acid and $PtCl_4$ to form cryst. salts, and with the usual alkaloidal reagents to yield ppts. None of the constituents isolated from this wood were found to irritate the skin or otherwise possess toxic properties. (4) Lapacho wood contains 0.26% lapachonone and 1.93% lapachol in addition to resins which in contact with the skin produce mild irritation and are characterized as follows: Et_2O -sol. 0.91%, I no. 108.50, sapon. no. 252.00, acid no. 74.48, ester no. 177.52; $CHCl_3$ -sol. 2.33%, I no. 109.10, sapon. no. 134.40, acid no. 44.68, ester no. 89.72; alc.-sol. 8.56%, I no. 101.70, sapon. no. 173.60, acid no. 35.56, ester no. 138.04. Petroleum-benzene-sol. ext., amounting to 3.29%, produces no irritation when brought into contact with the skin; the other 3 exts. produce a marked reddening of the skin but no itching sensation, the inflamed localities healing completely after 6 days. (5) *Tecoma araliacea*. This very hard and heavy wood contains, in addition to 7.64% lapachol, resins separable by fractional extn. and capable of producing intense itching and inflammation of the skin, being characterized as follows: Et_2O -sol. portion 1.49%, I no. 97.53, sapon. no. 98.00, acid no. 25.20, ester no. 72.80; $CHCl_3$ -sol. portion 1.55%, I no. 99.40,

sapon. no. 119.00, acid no. 31.50, ester no. 87.50; alc. sol. portion 5.02%, I no. 98.96, sapon. no. 56.00, acid no. 25.20, ester no. 30.80. (6) Greenheart wood contained 3.69% lapachol and resins separable by fractional extn. They are characterized as follows: Et_2O -sol. 3.67%, I no. 79.22, sapon. no. 140.00, acid no. 32.76, ester no. 107.24; CHCl_3 -sol. 1.32%, I no. 88.75, sapon. no. 196.00, acid no. 29.68, ester no. 66.32; alc.-sol. 5.92%, I no. 88.58, sapon. no. 106.40, acid no. 23.80, ester no. 82.68. The toxic properties of the woods examd. are shown to be due to resins contained therein, more particularly to the content of the latter in free unsatd. resin acids. It should be noted in this connection that all wood derived from the Bignoniaceae, to which likewise the *Tecoma* and *Illipe* belong, contain, in addition to lapachol or lapachonone, or both together, resins which are in greater or less degree skin irritants. The assumption that the former substances, which are sol. in resins and oils, stand in genetic relation to the resins themselves appears to be unwarranted. W. O. E.

The artificial resin "albertol" as a substitute for mastic. G. MAUR. *Pharm. Ztg.* 59, 876 (1914).—This new product is shown to have the following properties: d_{15}^{20} 1.0420, m. 56–9°, $[\alpha]_D^{20}$ +38.05, acid no. 22.72, ester no. (calcd.) 44.88, sapon. no. 67.60, loss of wt. at 100° 1.03%, mineral constituents 0.05%. A 5% soln. in a 200 mm. tube gave a rotation of +3.4°. W. O. E.

Partially neutralized resin solutions. KARL DIETERICH. *Pharm. Ztg.* 59, 937–8 (1914).—A soln. of colophony (200) in a mixt. of turpentine (100) and benzene (700) is treated with dry powd. NaHCO_3 , previously triturated with benzene, then dild. to 1000 cc. and filtered. The product is recommended as a substitute for mastic. W. O. E.

Masticol. A. FRIEDLAENDER. *Pharm. Ztg.* 60, 77 (1915).—A reply to Dieterich's article on "Partially neutralized resin solutions." W. O. E.

Resin solutions for surgical dressings. KARL DIETERICH. *Pharm. Ztg.* 60, 62 (1915).—Reference is made to the article on "Partially neutralized resin solutions." W. O. E.

A note on compressed tablets. S. BERTHA MÜLLER. *Am. J. Pharm.* 87, 197–8 (1915).—A brief discussion of the use of white dextrin as a diluent and disintegrator both for compressed tablets and tablet triturates. W. G. GARSSLER.

Remarks on digitalis. WILLIAM C. ALPERS. *Am. J. Pharm.* 87, 210–20 (1915).—A review of the pharmacy and chem. of digitalis and its physiol. tests. W. G. G.

Review of therapeutic novelties discovered in 1914, including specialties and secret remedies. S. RABOW. *Chem. Ztg.* 39, 211–2, 241–2, 254–5, 263–5 (1915). E. H.

Review of recent work on perfumes and ethereal oils. S. FACHINI. Milan. *Ann. chim. applicata* 3, 181–97 (1915). S. LEVY.

Preparation of sirup of iron calcium lactophosphate. A. C. BARBANO. Turin. *Giorn. farm. chim.* 63, 105–7 (1914).—Prepare 2 solns. composed resp. of (1) 9.25 g. cryst. FeSO_4 in 350 g. distd. H_2O and (2) 22.75 g. NaHPO_4 in 159 g. distd. H_2O ; mix these solns., collect the ppt. on a filter, wash, allow to drain until the wt. does not exceed 100 g. and dissolve in 14 g. conc. lactic acid. Prepare another soln. composed of 13.30 g. tricalcium phosphate, 24 g. conc. lactic acid and 100 g. H_2O . Add this soln. to the final soln. above with the addition of sufficient H_2O to make 388 g., filter and add 625 g. white sugar and 15 g. alc. soln. of lemon oil. This prepn. on standing was observed to deposit a cryst. ppt. which proved to be CaSO_4 . The occurrence of this ppt. is explained by the fact that the Na_2SO_4 produced by the reaction of solns. (1) and (2), when not completely removed from the ppt. (also produced by this reaction), reacts with $\text{CaH}_2(\text{PO}_4)_2$ to form CaSO_4 . The sucrose of the sirup is

also inverted by the excess acid of the soln. and a portion of the glucose of the invert sugar is gradually deposited by crystn. As a modification of the original method, B. proposes that the ppt. produced by the reaction of solns. (1) and (2) be washed with distd. H_2O until the filtrate no longer reacts with $BaCl_2$, and H_2O sufficient to make 300 g. instead of 388 g. be added to the soln. before the addition of sugar; the amt. of sugar is reduced from 625 g. to 585 g. and 100 g. neutral glycerol (31°) are added with the sugar. Otherwise the formula remains the same.

H. S. PAINE.

Benzene as a substitute for ethyl alcohol in the preparation of tincture of iodine. ITALO CEPPELLINI. Pontremoli. *Boll. chim. farm.*, 53, 660(1914).—In order, to test the resp. merits of $EtOH$ and C_6H_6 in the prep. of tincture of I, C. prepd. a soln. with each solvent according to the Italian pharmacopeia (2 g. I in 18 g. of C_6H_6 or 95% $EtOH$). The I crystd. from the C_6H_6 soln. in a short time, when the latter was placed in a large glass container at a temp. of 5° . After standing 48 hrs. in open Erlenmeyer flasks (24° and 763 mm.) the C_6H_6 and $EtOH$ solns. lost 6.065 g. and 2.015 g., resp., in wt. In addition to the above disadvantages of C_6H_6 the odor of the latter was also found to be objectionable. The presence of HI in $EtOH$ solns. of I may be successfully obviated by employing Gaglio's suggestion, i. e., by the addition of 1.1% of HIO_3 , which reacts with HI to form I and H_2O .

H. S. PAINE.

Bromotannic sirup. G. DE RIDDER. *J. pharm. Anvers; Boll. chim. farm.* 53, 663(1914).—Dissolve 2 g. tannic acid in 25 cc. hot distd. H_2O ; to the cold soln. add 2 g. Br in 100 g. H_2O and immediately add sufficient simple sirup to make 1 kg., with further addition of 2.5 g. aromatic tincture, 1.25 g. tincture of vanilla and 4 drops $AcOEt$.

H. S. PAINE.

The use of large doses of morphine as an analgesic in obstetrics and surgery. G. BERTRAND. *Bull. sci. pharmacol.* 21, 497-501(1914).—An exam. was made of a prepn. of morphine recently used by Ribemont Dessaignes in the Paris hospitals as an analgesic in childbirth. The prepn. was reported to be produced by the action of an enzyme, such as that of yeast or papaw, on a morphine salt. It was claimed that the prepn. was only about $1/15$ as toxic as morphine-HCl. B. found the prepn. to be a soln. of morphine-HCl contg. 3.24% of the pure salt. In its physical consts. and its action towards the various alkaloidal reagents, the alkaloid present was found to be identical with morphine. The toxicity of the prepn. was also found to be the same as that of a soln. contg. an equal amt. of morphine-HCl. A 3.24% soln. of morphine-HCl was given to five women in childbirth in the same dose as it is directed that the above prepn. be used, i. e., $1\frac{1}{2}$ cc. contg. 0.0486 g. morphine-HCl and a very similar action was noted. Thus a profound anesthesia can be obtained successfully by the judicious use of a relatively high dose of morphine, but there is always danger of blue babies, though as a rule they are easily resuscitated.

B. H. ST. JOHN.

The stability of morphine in presence of putrefaction. F. DOEPMANN. Breslau. *Chem. Ztg.* 39, 69-71(1915).—Separate quantities of 1 kg. of chopped, lean horse flesh were mixed with 200, 100, 50 and 20 mg., resp., of morphine-HCl and 200 g. of the mixt. investigated after 1, $2\frac{1}{2}$, $5\frac{1}{2}$, and 11 months. The putrefying mass was thoroughly extd. with very dil. $AcOH$, first cold, then warm, and finally on the water bath. The acid ext. was concd., pptd. with alc., the alc.-free filtrate pptd. with $(AcO)_2Pb$, excess of Pb removed by H_2S and the soln. concd., made alk. with NH_4OH , and extd. repeatedly with warm $CHCl_3$. The residue from the $CHCl_3$ ext. was dissolved in dil. H_2SO_4 and extd. with pure amyl alc. to remove coloring matters, then made alk. with $NaOH$, and extd. with a small amt. of $CHCl_3$ to remove ptomaine bases, and finally made alk. with NH_4OH and repeatedly extd. with warm $CHCl_3$. The pale yellow varnish left on evapg. the $CHCl_3$ gave in every case the characteristic reactions of morphine.

F. W. SMITHERS

Synthetic camphor and its detection in official camphor. HEFFTER; LANGGAARD; BOHRISCH. *Apoth. Ztg.; Pharm. Zentralhalle* No. 50; H., *Schweis. Apoth. Ztg.* 53, 101-2(1915).—Unless synthetic camphor is free from impurities, *e. g.*, pinene-HCl, camphene, borneol, and until expts. on animals (by Langgaard and others) shall have been extended to man, internal and subcutaneous uses of synthetic camphor should not be considered. Bohrisch, in reexamg. the official tests for true camphor, substitutes the following for Lenz's test: To 0.1 g. of powdered camphor in test tube is added 2 cc. of a 1% vanillin-HCl soln., and the mixt. put into a beaker with water which is warmed gradually. At 30° the color is yellow, at 60° bluish green, at 75-80° indigo-blue. The latter color persists for several hrs. even after cooling. Synthetic camphor by the same treatment gives only a yellow color. Vanillin-HCl-H₂SO₄ gives still better results. The best identity test is that of optical rotation, official camphor being +, synthetic inactive.

S. WALDBOTT.

Incompatibility of tincture of iodine and mercuric chloride solution. L. REUTTER. *Bull. sci. pharm.* 1914, 463; *Schweis. Apoth. Ztg.* 53, 107(1915); *Pharm. J.* 94, 357 (1915).—Now that tinct. of I is so widely used as a first aid disinfectant for wounds, the danger of applying HgCl₂ dressings afterwards is pointed out. The strongly irritating HgI₂ is formed in such a case. To remove it, wash the wound with 1:10 KI soln.

S. WALDBOTT.

New method of making syrupus hypophosphitum U. S. P. and syrupus hypophosphitum compositus, U. S. P. F. A. UFAHER SMITH. *Midland Druggist* 49, 193(1915).—To avoid in these preps. the use of 5 different hypophosphites, 2 of which are deliquescent, 2 new formulas are proposed, based on the interaction of the Ca salt with the sulfates of K, Na, Fe⁺⁺⁺ and Mn.

S. WALDBOTT.

"Salvarsansodium." WECHSELMANN. *Münch. med. Wochschr.* No. 6, 1915; Fleissig, *Schweis. Apoth. Ztg.* 53, 137-9(1915).—This is the di-Na salt of salvarsan, a yellow powder, sol. in H₂O with alk. reaction, contains about 20% As. 0.1 g. salvarsan corresponds to 0.15 g. "salvarsansodium." In air it turns brown, becomes insol. and more toxic. It is intended to replace neosalvarsan.

S. WALDBOTT.

The British pharmacopeia 1914, as it affects officinal pharmacy. J. P. GILMOUR. *Pharm. J.* 94, 202-5(1915).—A detailed criticism of the changes made, and the relation of a great many pharmaceutical preps. to the various legislative acts is pointed out.

S. WALDBOTT.

Alkaloids, chloroform and opium preparations of the British pharmacopeia. D. B. DOTT. *Pharm. J.* 94, 206(1915).—Criticisms are made on these subjects.

S. W.

The British pharmacopeia 1914, with special reference to the limit tests for arsenic and lead. J. F. TOCHER. *Pharm. J.* 94, 207-8(1915).—The dual, semi-equiv. use of the imperial and the metric systems of wts. and measures in stating doses is deprecated. To test for Pb, render the filtered soln. of the sample alk. with NH₃ and add 1 cc. of KCN (to prevent pptn. of Cu). The amt. of standard Pb soln. necessary to add to a control soln. so as to produce the same depth of color as that found upon adding Na₂S, measures the amt. of impurity present. Limits are given for Na, K, NH₄, Mg and Cu salts and the chief acids of the Brit. Pharm. The test for As is a modified Gutzeit test, *i. e.*, forming of a yellow stain on HgCl₂ paper if As is present. To prevent interference by H₂S, paper satd. with Pb(AcO)₂ is interposed. The use of SnCl₂ reduces any As to As⁻⁻⁻. The amt. of As allowed in tartaric acid is 1.4:1,000,000, in many other compds. 5:1,000,000, in reduced Fe 200:1,000,000. The influence of errors of observation is recognized.

S. WALDBOTT.

Notes on chemical nomenclature of the British pharmacopeia 1914. WM. B. COWIE. *Pharm. J.* 94, 236(1915).—Improvements in Latin titles are suggested. The

treatment of "characters and tests" for fixed oils and essential oils is generally commended. Exceptions are noted, also regarding "syrops." S. WALDBOTT.

The new (British) pharmacopeia: A few general criticisms. THOMAS STEPHENSON. *Pharm. J.* 94, 236-7(1915).—The inclusion of Indian drugs, *e. g.*, betel leaves, is objected to. The nomenclature of certain synthetics and other compds. is not well chosen. Tinct. of *nux vomica* is only $\frac{1}{2}$, the former strength, yet the dose remains the same. The book marks an advance, but bears evidence that the coöperation of pharmacists was not secured. S. WALDBOTT.

Notes on the British pharmacopeia 1914. FRASER McDIARMID. *Pharm. J.* 94, 237-9(1915).—The subjects discussed are recognition of pharmaceutical research, active principles, rejected and new drugs, assay processes and the principle of limits. Over-strength powdered exts., *e. g.*, belladonna, should be dild. with powdered leaves, not milk sugar, etc., making due allowance for the alkaloid in the leaves. S. W.

A discussion on the new British pharmacopeia. *Pharm. J.* 94, 244-6(1915). I. HENRY STOUT. *Materia medica* of the new pharmacopeia. II. DAVID MURRAY. Notes on the Br. Pharm. 1914. III. J. TAIT. Ether solubility of citric acid. IV. J. R. HILL. The British pharmacopeia 1914. V. J. A. FORREY. Comments on the Brit. pharm.—(I) Physiol. standards are wisely excluded. For belladonna root and henbane leaves, alkaloidal standards should be given. No distinction is made between Barbados and Socotrine aloes, and a test for Cape aloes as adulterant should be given. The additions to the chem. *materia medica* are summarized. (II) The subjects acetum scillæ, acid. carbol. liqu., collodium vesicans, lin. camphoræ, syr. ferri iodidi, tinct. capsici, tinct. hyoscyami, ung. acid. boric., ung. pot. iodid. are discussed. (III) The Br. Pharm. should state that solubility of citric acid in Et_2O (d. 0.720) is 1:40; tartaric acid is slightly sol. in Et_2O . (IV) The demanded absence of Fe in citric acid is not found in practice. Since the tannin in cinnamon bark ppts. alkaloids, flavoring tincts. should be made with the *essential oils*, *e. g.*, of caraway, cinnamon and cardamoms. (V) In the place of the terms decimil, centimil, 0.1 or 0.01 mil. should be used. For liquid ext. of cascara and others, repercolation should be practiced. S. WALDBOTT.

Some medico-legal aspects of the new British pharmacopeia. H. W. GADD. *Pharm. J.* 94, 272(1915). S. WALDBOTT.

Some notes on the new British pharmacopeia. H. H. JONES. *Pharm. J.* 94, 272-3(1915).—An extended discussion of the changes from the 1898 edition. Many exts. have disappeared. Confusion may arise from replacement of the green exts. of henbane and belladonna by dry powdered exts. from the leaves, standardized to contain 0.3 and 1% alkaloids. S. WALDBOTT.

Acidity of hydrogen peroxide solution. J. S. WHITE. *Pharm. J.* 94, 316(1915); cf. *C. A.* 8, 2600.—Four samples came well within the limit for acidity set by Brit. Pharm. 1914 (direct titration method), but the same samples showed notably higher acidities by the U. S. P. method (previous evapn. in alk. soln.), 1 being above the limit, which is alike in both pharmacopeias. The method of Murray (*C. A.* 8, 2453) applied to 1 sample gave a result which agreed with that by the U. S. P. method. S. WALDBOTT.

Acidity of hydrogen peroxide solution. THOS. CALLAN. *Pharm. J.* 94, 413 (1915); cf. preceding abstr.—When 4 samples were tested by the Brit. Pharm. direct titration method using Me orange, the results were almost the same as when tested by the evapn. method of the U. S. P. when the same indicator was used. When phenolph. was used on the same 4 samples, the results were again almost alike by both methods, but considerably higher than the results with Me orange, and in all cases exceeded the limit of 2.5 cc. 0.1 *N* KOH per 25 cc. H_2O_2 . Hence detns. of acidity give widely

varying results according to the indicator used (Me orange in Brit. Pharm., phenolph. in U. S. P.). The cause often lies in the Na_2HPO_4 observed in the evapn. residue. This, in presence of mineral acid, is acid to phenolph., but neutral to Me orange; hence the higher results in the former case. The U. S. P. method, in addition, has several sources of error; decompn. of traces of NH_4Cl , also of AcNHPh by alkali; and possible absorption of CO_2 during evapn., especially if this is done in an open basin instead of a flask.

S. WALDBOTT.

The use of salol with liquid paraffin. F. GOLDBY. *Pharm. J.* 94, 316-7(1915).—Salol being quite sol. in liquid paraffin, G. recommends the following untried formula as an intestinal antiseptic: Salol, 800 grains; oil of cinnamon, 40 minims; CHCl_3 , 4 fluid drachms; Biebrich scarlet, $\frac{1}{8}$ grain; liquid paraffin to make 80 fluid ounces.

S. WALDBOTT.

A criticism of the British pharmacopeia 1914. MALCOLM M. IRVINE. Glasgow. *Pharm. J.* 94, 318-20(1915).—The criticism extends to metric wts. and measures, metric prescribing, descriptions and formulas, omissions, inferior drug standard (of aloes, benzoin, asafetida) by the side of highly developed methods of standardizing and to abbreviations.

S. WALDBOTT.

Discoloration of Na salicylate solution. W. MACADIE. *Pharm. J.* 94, 355(1915).—The black ppt. is very likely due to traces of NH_3 in air. It forms, *e. g.*, when Na salicylate is mixed with Spir. ammon. aromat. Discoloration of Na salicylate soln. is avoided completely when a basin with AcOH and cotton wool is floated on its surface.

S. WALDBOTT.

The analytical chemistry of the British pharmacopeia 1914. P. A. W. SELF. *Pharm. J.* 94, 384-5, 419-21(1915).—Quant. detns. (alkaloidal assays, non-alkaloidal detns.), limit tests, and identification and other qual. tests are discussed in detail. In *alkaloidal assays*, the use of same strength alkali with which to titrate back is condemned, owing to very low margins of difference. The acid should be 0.05 N, the alkali 0.02 N. A serious error occurs in *assay of ipecac root* where an insufficient amt. (10 cc.) of HCl is directed to remove the alkaloids from the ammoniated $\text{Et}_3\text{O}\cdot\text{CHCl}_3$ soln., whereas about 20 cc. are required. The *assay of opium* is discussed. Upon titrating back the excess of acid with alkali, mineral matters are pptd. with the morphine. Under *Na arsenite*, S. recommends substituting the starch indicator by the disappearance of the yellow color of the I soln. Under *Mel depuratum*, the statement that the soln. of the ash in H_2O is not alk. to litmus, should be corrected. A test similar to that with $\text{K}_2\text{Cr}_2\text{O}_7$ and H_2SO_4 for *strychnine*, is shown by *yohimbine*. To distinguish between both, treat the alkaloids with H_2SO_4 and NH_4 vanadate. With strychnine, an intense blue color forms, fading rapidly. On now dilg. with H_2O , a beautiful rose-pink soln. is developed. With yohimbine, a similar blue is formed, but no rose-pink color develops upon diln.

S. WALDBOTT.

The galenicals, etc., of the British pharmacopeia, 1914. J. H. FRANKLIN. *Pharm. J.* 94, 385-7(1915).—A criticism on about 35 topics. "Ether" and "ether purificatus," the latter the anesthetic, may both be prepared from industrial spirit. F. finds the purified of excellent quality (cf. following abstr.). Ext. ergotae liquid should be prepared with 40% EtOH (*C. A.* 4, 3273; 7, 3815), not with H_2O as officially required. With *syrup. ferri iodidi*, the FeI_2 soln. should be filtered into the mixt. of glucose and syrup. The addition of H_3PO_2 as a preservative (1:1000) should be allowed. *Tinct. nux vom.* has but $\frac{1}{2}$ the strength of the old tinct., yet the dose remains the same. The increase of strength of *tinct. strophanthin* by 300% is inexplicable. Standards should have been introduced for the widely used cod liver oil emulsion, compd. sirup of hypophosphites, Parrish's chem. Food, etc., which in practice vary considerably.

S. WALDBOTT.

The examination of commercial ethers. B. S. ELLIS AND ARTHUR FLETT. *Pharm. J.* 94, 387(1915).—No practical importance can be attached to detn. of sp. gr. of com. ethers, unless as a supplement to fractionation tests, in a suitable app. The data from 6 samples of com. ethers show the necessity of fractionation to obtain a uniform boiling range of 34–36°, the new Brit. Pharm. standard. They also show that ethers made from industrial alc. are the only ones yielding a large % of fractions lower than 34°, which will tend to raise the price of such ethers. Reasonable limits for sp. gr. are 0.720–0.723 at 15.5°. All com. ethers examd. showed traces of tests for aldehydes, H_2O_2 , and Me_2O , even one prepared from duty-paid EtOH. S. WALDBOTT.

Practical notes on the British pharmacopeia 1914. DAVID GILMOUR. *Pharm. J.* 94, 484–5, 500–1(1915).—The practical aspect of changes in "laudanum," the strength of acids, spirit. aether. nitrosi, glycerin, acidi boric, etc., is discussed.

S. WALDBOTT.

Pasta iodi et amyli, B. P. C. PETER BOA. *Pharm. J.* 94, 485–6, 501(1915).—In Martindale's original formula, and in Brit. Pharm. Cod. 1907, starch 1, glycerol 2 and H_2O 6 parts were *boiled* together; when cold, 1 soln. was added. The result was a firm, blue paste. In Brit. Pharm. Cod. 1911, only water-bath heat is used; an unsatisfactory semi-liquid mass of dead black color results. S. WALDBOTT.

A new color reaction for salicylic acid. P. A. W. SELF. *Pharm. J.* 94, 521(1915).—The usual color tests are not distinctive. S. finds that a combination of Kobert and Mandelin's test gives strong and characteristic colors with very small amts. of salicylic acid. Mix equal vols. of 40% $HCHO$ and concd. H_2SO_4 and cool. Moisten the substance to be tested on porcelain with the mixt., add a little NH_4 vanadate, stir well. In presence of salicylic acid, a Prussian blue color forms at once, changing rapidly to greenish blue, finally green. If the acid is absent, a yellowish red or orange color appears; this in 2–3 min. turns greenish yellow, finally green. Salicylic aldehyde is the only substance giving the same test, except that before adding the vanadate, it shows pale yellow while salicylic acid gives no color. Phenol shows pale pink before adding the vanadate, and brownish, strong pink, then brownish red and chocolate-brown, after addition. The effects of the test on 28 phenols, etc., are tabulated.

S. WALDBOTT.

A possible source of error in some alkaloidal assays. P. A. W. SELF. *Pharm. J.* 94, 585–6(1915).—Free alkaloids will expel NH_3 when evapd. with NH_4 salt solns. This happens when small amts. of the aqueous liquid, from which the alkaloid (set free by NH_4OH) was shaken out with an immiscible solvent, are evapd. together with the solvent. Titration will then give lower, gravimetric detns. higher results. Atropine showed largest loss, up to 50%, strychnine nearly 6%. From assays of belladonna leaves by Brit. Pharm. method with varying degrees of precaution it is evident that in any alkaloidal assay in which the alkaloidal residue is titrated, the accidental admixt. with even as little as 1 mg. of an NH_4 salt must be avoided, owing to the high mol. wts. of the alkaloids. It is imperative to wash the alkaloidal soln. in the volatile solvent prior to evapn.

S. WALDBOTT.

Preparation of animal charcoal for medical use. RUDOLF DITMAR. *Die Umschau*. No. 48, 1914; *allg. Oest. Apoth. Ver.* Dec., 1914; *Pharm. J.* 94, 209(1915).—Sea fish and fresh-water fish are cut into small pieces, washed and boiled with 2–5 times their vol. of H_2O for 3–5 hrs. The H_2O is then drawn off and evapd. to a sirup which is dried *in vacuo*. The residue is ground and charred in the usual way. If necessary, the charcoal is washed with HCl and H_2O . The ground product is a dark, non-hygroscopic powder with 90–95% of C, very suitable for its microbe-absorbing qualities.

S. WALDBOTT.

Analysis of a piece of resin discovered in a Moroccan vase at Port-Etienne, Cape Blanco. LOUIS REUTTER. Geneva. *Schweiz. Apoth. Ztg.* 53, 96-7(1915).—The resin consisted of greenish gray, hard pieces, softening by the warmth of the hand, of aromatic odor and enclosing débris of some dicotyledonous plant. The greater part was sol. in Et₂O, a large amt. in oil of turpentine, EtOH, nearly all sol. in CHCl₃, CS₂ and KOH. M. p. 70-72°. Acid no. 126-131.5; sapon. no. 225-234. With KOH, a strong odor of turpentine is evolved. Further tests showed the presence of sugar and mucilage, but the absence of cinnamic acid, storax, myrrh, ammoniacum, mastic, incense, bdellium. The aromatic part of the resin was evidently the exudate of *Pistacia terebinthus*, family of Anacardiaceae. S. WALDBOTT.

Analysis of a Roman pomade. L. REUTTER. *Schweiz. Apoth. Ztg.* 53, 130-2 (1915).—A specimen from a Roman amphora in the Locarno Museum was brownish yellow, soft, sticky, m. 58°, and had the odor of turpentine and storax. Analysis showed that this pomade was no doubt prepared by macerating resin of turpentine and storax in wine, to which an oily ext. of Henna and perhaps other aromatic plants were added as perfume, then beeswax and animal greases. S. WALDBOTT.

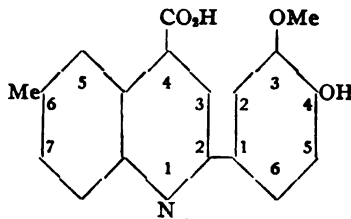
Optochin hydrochloricum. J. MORGENROTH. Fleissig. *Schweiz. Apoth. Ztg.* 53, 139-40(1915).—Another name for ethylhydrocuprein. Cf. C. A. 8, 182. S. W.

The calcium and the lithium salts of *o*-acetoxybenzoic acid. "J. A." *Schweiz. Apoth. Ztg.* 53, 177-9(1915).—The 2 salts decompose easily in presence of moisture; hence they are prepared by the aid of organic solvents. FeCl₃ gives a yellow brown ppt. with the pure salts; a violet color indicates decompn. The H₂O soln. of the pure Ca salt is neutral or faintly acid. Upon decompn. it becomes strongly acid; the acidity may be measured by titration. The com. names of the Ca-salt are "aspirin-soluble" and "kalmopyrin;" of the Li salt, "hydropyrongrifa" and "apyron." S. W.

The active principle of sulfur baths. O. v. SPINDLER. Zürich. *Schweiz. Apoth. Ztg.* 53, 217-20(1915).—The tonic activity of sulfur baths is not due to the small amts. of sulfides as such, or to free H₂S contained in the waters, but to colloidal S formed by oxidation of H₂S or sulfide solns. in contact with air and CO₂. It is suggested that some active organic S compd., e. g., ichthyol, which, however, is too expensive, might ultimately replace the use of natural S springs. S. WALDBOTT.

Seeds of Trichilia (AMMANN) 27. Detection of cinnamic acid (SCHENK) 7. Glass for ampoules, etc. (KROEBER) 19. Test for sesame oil in olive oil (SAGE) 27. Organic chemical industry in Gt. Britain (PERKIN) 10.

U. S., 1,138,936, May 11. A. B. DAVIS. 2-(*p*-Hydroxy-*m*-methoxyphenyl)-6-methylquinoline-4-carboxylic acid of the formula



is made by boiling a soln. of pyruvic acid 44, *p*-toluidine 54 and vanillin 76 parts, in abs. alc. The product seps. from alc. as deep orange colored crystals. Similar compds. derived from 2-[*p*-hydroxy-*m*-methoxyphenyl]-quinoline-4-carboxylic acid by boiling together in abs. alc. soln. equimol. proportions of an aromatic amine, pyruvic acid and

vanillin. Thus from the toluidines and anisidines are formed the corresponding substituted quinoline compds.; *m*- and *p*-anisidine, and *o*- and *m*-toluidine yield, resp.: 2-[*p*-hydroxy-*m*-methoxyphenyl]-8-methoxyquinoline-4-carboxylic acid, 2-[*p*-hydroxy-*m*-methoxyphenyl]-7-methoxyquinoline-4-carboxylic acid, 2-[*p*-hydroxy-*m*-methoxyphenyl]-6-methoxyquinoline-4-carboxylic acid, 2-[*p*-hydroxy-*m*-methoxyphenyl]-8-methylquinoline-4-carboxylic acid and 2-[*p*-hydroxy-*m*-methoxyphenyl]-7-methylquinoline-4-carboxylic acid. If ethyl *p*-aminobenzoate be the amine used, then the product is 6-ethyl 2-[*p*-hydroxy-*m*-methoxyphenyl]quinoline-4,6-dicarboxylate. These compds. are useful as mobilizers for uric acid.

U. S., 1,138,937, May 11. A. B. DAVIS. 6-Ethyl-2-phenylquinoline-4,6-dicarboxylate is made by boiling together in abs. alc. equimol. proportions of Et *p*-aminobenzoate, BzH and pyruvic acid. It is a white cryst. powder. Compds. similarly prep'd. are: 6-ethyl 2-[*m,p*-methylenedioxyphenyl]quinoline-4,6-dicarboxylate (from heliotropine, Et *p*-aminobenzoate, and pyruvic acid); 6-ethyl 2-[*o*-hydroxyphenyl]quinoline-4,6-dicarboxylate (from salicylic aldehyde, ethyl *p*-aminobenzoate and pyruvic acid); 6-ethyl 2-[*p*-methoxyphenyl]quinoline-4,6-dicarboxylate (from *p*-anisaldehyde, ethyl *p*-aminobenzoate and pyruvic acid); 6-ethyl 2-[*p*-hydroxy-*m*-methoxyphenyl]quinoline-4,6-dicarboxylate (from vanillin, ethyl *p*-aminobenzoate, and pyruvic acid). All of these are yellow to white cryst. powders, slightly sol. in alc., insol. in water and *m*. at high temps. They are sol. with decompn. in strong H₂SO₄ and in hot conc'd. alkalis. All are for pharmaceutical use.

Brit., 29,546, Dec. 22, 1913. BOEHRINGER & SOEHN. Mono- and dinitro-aminophenylarsonic acids and their derivs. are prep'd. by treating 4-Cl-mono- or dinitrophenylarsonic acids with NH₃ or its derivs., the product being further nitrated if a dinitro comp'd. is desired and a mononitro comp'd. is the parent substance. NH₃ derivs. include primary and secondary amines, and compds. of the type of aminoacetic acid, phenylsulfonamide, and piperidine. 3,5-Dinitro-4-chlorophenylarsonic acid for use as a parent material is obtained by direct introduction of 2 NO₂ groups into 4-Cl-phenylarsonic acid, or by further nitration of the mononitro comp'd. 4-Chloro-3-nitrophenylarsonic acid is prepared by nitration of 4-Cl-phenylarsonic acid.

Brit., 28,736, Dec. 12, 1913. G. B. ELLIS. *p*-Dimethylaminophenol and *p*-hydroxyphenyltrimethylammonium hydroxide are sep'd. from solns. containing both products by adding a ferrocyanide and acidifying with a mineral acid. The mixed acid ferrocyanides resulting are sep'd. either by extn. of the weakly alk. soln. of the mixed salts with C₆H₆, Et₂O, etc., whereby the *p*-Me₂NC₆H₄OH is removed, and then seg'd. the pure ferrocyanides from the ext. and residue, resp., or by recrystg. the mixed acid salts with alkali sulfite whereby the neutral ferrocyanide of *p*-Me₂NC₆H₄OH is obtained cryst. The pure bases and other salts may be prep'd. from the ferrocyanides.

Brit., 29,841, Dec. 24, 1913. F. HEINEMANN. Iron salts of therapeutic value are prep'd. from the arseno- and phospho- derivs. of fatty acids described in 18,732, 1912 (C. A. 7, 2096). The examples describe the production of Fe salts from the chloroarsenobehenolic acid obtained according to example B described in the principal patent, by neutralizing the MeOH soln. of the acid with alc. NaOH and adding alc. FeCl₃; by adding an alc. soln. of the acid to liquor ferri oxychlorati of the German Pharmacopoeia and by mixing a soln. of basic Fe acetate with alc. and an alc. soln. of the acid.

Brit., 30,047, Dec. 31, 1913. K. H. SCHMITZ. Methylhexamethylenetetramine thiocyanate. See Fr., 466,619 (C. A. 9, 1369).

Brit., 30,068, Dec. 31, 1913. FABRIQUES DE PRODUITS DE CHIMIE ORGANIQUE DE LAIRE. Chlorohydrocarbons containing the group CH₂Cl are prep'd. by condensing an aromatic hydrocarbon with chlorodimethyl ether or a homolog in the presence of

SnCl_4 , SbCl_5 , AlCl_3 , Fe_2Cl_6 , ZnCl_2 , TiCl_4 , etc. In an example the treatment of toluene is described, *p*-methylbenzyl chloride and a dichloro compd. resulting. Similarly, there may be prepd. chloromethylethylbenzene, -propylbenzene, -butylbenzene, -amylbenzene, -cyclohexylbenzene, -ethyltoluene, -propyltoluene, -butyltoluene, etc. Alcohols, aldehydes, acids, and ethers may be prepd. from the chlorohydrocarbons obtained as above described.

Brit., 30,072, Dec. 31, 1913. BAYER & Co. β -Naphthisatin and its derivs. See Ger., 269,750 (C. A. 8, 2221).

18. ACIDS, ALKALIES, SALTS AND SUNDRIES.

T. LYNTON BRIGGS.

Reburning of lime from alkali waste and other forms of precipitated carbonate of lime. R. K. MEADE. *Met. Chem. Eng.* 13, 289-90(1915).—Where lime is being purchased at a cost of \$3 per ton it will generally prove economical to put in a lime recovery plant, provided the quant. sludge obtained is not too small. If properly installed a kiln 6 ft. in diam. and 100 ft. long will burn at least 30 tons of quicklime per day when working on a waste containing 45% H_2O . The cost, including interest on the investment and depreciation, will vary between \$2 and \$3 per ton, depending on the quantity of waste to be recovered and cost of fuel. The power required by the plant will amount to about 15 kw. hrs. per day. M. has designed a plant (diagram given) in which the % of H_2O in the waste is reduced as low as will permit of the pumping of the latter. This is done by allowing the waste to settle in 2 tanks provided with a movable syphon tube. The contents of one tank are allowed to settle while those of the other are fed to the kiln. The sludge is allowed to settle for 24 hrs., when the H_2O is drained off. The slurry is then agitated with compressed air to make it of uniform consistency, and pumped into the kiln with a small centrifugal pump. A valve controls the flow of slurry and the excess goes back into the tank and serves to keep the contents agitated. The rotary kiln is of the ordinary type. A small plant (including gas producer), which will have a capacity of about 10 tons lime per day, may be put up for about \$12,000-\$15,000. If oil or natural gas is to be used for fuel the cost will be materially less. The recovered lime, if burned at all skilfully, will contain fully as much caustic lime as the best lump lime made from limestone.

C. A. NOWAK.

Theoretical and practical study of the manufacture of sodium hypochlorite from sodium hydroxide. U. CATTANIA AND C. RANUCCI. Palazzolo. *Ann. chim. applicata* 3, 161-4(1915).—In a sandstone vessel, Cl was allowed to pass through a 28° Biné NaOH soln., which was kept agitated, while the vessel was cooled by an external water bath. In 10 min., 1 hr., 2 hrs., 3 hrs., and 3½ hrs., resp., the soln. showed 2.30, 6.82, 10.43, 13.65 and 17.70% active Cl, with NaOH in excess amounting to 17.94, 12.75, 7.89, 5.14 and 1.50%. These test samples analyzed a day later showed, resp., 2.30, 6.75, 9.10, 6.20 and 2.80% active Cl. A small amt. of free NaOH, not exceeding 0.5%, should be allowed to remain in order to prevent decompn. of the hypochlorite by the CO_2 of the air, and by HClO and HCl always present in the liquid. It was found that by removing the NaCl gradually as it was deposited from the liquid, the hypochlorite formed retained its activity in full after standing 24 hrs. S. LEVY.

The development of the chemical industries in Canada. H. G. *Chem. Ind.* 38, 94-5(1915). F. W. SMITHER.

The chemical industry of Sweden and the war. ALF. LARSON. *Chem. Ztg.* 39, 253-4(1915). E. H.

The chemical industries of Germany. PERCY FRANKLAND. *Pharm. J.* 94, 353-4 (1915); *J. Soc. Chem. Ind.* 34, 307-16(1915); *Mét. Chem. Eng.* 13, 378-87(1915).—A descriptive account and discussion of the causes of German success in chem. industries. S. WALDBOTT.

Ammonium magnesium sulfate (PORLEZZA) 2.

U. S., 1,137,043, Apr. 27. F. P. WOOD. Fusible adhesive for use in making paper-walled receptacles; composed of gilsonite 30, linseed oil 4 and vaseline 15 parts. Parolite or elaterite may be substituted for gilsonite and China wood oil for linseed oil.

U. S., 1,137,181, Apr. 27. O. BERG. Granulating calcium nitrate, etc., by drying and hardening in a rotating drum and scraping off in the form of flakes which are allowed to collect at the point of removal until the compression causes them to become granulated. They are then subjected to a current of air to cool them and prevent them from sticking together.

U. S., 1,137,366, Apr. 27. W. R. UHLEMANN. Fusible cement for eye-glass mountings, formed of shellac 15, bronze leaf powder 8 and powdered talc 10 parts.

U. S., 1,137,373, Apr. 27. J. W. AYLSWORTH. A composition for making bearings, valve disks, brushes for electric motors, etc., is formed by treating flake graphite with hot conc. HNO_3 for 0.5-2 hrs. and then heating to about 500° after washing, to expand the graphite to several times its original bulk and open up and separate the laminae of which it is composed like the leaves of a book, and finally mixing the expanded material with a phenolic condensation product, with or without wood flour or other filler.

U. S., 1,137,617, Apr. 27. P. R. HERSHMAN. Obtaining alkali-soluble alumina from alunite by calcining it and then heating with 20-50% of C in an atm. of N or CO to about $1450-1650^\circ$ for 0.5-2 hrs. Heating in air or CO_2 gives a less completely sol. product.

U. S., 1,137,774, May 4. E. MAZZA. Separating constituents of air or other gaseous mixtures, by centrifugal action.

U. S., 1,137,806, May 4. R. STEWART. Producing calcium hydrogen phosphate by treating phosphate rock with steam and the smoke from a smelter, containing SO_2 and SO_3 , to form CaHPO_4 and $\text{Ca}(\text{HSO}_4)_2$, oxidizing the soln. obtained by the action of an elec. current and evapg. to recover the CaHPO_4 .

U. S., 1,137,860, May 4. H. HOWARD. Removing silica from aluminate solutions by treating the hot soln. at a concn. of about 23-25° Bé. with the residues remaining after the digestion of bauxite with alkaline aluminate soln.

U. S., 1,137,871, May 4. S. H. LAWTON. Purifying zinc chloride solutions containing dissolved ferric salts, such as obtained by treating galvanized iron scrap with hydrochloric acid. ZnO , ZnCO_3 or basic Zn chloride is added to the soln. and it is then conc. by evapn. to about 85-95° Bé. to convert the Fe into anhyd. Fe_2O_3 .

U. S., 1,138,190, May 4. J. E. BUCHER. Fixing atmospheric nitrogen by bringing free N and Na vapor into contact with a catalyst formed of Fe, C and Na_2CO_3 at a temp. of about $920-1000^\circ$ to form NaCN and supplying fresh C to the catalyst as it is consumed by the reaction. Na metal may be used to start the reaction or, instead, NaOH, NaOAc, NaHCO_3 or Na oxalate may be used with an easily reducible Fe compd. and C. Cf. C. A. 9, 357.

U. S., 1,138,191, May 4. J. E. BUCHER. Fixing free nitrogen by bringing it into contact with Na_2CO_3 and a catalyst formed of a finely powdered mixt. of Fe and

graphite at a temp. of about 725° , to form NaCN. The latter may be acted on with steam, as formed, if desired, to produce NH_3 .

U. S., 1,138,595, May 4. W. H. STANTON and J. G. VAIL. **Dissolving alkali silicates** without agitation by covering an excess of the silicate with H_2O and then surrounding the receptacle in which it is contained with steam to form a soln. sufficiently conc. that the rate of solution is not reduced by hydrolysis.

U. S., 1,138,658, May 11. H. HOWARD. **Drying sodium hydrogen sulfite crystals** by a current of hot SO_2 . The latter is repeatedly used after removal of moisture from it by cooling and condensation. $\text{Na}_2\text{S}_2\text{O}_3$ may be similarly dried without decomn. Cf. C. A. 8, 2783, 3222.

U. S., 1,138,676, May 11. W. J. LONGMORE. **Making electrical insulation in sheet form** by collecting a shower of mixed mica scales and shellac or other binder upon a heated plate and subjecting the layer thus formed to pressure beneath another heated plate.

U. S., 1,138,691, May 11. J. H. SANBORN. **Electrical insulation in sheet form** is made by allowing mica flakes and powdered shellac to settle through a tall chamber filled with air and heating and pressing the layer of the mixt. which collects on the floor of the chamber.

U. S., 1,138,751, May 11. W. M. GROSVENOR. **Apparatus and method for drying glue in a current of dry, purified air.**

U. S., 1,139,291, May 11. C. F. JENKINS. **Coating lace or other textile fabrics, wood, paper, etc., with metals.** A wire of the coating metal is fused by passing an elec. current through it and the fused metal is atomized and projected upon the article to be coated by the explosive action of O and H or other explosive gases introduced into the tube in which the elec. fusion takes place. The highly heated particles of metal serve to ignite the gases.

Brit., 29,254, Dec. 18, 1913. G. HUNNYBUN. The heat generated by the combustion of S is utilized for the recovery of sulfuric acid from bisulfates. In an example, pulverized S is mixed with powdered or liquid NaHSO_4 , and the mixt. roasted in an open pan until the S ignites. The free acid is driven off along with SO_2 , the residue consisting chiefly of Na_2SO_4 .

Brit., 29,521, Dec. 22, 1913. G. MASON. **Impregnating compositions for sacks,** such as cement sacks, etc., to render them dust-proof, comprises gelatin, black molasses, alum or chrome alum, and petroleum product. The gelatin is heated with H_2O , the molasses is added, and subsequently chrome alum. The heating is then stopped and the petroleum product added.

Brit., 29,621, Dec. 23, 1913. S. A. C. KRISTENSEN. **Light-weight printing-blocks** are made by pressing into a suitable matrix (1) a compd. consisting of a metal powder, such as Al, and an adhesive such as water glass, or (2) an unsized paper coated with the comp., the block being completed in each case by the application of a filling or backing medium, such as plaster of Paris alone or mixed with celluloid. An oiled celluloid, metal, or paper matrix is employed, or a rubber or wax matrix may be used. When the metal compn. alone is employed, it is pressed into the matrix by a soft brush and when this is dry, thin linen or tissue paper coated with the metal compn. is applied and also pressed; when this is dry, the filling medium is applied. The completed block may be detached from a rubber or wax matrix by melting this. The completed block is mounted on wood. For auto-types, no filling medium is required, and the printing surface, when pressed into its matrix, is coated with an adhesive so that it can be applied directly to a plane or curved support. Cf. C. A. 8, 1490.

Brit., 29,827, Dec. 27, 1913. M. SPAZIER. Sodium carbonate crystals. See U.S. 1,122,323 (C. A. 9, 516).

Brit., 29,934, Dec. 30, 1913. J. WOLFENDEN. A composition for removing gloss from worn garments consists of vinegar, turpentine, oil of tar, benzine, and spirits of camphor. The mixt. is boiled, and the vapor passed through the clothes from the inside.

Brit., 30,035, Dec. 31, 1913. J. S. ELDER. A plastic composition for application to surfaces subjected to friction, such as boot soles and heels, consists of about 20% of gutta-percha, 5% of rubber, 5% of shellac, and 70% of metal in granular form, such as Fe filings. The ingredients are heated and kneaded until homogeneous. For repairing boots, the surfaces to be patched are coated with coal tar and Archangel tar, and the comp. while warm is applied like putty.

Brit., 41, Jan. 1, 1914. E. STAUBER and W. KOCHAN. Ammonia. See Fr., 464,227 (C. A. 9, 1376).

Brit., 234, Jan. 5, 1914. J. H. HARGREAVES and G. K. DAVIS. Iodine and other products, such as sodium or potassium salts, combustible gases, oils, tar, ammonia, etc., are obtained by burning seaweed by admission of air in a series of vertical chambers, the gases from the chamber in which combustion is taking place being passed downwards through the seaweed in the remaining chambers of the series, each chamber becoming in turn the last, intermediate, and first in series.

Brit., 337, Jan. 6, 1914. R. FABRY. An app. for dissociating chemical solutions, e.g., decomposing crude ammoniacal liquor into caustic ammoniacal liquor and gaseous H_2S and CO_2 , transforming bicarbonate solns. into normal carbonate and CO_2 , or treating combined solns. of alkali bicarbonates and NH_4 compds. resulting from the washing of coal-gas with a soln. containing NH_3 and alkali carbonate, consists of a still, a dephlegmator to which the vapors from the still are led by a pipe, and a preheater to which the residual liquid from the still is led by a pipe, the plant being so arranged that the crude liquor is fed in proportions regulated by valves partly through a pipe to the dephlegmator, and partly by a pipe to the preheater. The liquor fed to the dephlegmator seps. H_2O and NH_3 from the escaping gases, and flows, together with liquor from the preheater, through the vapor pipe (from the still to the dephlegmator) to the still. The still is fitted with a steam heater. The app. may be worked under pressure to avoid loss of NH_3 .

Ger., 279,699, Oct. 8, 1913. M. DIEBOLD. Preparing permanent macroscopic exhibits by imbedding the object in a nitrocellulose soln. which is afterwards hardened. The hardened block is satd. with a transparent colorless material, fast to light, having no solvent action on cellulose, and with a refractive index of 1.35-1.65. The block is rendered as clear as glass by this means.

Ger., 280,032, July 20, 1913. R. PIETERS VAN CALCAR, J. ELLERMANN and H. J. MARTIJN. In drying air, the $CaCl_2$ soln. which drops down from the solid salt used is caught in a deep tray containing porous material (wadding, sponge, or felt, mounted on rods or spirals) which absorbs the soln. and serves to abstract moisture from the moist air as it enters the app.

Ger., 280,499, Jan. 31, 1913. BADISCHE. Mfg. nitrogen oxides. See Brit., 9,263, 1913 (C. A. 8, 3355).

Ger., 280,821, Jan. 3, 1913. Addition to 273,132 (C. A. 8, 2608). E. WEIDINGER and DRESER. Insulating plates are prepd. from feldspar and mica, or from either of these alone instead of from the 3 constituents of granite as specified in the principal patent. Also, instead of a soln. of caoutchouc in turpentine, a soln. of other high

melting colloids may be employed, such, *e. g.*, as an asphalt soln. In this case the addition of H_2O is unnecessary.

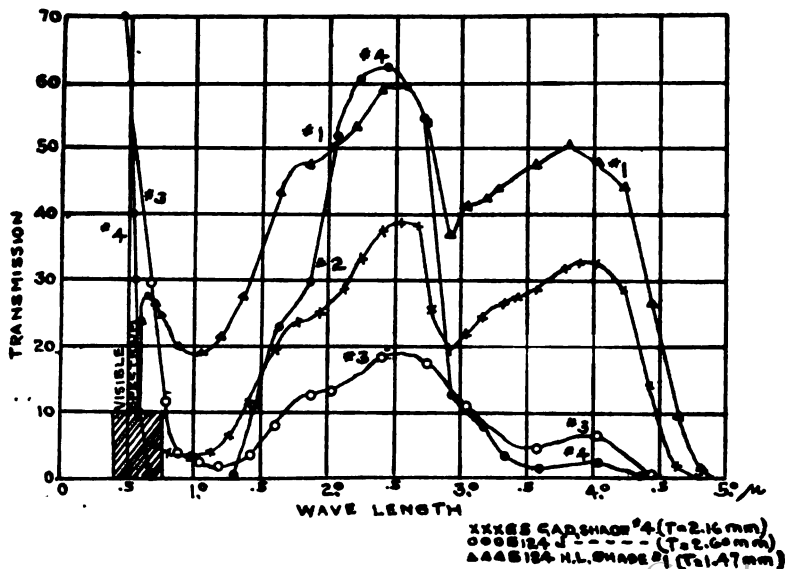
Ger., 280,863, July 1, 1913. R. JORDAN. Coating acid-proof containers, to be used for transporting acids. The glass, earthenware, or like vessel is provided with 3 coats which blend together at the fusion temp. The 1st coating is made of bituminous and fibrous materials, such as jute or hair, and the 2nd coat consists of a flexible layer of wood, peat, and the like, while the outer coating is strengthened by sand or gravel. A blow applied from without is transmitted to the middle layer in which the shock is absorbed with consequent protection of the glass vessel.

Ger., 281,004, Feb. 5, 1914. Addition to 261,922 (C. A. 7, 3645). F. MEYER. The principal process for effecting chemical reactions at a high temperature is modified in that the flame is directed against, instead of through or into, the reaction mass. Molten, instead of pulverulent products, are obtained, and re-oxidation is prevented by a film of oxide. The process is applicable in all cases wherein 1 of the components concerned in the reaction is non-volatile, *e. g.*, in the reduction of oxides to metals, or in the production of nitrides from oxides. The process is applicable also to the smelting of the precious and base metals. As the flame is directed against the metal itself, the crucible remains relatively cold. The charge itself may serve as the crucible, thereby ensuring greater purity of the product. The temp. and reducing power of the flame can be increased greatly by increase of pressure, even the temp. of the elec. arc being attained.

19. GLASS AND CERAMICS.

G. E. BARTON, A. V. BLEININGER.

Glasses for protecting the eyes from infra-red rays. W. W. COBLENTZ. *J. Frank. Inst.* 179, 579-80(1915); see fig.—Curve No. 1 gives the transmission through a sample of glass, 1.47 mm. in thickness, yellowish brown color, maker's No. "G124, H.L., shade No. 1." Curve No. 2 gives results from a much more opaque sample of



the same kind of material, 2.16 mm. thick, marked "G5, C. A. D., shade No. 4." It transmits about 5% in the "orange" part of the spectrum, while No. 1 transmits almost 30% in the "orange." These samples absorb also the violet end of the spectrum. The transmission curve No. 3 is of a sample with a faintly bluish tint, being quite colorless; the infra-red is marked by almost complete opacity. Thickness = 2.6 mm; makers' No. "G124 J." This will make excellent spectacle glass for working near a "red-hot" source which emits but little light, but which emits a great deal of "heat," i. e., infra-red radiations. It was shown in a previous article (*Carnegie Inst. Pub. No. 97*) that ordinary black glass ("smoked glass") is quite transparent in the infra-red, although it is quite useful for reducing the visible radiations. No. 3 is the first sample found to fulfil the claim of great opacity in the infra-red. Another blue glass (Corning G 401ZA and Schott's blue-violet glass No. F 3086) has practically the same form of transmission as curve No. 3 in the infra-red; this is shown in curve No. 4. The peculiarity of this glass is that a high transmission in the visible gives a high transmission at 2.2μ . Samples made by the Corning Glass Works.

F. W. SMITHER.

Examination of glass for ampoules and medicine bottles. L. KROEBER. *Apoth. Ztg.* 29, 974-8(1914); *Schweiz. Apoth. Ztg.* 53, 147-51.—Fiolax Jena glass (cf. C. A. 6, 3432) answers the strict requirements for ampoules and especially stands the test of Mylius (C. A. 8, 1000). The scale of sensitiveness towards free alkali in decreasing order is narcotine-HCl, strychnine-HNO₃, phenolphthalein, HgCl₂, morphine-HCl. The German Ministry of War requires this test: Fill the rinsed ampoules with weak phenolph. soln., heat the tubes, close them by fusion, heat again to 100° for 1½ hr. The contents must not show red color. Anneler's test (C. A. 7, 2451) with 0.1% narcotine-HCl soln. is by far the most sensitive. For medicinal glass in general, many possibilities of dangerous ppts. in inferior glass are cited. K. recommends filling the glasses with CO₂-free H₂O containing 2-3 drops of phenolph. in 100 cc. Heat in a current of steam for at least 1 hr. Allow to stand 24 hrs. The contents should be colorless or faint pink, and the color should disappear upon adding 2-3 drops of 0.1 N HCl. The following summary of treatment is given: Sterilize in a current of steam for 1½-1 hr. After 24 hrs., dist. H₂O should show no glittering silicates. Morphine-HCl soln. 1-2% should show at most a faint yellow color. Strychnine-HNO₃ 0.6% should not deposit cryst. needles. HgCl₂ should not ppt. colored oxides. Phenolph., see above. Narcotine-HCl soln. 0.1% at room temp. should not ppt. or only very slightly, after 1 hr. Sterilize for 1 hr. with a 1% HCl soln., then wash until litmus no longer shows acid.

S. WALDBOTT.

Jena glass. C. BÜHRER. *Schweiz. Apoth. Ztg.* 53, 169-73(1915).—An account of the historical and technical development of Jena glass and "Fiolax." Cf. preceding abstr.

S. WALDBOTT.

The chemical properties of glass. C. BÜHRER. *Schweiz. Apoth. Ztg.* 53, 186-9 (1915).—A review of articles by Moeller, Baroni, Anneler and L. Kroeber. Cf. preceding abstr.

S. WALDBOTT.

Refractory materials; their definition and their tests. *Ceramique* 17, 202-4. (1914).—In estg. the refractory degree of a substance the following points should be considered: (1) The temp. to which the substance can be heated without melting; (2) the uses to which it will be put and whether it will withstand variations in temp. and maintain a volume sufficiently nearly const. to have no detrimental effect; (3) its resistance to the action of basic or other agents such as lime, cement, magnesia, clinker and corrosive gases. Methods are given for testing these points. J. C. EVANS.

The specific heat of refractory products. W. STEGER. *Silicat-Z.* 2, 203-5(1914). Within one and the same temp. range the sp. heat of all ceramic mixts. is practically

the same. The value increases as a straight line function with temp., averaging about 0.204 between 20 and 200° and about 0.225 between 20 and 400°. The value is not affected at all by method of manuf. or the burning temp. and but slightly by a change in chem. comp.

C. S. KINNISON.

The coefficient of expansion of glazes. R. RIEKE AND W. STEGER. *Sprechsaal* 47, 577-8, 585-6, 593-5, 601-4(1914); cf. C. A. 8, 3846.—The base glaze used in the study was 0.3 CaO, 0.7 PbO, 0.2 Al_2O_3 , 2.1 SiO_2 , 0.4 B_2O_3 . This RO was kept constant while the Al_2O_3 varied from 0.0 to 0.40, to SiO_2 from 2.0 to 3.0 and the B_2O_3 from 0.0 to 3.0. The coeff. of expansion was measured between room temps. and 100°. *Conclusions:* An increase of the SiO_2 or a replacement of B_2O_3 by SiO_2 in equimol. proportions lowers the coeff. of expansion. (2) The addition of Al_2O_3 up to 0.30 equiv. always lowers the coeff. of expansion. In SiO_2 -free, boric acid glasses, raising the Al_2O_3 content above 0.20 equiv. raises this coeff. (3) Increasing the B_2O_3 or replacing the SiO_2 by B_2O_3 in equimol. amts. raises the coeff. Only in SiO_2 -free glasses or those very high in B_2O_3 does an addition of the latter raise the coeff. (4) There is no direct relation between the magnitude of the coeff. of expansion and its behavior as regards crazing and shivering.

C. S. KINNISON.

Process of the metallization of porcelain. M. P. MARINO. *Ceramique* 17, 188 (1914).—The object is first covered with a coat of AgF and then exposed to a stream of illuminating gas. The SiO_2 of the porcelain combines with the F and Ag is liberated. The liberated Ag penetrates the pores of the article and adheres to the surface, provided the surface is rough and not glazed. The object is then exposed to vapors of CS_2 at about 50°. The CS_2 reacts with Ag to form Ag_2S ; CF_4 is also formed, and both of these form a strong, adherent coat. To increase the adherence the surface can be brushed with a revolving brush of brass, zinc, copper or other metal. The object is finally made the cathode in a soln. of a metal salt and metallized by electrolysis. Pottery can also be coated with Ag_2S by treating the surface with a soln. of $AgNO_3$ and subsequently dipping it in a solution of H_2S .

J. C. EVANS.

Preserving the resisting quality of ceramic bricks. LA SOCIÉTÉ UTZSCHNEIDER ET JAUNEZ. *Ceramique* 17, 178(1914).—Bricks or flagstone which are resistant to acids and frost are made by adding to the ceramic paste before mixing carborundum grains dipped in a frit. The grains added, although completely enveloped by the fritted material, are not attacked during the burning and the resultant material has a rugged appearance and a minimum contraction; its resistance to acids is not impaired.

J. C. EVANS.

Preparation of humid clay for dry pressing. ANON. *Ceramique* 17, 187-8(1914).—The addition of the correct amt. of milk of lime in place of $CaCO_3$ to argillaceous pastes followed by the addition of fine sand offers the following advantages: (1) It gradually raises the humidity of the clay; (2) it secures a better consolidation of the product; (3) it brings about desiccation, without cost, of the mixt., which can subsequently be pressed dry. The amt. of lime that combines with the clay matter should be detd. and that much, only, added. The fine sand can be added either during or after mixing with lime. This fine sand with some of the clay matter combines with the lime and fills the voids during vitrification; it gives a more compact material.

J. C. EVANS.

Firing and burning. ERNST SCHMATOLLA. *Brick Clay Record* 45, 487-90, 600-2, 697-9, 791-3, 1092-4(1914).—Two types of liquid fuel burners are described, the oil being atomized either by pressure or a steam-jet. An illustration is given of a small testing kiln heated by crude oil, atomized by steam, and the burning is described. The front view, side elevation and plan of a clamp-kiln are shown and the building of the firing arches, the flues, and the setting of the kiln described. S describes a method

for utilizing the waste heat from clamp kilns for drying purposes. Two round type up-draft kilns are shown, one of which represents the kind used in potteries; it has 2 or 3 chambers arranged above each other for the best utilization of the heat. A horizontal draft, periodical kiln, a semi-continuous kiln, and a continuous ring-system of down-draft kilns are also described briefly with illustrations. A description is given of the following kilns: (1) A down-draft kiln which may also be operated with horizontal draft and which is equipped with a semi-gas producer and a heat recuperator; (2) a combination pottery kiln, consisting of two up-draft chambers arranged above one down-draft chamber; (3) a one-chamber up- and down-draft kiln cf. the Hook patent kiln, (C. A. 8, 3494). It has two sets of furnaces, one burning from the top downward and the other from the bottom upward, thus insuring an even burn throughout the kiln; (4) a center-stack, down-draft kiln with auxiliary furnace arrangement for heating the kiln bottom and stack; (5) a semi-continuous kiln system for round, down-draft kilns; (6) a steel-jacketed, down-draft kiln. Different ways of setting, water-smoking and firing down-draft kilns are described with illustrations. Seven illustrations of the Hoffmann continuous horizontal-draft kiln with a detailed description of the methods of operation for both coal and gas firing are given. Advantages of the zig-zag type of the Hoffmann kiln are mentioned. S. describes the construction and operation, with illustrations, of the continuous compartment kiln, the tunnel kiln and the regenerative kiln.

ROBERT BACK.

Some tests upon large brick piers. J. H. GRIFFITH AND J. G. BRAGG. U. S. Bureau of Standards. *Clayworker* 63, 367-373(1915).—The strength of large piers under vertical loading in common with smaller piers bears a close relation to the kind of brick used and the quality and age of mortar. The specimens laid in the cement (1:3) and the cement and lime (15% + 85% = 1:3) mortars have an equiv. strength for any one grade of brick. The relative strengths of piers of vitrified, hard and soft (A, B and C) brick laid in these mortars are approx. in the ratio of 5:3:1. The ratio of the max. unit loads of the piers laid in the above mortars compared with those laid in the 1:6 lime mortar is about 2:1 for the A, B and C grade, resp., this ratio being still larger (about 4:1) in the case of "C specification" brick laid in 1:3 mortar. The low strength of piers laid in the lime mortars is attributed in the main to insufficient aging with a consequent lack of proper carbonation of the mortars. The expts. thus far conducted seem to indicate that the strength of a pier is largely independent of the course bonding, the real function of bond being, it is believed, to maintain a certain integrity and monolithic action of the masonry against initial strains induced through setting and "drying out" of the mortar rather than any great increase of vertical strength due to the bonding. The slight increase of strength with the increase of distance between header courses is thought to be inconclusive on account of a probable reduction in the effective resistance of the bonding courses chosen due to the presence of too many fractional brick. The mean moduli of the piers of A and B specification brick laid in cement mortar was 3,000,000 lbs. and 2,500,000 lbs., resp., the corresponding figures for piers in the lime and cement mortar being somewhat lower. The "elastic limit" of the piers in the cement and cement and lime mortar is approx. one-half the max. load. Piers fail through a tendency to sep. into vertical laminae caused by transverse failure in the individual brick occurring from flexural action produced through unequal distribution of the vertical load over the cross section, together with ineffective shearing and adhesive strength of the mortar. Uniformity in the brick dimensions is also a factor to a lesser extent in reducing unequal compressions of the joint, as is the thickness of joint itself. A high modulus of rupture is more desirable than superior crushing strength, as far as these can be differentiated in their inter-relations. A higher modulus of rupture would be realized in practice either by increasing the thickness of

the bricks or by laying them on edge so as to give their greatest flexural efficiency. A further study of the action of steel mesh reinforcing is recommended in order to ascertain the load efficiency of piers having an outer shell of hard brick with an inner core of softer brick in the case of districts which are unfavorably located for the production of the higher grades of brick.

ROBERT BACK.

The efflorescences and the spots of burnt earths. ANON. *Ceramique* 17, 186-7 (1914).—To prevent efflorescence in burnt material the following means are discussed: (1) washing out the sol. salts in the earths, avoiding water containing dissolved salts; (2) preventing the concn. of the sol. salts in the earths on the surface of the product; (3) eliminating the efflorescence by chem. reactions during the burning. Washing the earth with water containing BaCl_2 to transform the sol. sulfates into BaSO_4 seems to be more successful than washing with pure water. Under (2) the following methods are discussed: (a) steeping the product before burning in a paste of burnt material and yellow clay so as to produce a red coloration all over the surface; (b) steeping the earth in a very sol. salt of iron, which diminishes the solubility of the lime salts contained in the earth and also gives a red color on the surface; (c) applying to the surface of the earth a film consisting of the product of the condensation of CH_3O and PhOH . This film absorbs the sol. salts during the first stages of the burning and they are later volatilized with the film. Finally the effect of a blast of sand to remove the spots on the burnt material is mentioned.

J. C. EVANS.

Kiln expansion and bracing. C. B. HARROP. Ohio State Univ. *Clayworker* 63, 353-9(1915); 24 figs.; *Brick Clay Record* 46, 566-569, 656-660(1915).—Since the expansive force of kiln walls is practically irresistible, expansion joints are a prime necessity. The greater the number of expansion joints in a given length of wall, the smaller they may be and the less the chance of damage to the wall. It is possible to make expansion joints too large. Thorough bonding of lining to the main wall is essential. The crowding out of kiln walls is inevitable (except in cases of very special construction), but this action can be retarded to a great degree by first-class material and careful workmanship. Probably the greatest damage is done by the expanding of the kiln floor. The floor should have expansion joints on all sides. Cracks in kiln walls, especially those near the bottom, are sources of considerable loss. The single I-beam brace for rectangular kilns is stronger and cheaper than the older form of trussed channel brace. The wedge brick starter for rectangular kiln crown arches has no advantage over the ordinary skewback starter, although in round kilns there may be some slight advantage. Theoretically the crown of a rectangular kiln produces but very little more thrust at the heel when hot than when cold. The steel bands used for supporting the crowns of round kilns are often made heavier than necessary. If the upper part of the wall of a round kiln and the lower part of the crown contain sufficient expansion joints to take care of horizontal expansion, there should be but little more thrust at the heel when hot than when cold.

ROBERT BACK.

Thermo-technical calculations for a gas chamber furnace for burning clay ware. L. LITINSKY. *Feuerungstechnik* 3, 117-120(1915).—L. describes a 14-chamber gas furnace, with several illustrations, indicates the course of the flames and hot gases, manner of combustion and the advantages derived from the use of this type of furnace. Methods of calcg. of the following are given: gas yield, efficiency of generator, max. theoretical temp., dimensions of furnace, fuel consumed, combustion products, cross-section of gas passages and the dimensions of generator and chimney.

H. R. GUNDLACH.

White-burning clays of the Southern Appalachian States. J. H. WATKINS. *Bull. Am. Inst. Mining Eng.* 1915, 391-411.—The paper gives a general description of the

occurrence and methods of mining and washing the white burning clays and a discussion of their economic value. The clays dealt with particularly are the N. C., Va. and Ga. kaolins or china clays (residual); the S. C. and Ga. kaolins or paper clays (sedimentary), and the Fla. and Tenn. plastic kaolins or ball clays (sedimentary). Tables of analyses are given. Illustrated. C. S. KINNIBON.

Drying of clay wares. ELLIS LOVEJOY. *Clayworker* 62, 389-90, 516; 63, 182-3, 538-9(1915); 5 figs.; cf. C. A. 8, 3714.—L. gives the general principles of a hot air periodical drier (Bechtel) which is extensively used in the U. S. and Canada. Tables and calcns. are given for the detn. of temps. available for steam coils when used in connection with drying clay wares. A problem is outlined for the detn. of the amt. of piping for any clay drier. Methods of drying terra-cotta products are described. An illustrated description is given of a 2-storied tunnel type drier and the Scott system of drying is explained. The purpose of the latter system is to eliminate the drier. L. writes on the conservation of heat in German factories, giving plan and sectional views of a German drier equipment, making extensive use of waste heat. The principles of the progressive driers are also given. ROBERT BACK.

The proper construction of hollow ware dies. ERNEST W. KNAPP. *Brick Clay Record* 46, 457-62(1915); 13 figs. ROBERT BACK.

A new method of steam lubrication. R. S. GANGEWERE. *Brick Clay Record* 46, 468(1915); 1 fig.—One steam pipe leads to the pug mill and another to the brick machine while the usual type of oil lubricator is attached to the die. R. BACK.

The manufacture of sewer pipe. ANTON VOGT. *Clayworker* 62, 273-4(1914).—V. tells how blued pipe, dark glazed and brown pipes are produced. He gives directions for the manipulation of the damper during the salt-glazing process. The "white" which sometimes appears on the finished pipes is explained by the deposition of undecomp. salt caused by too low a temp. during salt-glazing. ROBERT BACK.

Improvement on filter press plates. ANON. *Deut. Toepf. & Zieg. Z.* No. 51, 1914; through *Clayworker* 62, 292.—The plate consists of an iron frame with galvanized iron wire stretched in it and covered on both sides with a cement body. R. BACK.

A new and improved cutting table. ANON. *Brick Clay Record* 45, 707(1914).—Broken wires may be replaced while the machine is in motion. R. B.

A new clay washing device. ANON. *Brick Clay Record* 45, 814(1914); illustration. R. BACK.

Adsorption of dyes by clay (ROHLAND) 2. Formation of crystalline hematite during the burning of bricks (HUGHES) 6. The high tension test (WOODWARD) 4.

U. S., 1,137,814, May 4. G. VON PAZSICZKY. Spinning glass. Cf. C. A. 8, 2612.

U. S., 1,138,110-11, May 4. G. E. HOWARD. Tank-furnaces for melting glass.

U. S., 1,138,870, May 11. H. F. HITNER. Glass-drawing apparatus. Cf. C. A. 8, 3106.

U. S., 1,138,885, May 11. G. E. MOORE. Bait for drawing glass.

20. CEMENT AND OTHER BUILDING MATERIALS.

C. N. WILEY.

Composition of portland cement mortars in sea-water. G. GEORGIS AND G. CARRU. Rome. *Ann. chim. applicata* 3, 168-81(1915).—G. and C. examd and

analyzed cement mortars from sea-water constructions built in 1886, 1888, 1893, 1897, and also from one that must have been centuries old. Making certain assumptions based on a review of old authorities and documents bearing on the original comp. of these mortars, and comparing the old with modern cement mortars, it is concluded: (1) that a part of the CaO of the mortar is eliminated, but this elimination ceases after a certain period of time, as the very ancient mortar does not differ much in this respect from some of those relatively recent; (2) as to MgO , there was found no noteworthy change in process of time; (3) that there is a marked tendency towards elimination or at least a large diminution in the quantities of alkalis; (4) that the ratio between SiO_2 and Al_2O_3 tends to decrease. The authors intend to undertake expts. permitting them to follow out from the beginning these changes in cement mortars.

S. LEVY.

Standardization of No. 200 cement sieves. R. J. WIG AND J. C. PEARSON. *Bur. of Standards, Tech. Paper 42*, 51 pp.—This paper discusses the results of a number of observations made to det. methods of standardizing the 200-mesh sieve and its manipulation so that greater uniformity may be obtained in its use. A study was made of: (1) the accuracy of sieving tests, personal equation in sieving, variations in sieving value of standard sieves and precautions required; (2) the results of sieving tests made in 85 different labs. and a comparison of these results with those obtained by the Bur. of Standards on some of the same sieves; (3) 4 proposed methods of standardizing sieves; (4) the suitability of a number of finely ground materials, as compared with portland cement, for use in calibrating sieves; (5) the adoption of a standard value of fineness; (6) the application of a "correction" to the sieving value of standard sieves; (7) a revised specification for standard sieves. Diagrams and tables are given.

C. S. KINNISON.

Blast furnace slag as aggregate in concrete. W. A. AIKEN. *Trans. Am. Soc. Testing Materials* 14, 280-97 (1914).—Concrete consisting of cement, slag, and New Jersey gravel was tested in compression at various periods up to and including 1 yr. From strength of concrete, wt. of slag per cu. ft., puzzolanic nature of slag, its alk. nature which is conducive to rust-prevention in reinforced concrete and from relatively high combined % of SiO_2 , Al_2O_3 , and Fe_2O_3 making for permanency in concrete, it is concluded that slag of similar constitution is satisfactory for use as aggregate in concrete. Analysis of slag gave in %: SiO_2 , 34.40; R_2O_3 , 23.40; CaO , 35.88; MgO , 3.21; SO_3 , 0.39; S, 1.27; ignition loss, 1.34.

A. A. KLEIN.

The cement gun and its work. CARL WEBER. *J. West. Soc. Eng.* 19, 272-316 (1914).—A description of the gun and its product, "gunite," with tables of tensile and compressive strengths, void, adhesion, permeability and absorption tests. W. B. J.

Dehydration products of gypsum (GRENGG) 6. Scrap mica from tin concentration (SIMMONS) 9.

U. S., 1,138,397, May 4. J. NESETRIL. Apparatus for mixing cement with fibrous asbestos, for making railway ties, etc.

U. S., 1,138,906, May 11. N. TAYLOR. Apparatus for drying and mixing constituents of tar macadam.

U. S., 1,139,091, May 11. C. WEBER. Method of mixing cement-sand plaster and projecting it by a current of compressed air on to the wall to be plastered. A portion of the H_2O required for complete hydration is added to the mixt. at the outlet of the discharge pipe.

Brit., 29,301, Dec. 19, 1913. C. BARTER. A composition for making floors, walls, etc., consists of white portland cement, ground calcined flint, and coarse calcined flint, with or without ground marble or other white stone dust, and with or without a soln. of CaCl_2 . Suitable proportions are 180 lbs. of white cement, 144 lbs. of ground calcined flint, 144 lbs. of coarse calcined flint, 18 lbs. of stone dust, and 1 lb. of CaCl_2 dissolved in 1 gal. H_2O .

Brit., 29,614, Dec. 23, 1913. L. PETERSEN-HVID. Impregnating, coloring, or softening wood, by heating the raw wood or wood already impregnated with liquid, with steam in a closed vessel, and, when acidic substances begin to be formed in the wood, introducing gaseous NH_3 , the same NH_3 being repeatedly used by reaction between NaOH lye, etc., in the chamber and the NH_4 salts formed by reaction between the NH_3 and the acids in the wood.

21. FUELS, GAS, TAR AND COKE.

J. D. PENNOCK.

The occurrence of chlorine in coal. A. DEWARLE. *Analyst* 40, 146-7(1915).—A case of abnormally rapid corrosion of boiler tubes was found to be due to the presence of sol. chlorides in the coal. Cl was detd. (1) by mixing a weighed amt. of the powdered coal with powdered lime in a Pt crucible, inverting the latter in a larger crucible, this being filled to within $\frac{1}{2}$ in. of the top with lime, and igniting in a muffle; after ignition, the material was dissolved in dil. HNO_3 , neutralized, and Cl titrated in the usual way; (2) by direct extn. of the powdered coal with water and titrating with AgNO_3 . Exam. of 6 samples of coal from the same sources as that used in the boiler showed the following min. and max. figures for Cl: By ignition, 0.018 and 0.344%; by extn., 0.019 and 0.346%. Five of the 6 samples contained 0.210% Cl or over. These figures indicate that the whole of the Cl is present as sol. chlorides. Exam. of 11 samples of coal used in a boiler in good condition showed Cl contents varying from 0.003 to 0.032%.

P. B. DUNBAR.

Coal resources of District VII (Illinois). FRE H. KAY, *et al.* Illinois Geol. Survey, *Bull.* 11, 233 pp.(1915). E. H.

Coal resources of District I (Longwall, Ill.). G. H. CADY, *et al.* Illinois Geol. Survey, *Bull.* 10, 144 pp.(1915). E. H.

The determination of volatile combustible matter. F. E. LATHE. *Chem. Analyst* 12, 5(1915).—Weigh 1 g. coal sample into an annealing cup or a porcelain crucible, cover well, placing sheet asbestos between cover and crucible if necessary to secure a close fit, and fasten on the cover with Fe wire. Place a little powdered charcoal in the bottom of an ordinary assay crucible (15 or 20 g. size) and place the small crucible contg. the sample on the charcoal. Fill the large crucible with powdered charcoal, cover with a scorifier, and place in a hot muffle ($1000-1200^\circ$) for 30 min. Remove, allow to cool undisturbed, and weigh the residue. Loss in wt., less the moisture is volatile combustible matter. H. M. LANCASTER.

Heating materials for military camp outfits. BRÜSTEDT. *Pharm. Ztg.* 60, 151-3(1915).—Expts. carried out to det. the relative efficiency of spirit, "hartspiritus," hexamethylenetetramine and "bewei" show that in point of cheapness spirit, of cleanliness $\text{C}_6\text{H}_{12}\text{N}_4$, of safety and convenience in shipment $\text{C}_6\text{H}_{12}\text{N}_4$ and "bewei" take first place. Eight g. combustible are required to bring 150 g. H_2O to the b. p. and maintain it there for a brief period. "Bewei" appears to consist of compressed plant fiber mixed with easily combustible substances.

W. O. E.

Improvements in firing construction for solid fuels. PRADEL. *Feuerungstechnik* 3, 157-162(1915); cf. *C. A.* 9, 961.—A review is given of recent improvements in firing construction including stokers for locomotives, ash removers, draft regulators, flue-ash and spark retaining apparatus, grates with automatic removal of clinker and smoke consuming apparatus. H. R. GUNDLACH.

Efficiency relation existing between various Argand and open flame test burners. F. H. GILPIN. *Proc. Am. Gas Inst.* 9, 379-405(1914).—Methods of detg. c. p. with 2 classes of burners are discussed in detail and 4 types of Argand burner are taken up and each type reviewed. It is shown that there exist differences in burners of the same class and types and that errors are more readily discovered and corrected in the open flame burner than in the Argand. Curves are given to show the effect of varying consumption on the c. p. of different types, also a comparison of various burners on coal, water and mixed gases. Values are given to show that the error due to variations of relative humidity on open flame burner is a "negligible amount." C. A. COLE.

Report of the committee on progress in carbonization methods. E. L. SPENCER. *Proc. Am. Gas Inst.* 9, 450-453(1914).—The report consists of an account of various types of carbonizing installations erected or partly completed during last year. C. A. COLE.

The mode of decomposition of coal by heat. H. C. PORTER AND G. B. TAYLOR. *Proc. Am. Gas Inst.* 9, 234-88(1914).—High grade bituminous coal of the gas making type is decomposed by heat primarily into paraffin hydrocarbons and completely altered non-volatile residue, with a small quantity of H_2O , CO_2 and CO . The latter products, though small, are the first produced and from other types of coal they are produced in greater relative quantity than from gas coal types. Complex and varied secondary reactions introduced by superheating the hydrocarbons, H_2O vapor and CO_2 , are of very great importance in industrial high-temp. carbonization. The products of low-temp. carbonization (at 800-900° F.) of a coal of the Pittsburgh type on an industrial scale would consist of a rich gas amounting to about 0.6-0.7 cu. ft. per lb. of coal and a large yield of heavy oils, or tar, (10-12% of the coal), made up chiefly of paraffin hydrocarbons very low in benzene and $C_{10}H_8$ derivs. and practically devoid of free C. The gas would contain 6-7% of unsatd. hydrocarbons and 20-25% of ethane and its higher homologs, having a high calorific and illuminating value. The tar might be distd. or cracked to produce light oils (gasoline substitutes). The possibility is suggested that low-temp. carbonization might be utilized in gas manuf. as an enriching process. Inferior coals might be thus utilized. Based on exptl. results of low-temp. decomp. *in vacuo*, the following hypothesis is proposed for the *constitution of coal*. All kinds of coal consist of cellulosic degradation products, more or less altered by processes of aging, together with derivs. of resinous substances in different proportions, also more or less altered. There is a large number of these substances and all undergo decomp. by a moderate degree of heat. The less altered cellulosic derivs. decompose more easily than the more altered derivs. and also more easily than the resinous derivs. The cellulosic derivs. decompose on moderate heating, yielding H_2O , CO_2 and CO and hydrocarbons, giving less of the first 3 products the more mature and altered they are. The resinous derivs. decompose on moderate heating, yielding chiefly paraffin hydrocarbons with H as a direct decomp. product. The more mature bituminous coals, having good coking properties, contain a large % of resinous derivs., and their cellulosic constituents have been greatly altered. The younger bituminous and sub-bituminous coals are constituted of cellulosic derivs. much less altered than those in older coals. They undergo a large amt. of decomp. below their fusion point and partly for that reason may not coke. The paper is illus. by a large number of sketches of app. used together with many tables, curves and other data. C. A. COLE.

Carbonization in bulk. Koppers' ovens. C. J. RAMSBURG. *Proc. Am. Gas Inst.* 9, 543-80(1914).—The paper deals with the fundamental principles involved in the carbonization of coal in bulk, its advantages, methods and results of plants in operation. Results are given of the operation of some of the European plants and a comparison is made with some American plants. The quality of gas, coke and tar is discussed and NH_3 yields of various coals and methods of operation are compared. C. A. C.

Care and maintenance of gas holders. J. H. BRAINE. *Proc. Am. Gas Inst.* 9, 762-875(1914).—The various theories of corrosion are taken up with especial reference to the attack on iron metal for illum. gas storage and transfer. The effect on different parts of the holder is noted and suggestions are made for the proper up-keep, together with a description of tools for removing corrosion products and a comparative test on a number of so-called protective coatings. C. A. COLE.

Purifier installations. C. E. PAIGE. *Proc. Am. Gas Inst.* 9, 721-62(1914).—P. briefly reviews the purification of gas by different processes and discusses the important points in the design of purifier boxes. A detailed description is given of the construction and operation of 4 concrete purifier boxes each 25 x 35 x 40 ft. deep with 20 in. connections. The paper also includes a series of questions sent out to a great number of gas companies concerning the operation of various types of purifiers. Replies include figures on cost of operation, efficiency, maintenance and labor charges. C. A. C.

Methods and facilities for specifying and testing blowers. Also measuring air and steam supply to the water gas generator. J. M. SPITZGLASS. *Proc. Am. Gas Inst.* 9, 615-77(1914).—S. gives an account of expts. made to det. the values necessary in designing blowers, together with tests with various types of instruments for measuring steam. Illustrated by sketches, charts, curves and other data. C. A. COLE.

The operation of inclined retorts. F. HUBER. *Proc. Am. Gas Inst.* 9, 406-50(1914).—The paper gives the experience of 13 yrs. operation of an inclined retort system at Louisville, Ky. The installation consists of 20 benches of 6's: 15 in. x 23 in. top; 15 in. x 26 in. bottom; and 18 ft. long, in 2 stacks (10 benches each) placed parallel. Illus. by sketches, tables, charts and other data of operation and labor cost. C. A. C.

Economical working of sulfate of ammonia plants and the quality of the sulfate. FREDERICK SHEWRING. *Gas World* 62, 465-6(1915).—S. discusses the ideal system of separate recovery of the fixed and free compds. of ammonia, the advantages of high testing sulfate, the financial aspect of efficient liming plants, prep. of lime and the continuous sight feed gravity liming system. A cut of the app. is given. M. L. T.

Simple determination of gases in flue gas. A. DOSCH. *Gesundh. Ing.* 38, 121-8(1915).—A modification of the Orsat app., in which stopcocks are eliminated as much as possible, is used. The app. is very compact. ARTHUR LEDERER.

Some notes on tar dehydration and benzene recovery. ROBERT BASS. *J. Gas Lighting* 129, 320-22(1915).—Sp. gr. may be detd. by means of a Lunge hydrometer. Distn. is carried out on 500 cc. of tar in a 750 cc. side neck distn. flask; fractions are collected as follows: up to 170°, between 170 and 270° and between 270 and 300°. The test for tar acids is made on the 170-270° fraction by extn. with NaOH soln., neutralizing with H_2SO_4 and reading vol. of tar "acids" separating. Free C is estd. by extn. of bituminous matter from a weighed portion of tar by C_6H_6 or CS_2 . C. A. C.

Dehydration of water-gas tar (at the Amsterdam Western Gas Works). ANON. *J. Gas Lighting* 130, 196(1915).—The centrifugal sepn. of water-gas tar (sp. gr. 1.05) and H_2O can be made to deliver, in one operation, tar containing less than 1% H_2O , if the tar be preheated by live or waste steam to between 60° and 70° for a 60% H_2O content, or to 95° or 100° for 90% H_2O content. B. W. GRIMES.

Kubierschky system of tar distillation. C. H. BORRMANN. *J. Gas Lighting* 130, 448-50(1915).—To distil off tar to an entirely hard, brittle pitch, without the use of a vacuum, in a continuous, safe process, there has been devised a column-like app. into which the tar is sent in a thin spray dripping down in a finely divided state in the interior, while from below a uniform flow of superheated steam is passed up to come in direct contact with the tar. With increasing distn. temp. the consumption of steam decreases, giving a high degree of economy. The distn. goes on in steps in a series of separate chambers so that the light boiling distillates are collected above, having sepd. from the residue liquid, and the hard pitch is left below. Several forms of app. have been designed for various purposes. *Advantages:* uninterrupted operation, elimination of fire danger, reduction of the boiling temp. through the use of steam, ability to reduce tar to pitch of any quality with one continuous process, dehydration of the tar is not necessary, the steam consumption is about 20 kg. for 100 kg. of tar. The figures on operating results and costs are believed to be highly satisfactory.

B. W. GRIMES.

The extraction of carboric acid from oils of the distillation of coal tar. W. MASON. *Mel. Chem. Eng.* 13, 293-4(1915); see *C. A.* 8, 3717. E. J. C.

The valuation and estimation of coke. THALER. *Feuerungstechnik* 3, 109-12 (1915).—Cokes for foundry and for blast furnace use are differentiated in practice but from a series of exams. were found to differ but little. Coke for foundries should be the largest and best pieces and should, as a rule, contain less moisture and S than blast furnace coke. A table showing the quality of coke demanded by the "Verein deutscher Giessereifachleute" is given and the high moisture content (5%) allowed is criticized by the author. The moisture content depends on the physical characteristics, and during transportation in rainy weather soft, porous cokes increase 2-4% in moisture, while harder cokes increase only 1-2%. P when present is practically entirely taken up by the iron, and hence should not exceed 0.04-0.05% in a good coke. In addition to the chem. comp. of the coke, the physical properties are taken into consideration in detg. a good or bad coke. T. classifies coke in 3 divisions, as follows: I. Silver-white lustre, sinewy structure, dense, firm, with a metallic ring, resistant to pressure; it should not break into small pieces on falling, and should contain not more than 8% ash, 3.5-4% moisture, and 0.8% S. II. Faint white to dark lustre, structure more bony and porous than I, less resistant to pressure and heavier than coke of class I; it should have not more than 10-11% ash, 8-9% moisture and 1.0-1.1% S. III. Lustreless, gray-black fracture, soft, breaking easily when struck; the individual coal particles are easily distinguished; it is highly porous and holds water tenaciously. It has a low density, 9.0-9.5% ash, 13-15% moisture, and 1.0% S. The importance of the method of taking samples of shipments, in order properly to det. the quality is emphasized.

H. R. GUNDLACH.

The soluble chlorides and total chlorine in some English cokes. STANLEY W. BRIDGE. *Analyst* 40, 143-6(1915).—Thirteen samples of English gas coke were found to contain from 0.013 to 0.262% sol. chlorides as NaCl, and from 0.039 to 0.499% total Cl as chlorides. A sample of metallurgical coke contained 0.007% sol. chlorides and 0.071% total Cl as NaCl, while a low-temp. canal residue contained 0.357% sol. chlorides and 0.918% total Cl. Lab. expts. were made as follows: (1) coal carbonized in a fire-clay crucible at 400-500°; (2) in a Pt crucible for 15 min. over a powerful Meker burner. The sol. and total chlorides, resp., calc. to the original coal are (in %) (1) *Canal*, 0.068, 0.987; low-temp. residue (volatile matter 10.77%), 0.357, 0.918; high-temp. residue, 0.123, 0.314; (2) *Canal*, 0.077, 1.141; low-temp. residue (volatile matter 7.79%), 0.192, 0.498; high-temp. residue, 0.068, 0.288; (3) *Coking coal*, 0.092, 0.525; low-temp. coke (volatile matter 13.08%), 0.140, 0.237; high-temp. coke (15 min)., 0.140, 0.237.

0.048, 0.094; high-temp. coke (90 min.), 0.048, 0.091. The following methods were used: *Sol. chlorides:* 15–30 g. of an av. sample crushed to pass a 10-mesh sieve were boiled with water for 1 hr. under a reflux condenser; the coke was then filtered and washed and the filtrate on cooling acidified with HNO_3 , followed by a slow addition of dil. KMnO_4 until the soln. was just permanently pink. Standard AgNO_3 soln. was then added, the AgCl filtered off, and the excess of Ag detd. by the Volhard method. The KMnO_4 is added to prevent blackening due to a reducing agent which is always extd. from the coke. *Total chlorine:* 2.5–5 g. of the coke were gently ignited with 3–6 g. of a mixt. of 1 part pure Na_2CO_3 and 2 parts pure CaO until the C was completely burnt, the mass being then boiled with water to which a little PbCO_3 was added to remove sulfides. After filtering, concg., if necessary, and acidifying with HNO_3 , Cl is detd. as above. The loss of Cl during ignition with Na_2CO_3 and CaO is negligible. That the % of sol. chlorides in the low-temp. residue is higher than that in the original coal is probably due to the fact that the sol. chlorides are not completely extd. from the original coal, while the mass is rendered more porous after ignition. P. B. DUNBAR.

Metallic iron in coke samples. J. R. CAMPBELL. *Colliery Eng.* 35, 538(1915).—Iron from grinding app. was the cause of discrepancy between actual and theoretical coke ash. C. recommends 40-mesh sample as fine enough. Pulverizing should be by impact strokes rather than rubbing. C. advises against removal of iron from sample with a magnet, because magnetic sulfides are removed at the same time. W. D. ESSES.

An analytical study of the principal systems of coke ovens and regenerative furnaces. C. BERTHELOT. *Rev. métal.* 11, I, 685–751(1914).—A comparative study of the principal systems of coke ovens and regenerative furnaces with a view to stimulating their more general use in France. In 1912 the French blast furnaces consumed 5,500,000 tons of coke, while the national production of the latter was only 2,600,000 tons. A critical review of the advantages and disadvantages of the principal types of furnaces is given and of their applicability to the conditions of various sections of the country. L. T. FAIRHALL.

Determining the radiant luminous efficiency of light sources (KARRER) 2. Fuels for internal-combustion engines (WATSON) 22.

U. S., 1,137,535, Apr. 27. G. F. SCHMIDT. Apparatus for carbureting gas with gasolene or other volatile liquid. Cf. C. A. 8, 2282.

U. S., 1,138,016, May 4. C. J. SCHNEIDER. Fuels briquets are made by mixing 15 gals. of molasses and 15 lbs. of soap with 1 ton of coal dust, adding a soln. of 25 lbs. of alum to the mixt., molding and drying.

U. S., 1,139,088, May 11. F. TSCHUDY. By-product coke-ovens and gas- and air-valve operating devices at each end of the oven for reversing the flow of air and gas.

U. S., 1,139,250, May 11. W. S. AYRES. Apparatus for separating coal from slate.

U. S., 1,139,315, May 11. N. TESTRUP and T. RIGBY. Briqueting peat. The peat is heated and filtered under pressure and then disintegrated and dried until it contains only about 5% H_2O . It is then heated to about 80° and is suddenly compressed sufficiently to heat the occluded air and fuse the binding ingredients.

Brit., 29,281, Dec. 19, 1913. J. W. LEADBEATER. A proportion of coke obtained from bituminous coal, say 5–10%, is added to a mixt. of the pure C or coke and the special tar product described in 18,587, 1912 (C. A. 8, 568), and the mass is molded into blocks and heated in a retort for the manuf. of a hard coke.

Brit., 29,367, Dec. 20, 1913. SIMON-CARVES BYE-PRODUCT COKE OVEN CONSTRUCTION & WORKING Co. and J. H. BROWN. A coke oven, having means as described in 14,281, 1906, for independently regulating the supplies of gas and air to the heating-flues, is modified for heating either by rich or poor gas, or both simultaneously.

Brit., 29,381, Dec. 20, 1913. W. DODD. In gas producers, steam is generated in a coil situated in the upper part of the producer and supplied with H_2O . The steam passes to the lower part of the producer, through a pipe, into which H_2O is delivered from a pipe having a trap, and the mixt. of steam and H_2O is admitted into the bottom part of the combustion chamber.

Brit., 29,494, Dec. 22, 1913. N. SCHUSTER. Constructional details of coke ovens of the type in which the gas for combustion is admitted through passages below the heating flues, and in which flues parallel to the passages serve alternately as exits for combustion products and for the admission of air. To prevent overheating of the gas passages, between them and the flues are provided cooling channels extending entirely through the structure and open at their ends to the atm.

Brit., 29,517, Dec. 22, 1913. N. SCHUSTER. Constructional details of a coke oven with special reference to air supply. Cf. C. A. 8, 3233.

Brit., 29, Jan. 1, 1914. R. FARRY. Purifying crude coal-gas by passing it through a cooler and then through a primary washer, in which it is treated with combined solns. of an alkali carbonate and NH_4OH . This treatment removes so much CO_2 and H_2S that no more and even less acid impurities will afterwards remain in the gas than will be sufficient to neutralize its NH_3 , and consequently will be removed with the NH_3 when the gas is further washed with weak ammoniacal liquor and fresh H_2O in secondary washers. The liquor from the cooler and secondary washers is treated with lime in a still to produce NH_3 . The liquor from the primary washer is treated in a still of the kind described in 337, 1914 so that the alkali carbonate and NH_4OH are regenerated for use in the primary washer, and the CO_2 and H_2S together with a trace of NH_3 driven off into a saturator, into which the NH_3 from the lime still is also passed. The gases from the saturator are either partially burned in a Claus kiln for S recovery or are burned in excess of air for obtaining H_2SO_4 . In a modification, the crude gas may be washed with alk. carbonate soln., then with NH_3 soln., each soln. being regenerated separately.

Brit., 228, Jan. 5, 1914. H. STEVEN. In agglomerating coal, etc., the material is subjected in a closed mold first to a light pressure to expel air, second to a higher pressure to expel fluids or liquids, third to a still higher pressure to render the body homogeneous, and fourth to a slight pressure to tighten up any cracks.

Brit., 304, Jan. 5, 1914. DELLWIK-FLEISCHER WASSERGAS GES. In the manuf. of water gas, air is supplied during the "blow," through tongues above the layer of coked fuel, the discharge of the combustion products taking place at the bottom. The steam for gasification is introduced at the bottom by a pipe, and the H_2O -gas and distn. products from the upper part of the fuel bed are taken off by a pipe at the top. Cf. C. A. 9, 1242.

Ger., 279,966, Nov. 22, 1912. H. KÜPPERS. Control of regenerative furnaces.

Ger., 280,849, Sept. 27, 1912. HOCHOFENWERK LÜBECK AKT.-GES. Purifying coke oven gases and purifying chlorinating liquors from roasted ore treatment. The coke oven gases contain H_2S in greater or less amt. In the treatment of pyrite cinder by chlorinating roasting, very dil. lyes are obtained which contain Cu and Zn salts, and which must be freed from these before being discharged. The coke oven process is coupled with the process of purifying these chlorinating liquors by conducting the gas into the liquors, whereby the H_2S and the metallic salts react. If the Cu is to be

sepd. from the Zn, the liquors are maintained acid until all the Cu has been pptd. CaCO_3 is added then, and the gas is passed to sep. the Zn as pure ZnS . The acid liberated in this pptn. of ZnS is neutralized in order to insure the complete pptn. of the Zn. If the lye contains other metals, such as Pb, Ni, Co, etc., these are pptd. and can be sepd. if this is desired.

22. PETROLEUM, ASPHALT AND WOOD PRODUCTS.

F. M. ROGERS.

The "cracking" of hydrocarbons. B. B. FREUD. *Chem. Eng.* 21, 160-2(1915).

—A discussion of recent work on the production of gasoline from heavy oils by heating under pressure under various conditions.

F. M. ROGERS.

Benzene, alcohol, and mixtures of these liquids with petrol as fuels for internal combustion engines. W. WATSON, *et al.* *Inst. Automob. Eng.* Dec., 1914, Sep. 20 pp.; *J. Soc. Chem. Ind.* 34, 266-7(1915).—The question of carburation, particularly when starting, and in cold weather, with fuels such as C_6H_6 , alc., and some of the heavier brands on petrol, is of great importance, and tests have been carried out comparable with those on petrol (cf. *Proc. Inst. Automob. Eng.* 7, 35). *Benzene*: Material used became practically solid at -12° ; the first indications of crystn. occurred at -4° . The crystals at once sink in the liquid, and risk of choking the jet of the carburettor as well as that of impeding the flow of liquid, is incurred. Even if crystals do not sep., the viscosity of the liquid at low temps. may influence the supply of fuel. The viscosity of C_6H_6 increases at a greater rate than that of petrol, and in cold weather it is important to heat the jet of the carburettor, or any constriction in the fuel-supply service. A mixt. of 1 part of petrol to 3 of C_6H_6 starts depositing at -14° ; a mixt. of equal vols. of the 2 gives no deposit at -21° . It would be advantageous always to mix 30% of petrol with C_6H_6 . The knocking produced at low engine speeds when petrol is used as fuel is not observed with C_6H_6 . This appears to be due to the fact that the critical temp. above which the charge fires in a way resembling detonation rather than inflammation, is much lower for petrol. C_6H_6 added to petrol causes a marked increase in the critical temp., and an engine which knocks badly with pure petrol runs quite smoothly with a mixt. of equal vols. of C_6H_6 and petrol. When using less than 12 parts of air to 1 of C_6H_6 by wt. the deposit of C in the engine is excessive, and the efficiency is greatly impaired. If the mixt. is so adjusted that practically no CO is found in the exhaust gases, the C deposit is no worse than with petrol. *Alcohol*: Expts. were made with ordinary methylated spirit in a jet carburettor, a larger jet being used than in the case of C_6H_6 and petrol; it was found necessary to supply additional heat to the carburettor by passing a current through a wire wound round the pipe leading from the jet to the throttle. This was not altogether sufficient, and owing to the irregular vaporization of the fuel, irregular exhaust gas measurements were obtained. The mean effective pressures obtained with alc. were slightly higher than those obtained with either petrol or C_6H_6 , and increased more rapidly with the strength of the mixt. than in the cases of the other fuels. When using the strongest mixt., 6 parts of air to 1 of alc., the mean effective pressure was still increasing with the strength of the mixt., and 6% CO was found in the exhaust gases. This means that max. power can only be attained by appreciable loss due to incomplete combustion. Max. thermal efficiency, as also that at complete combustion, increases slightly from petrol to C_6H_6 and C_6H_6 to alc., and the temps. attained with the 3 fuels do not differ much, though those with alc. are a little lower than the others, which may account for the slightly higher thermal efficiency obtained with alc. Unless the vapor tension of the fuel in the cylinder is above a certain limit it is impossible to obtain an explosive mixt. This

difficulty may be easily overcome in the case of petrol, as owing to the presence of highly volatile constituents it is possible to flood the cylinder and so obtain an explosive mixt. With C_4H_{10} and alc. no such volatile compds. are present; hence starting difficulties are encountered in cold weather. Expts. with different liquid fuels were made in a closed vessel, and it was found that with a very volatile brand of petrol an explosive mixt. could be obtained at 0° and a pressure of 40 lbs. per sq. in. Air satd. with C_4H_{10} vapor below 1° at atm. pressure is incombustible, and at all temps. below 20° air satd. with alc. vapor is incombustible even at atm. pressure. These results, together with others obtained from mixts. of these liquids, are shown graphically. When used in the engine the heat generated by the compression produced by starting the engine by hand is sufficient to vaporize the fuel, except, perhaps, in the case of alc., or, when the fuel is already vaporized, to keep it in the form of vapor during the compression.

F. W. SMITHER.

Illuminating power of kerosene. WILLIAM KUNERTH. Iowa State College. *Lighting J.* 3, 28-33(1915).—Tests were made on 61 samples of kerosene obtained from various sources to det. what relation existed between the illuminating power and the other properties. The illuminating power was detd. by burning the oil in a flat wick burner and measuring the c. p. in the direction perpendicular to the plane of the flame. This c. p. was multiplied by an exptly. detd. const. to obtain the m. s. c. p., the same const. being used for all tests. Early in the work it was found that the illuminating power in m. s. c. p. hrs. per gal. reached a max. value when the flame was burned at a certain optimum height, which varied with different samples and with outside conditions. The detns. of c. p. were made with the flame at the optimum height as nearly as possible. To make allowance for variable atmospheric conditions, the same standard sample was tested every day, and a correction derived from its performance, applied to the other tests. The illuminating power is expressed in m. s. c. p. hrs. per gal. in all of the results. The values for phys. properties are in some cases expressed in arbitrary units. The 2 sets of values given below are the averages, resp., of the 10 lowest and the 10 highest results. The illuminating power decreased as the cost increased, being 1114 at 10 c. and 1019 at 20 c. per gal. It increased as the d. increased, being 953 at d. = 0.791 and 1113 at d. = 0.821; increased as the temp. of the flash point increased, as follows: 1033 at 104° and 1116 at 124° ; increased as the temp. of the burning point increased, being 992 at 136° and 1109 at 158° ; increased as the viscosity increased, 1025 at 151 sec. and 1112 at 208 sec.; increased as the surface tension (as detd. by drop wts.) increased, being 980 at 3.096 and 1111 at 3.244; increased as the index of refraction increased, being 980 at 1.444 and 1120 at 1.463. The fogging of the chimney was slightly greater with oils of higher d. The charring of the wick was slightly less with oils of higher illuminating power. One sample was exposed to daylight for 6 weeks and thereby lost 15% of its previous illuminating power. In general Eastern oils have lower illuminating power, lower d. and higher cost, while Western oils have higher illuminating power, higher d. and lower cost. The results of all tests, along with several diagrams, are given.

A. B. GLADDING.

Preliminary report on the bituminous sands of northern Alberta. S. C. ELLS. Canada Dept. Mines, *Publ.* No. 281, 88 pp.(1914).—The bituminous sands of Alberta commonly referred to as "tar-sands," outcrop at a number of points along the Athabaska River and its tributaries. This area is probably not less than 750 sq. miles. These bituminous sands represent the Dakota sandstones and were originally in the form of soft sandstones and uncompacted sands, but subsequent impregnation by heavy asphaltic hydrocarbons has resulted in the present coherent material. Variation in the physical character and chem. comp. of the contained bitumen is due to the fact that the original petroleum varies over so extensive an area. Medium grained and

moderately compact deposit is usually the richest in bitumen. A bituminous sand that will comply with standard paving specifications should possess a certain grading of mineral aggregate and a suitable percentage of bitumen. Where the grading of mineral aggregate is not satisfactory, it is possible to obtain the desired grading by combining 2 or even 3 separate out-crops. Three sections involving a distance of about 170 miles on both sides of the Athabasca River and its tributaries were examd. Analyses of some of the bituminous sands from out-crops showed on the average 1.3% moisture, 18.5% bitumen sol. in CS_2 , 80.2% sand. The extd. bitumen contained 39.6% satd. compds. in the 88° naphtha soln. and 60.4% unsatd. compds. in the same solvent. The d_{20} of the ext. was 1.018 and upon analysis showed 7.23% fixed C, 4.85% S, and was sol. in 88° naphtha to the extent of 78.2%. When the extd. bitumen was submitted to distn. until coked, it was found that 69% of the original bitumen distd., leaving a coke residue of 23.7% and suffering a loss of 7.3% of uncondensed fractions. The bitumen contained in Alberta sand has too high a penetration factor; this must be modified by heating and fluxing before it can be used for asphalt work. After modification by heat, this bituminous sand is less susceptible to temp. changes. This is the result of the removal of the more volatile hydrocarbons as well as the oxidation of some of the bitumen. This hardening is carried out by heating the bitumen and MnO_2 or Fe_2O_3 to a temp. of 200° and then introducing some water and stirring. The water serves to keep the mass stirred by its transformation into steam and also to help the distn. by reducing the pressure with its own partial pressure. R. L. SIBLEY.

Bituminous shales of Colorado. G. R. DEBEQUE. *Eng. Mining J.* 99, 773-4 (1915).—Mainly a brief review of the work of Day and Woodruff (*C. A.* 8, 2664). "From the results of exptl. tests it seems probable that the Col. shale, at the lowest estimate, should equal in value the Scotch and French shales from which petroleum has been manufd. for so many years." F. W. SMITHER.

Machine to test oils and friction metals 1. Obtaining turpentine and resinous products in the manufacture of paper pulp (LUTTRINGER) 23.

U. S., 1,136,994, Apr. 27. W. M. BASHLIN. Removing resin and turpentine from resinous woods by heating under less than atm. pressure, extg. resin and turpentine by percolating a solvent such as benzine and turpentine through the wood without submerging it and treating with steam and H_2O at about the b. p., after withdrawing the conc. extract formed by the solvent first applied.

U. S., 1,137,075, Apr. 27. W. L. MORRIS. Filter for removing water and other impurities from oil. Cf. *C. A.* 9, 982.

U. S., 1,137,255, Apr. 27. A. CAMERON. Destructively distilling cord-wood in an app. in which the wood is closely piled on several supports one above the other, which keep the charcoal produced in independent layers with spaces between them formed by shrinkage during the distn.

U. S., 1,137,480, Apr. 27. A. R. GWYNN. Gasoline filter.

U. S., 1,138,260, May 4. A. TESTELIN and G. RENARD. Apparatus for making volatile hydrocarbons from petroleum by heating with steam, under high pressure, and passing over refractory material, *e. g.*, clay, maintained at a red heat. Cf. *C. A.* 8, 1667.

U. S., 1,138,266, May 4. C. H. WASHBURN. Producing lighter hydrocarbons from kerosene or heavier hydrocarbons by mixing with about 25-100% its wt. of H_2O , heating the mixt. in a retort to 315-510° and condensing the vapors generated while maintaining a pressure of 3-5 atm. throughout the distn. and condensation.

Brit., 30,080, Dec. 31, 1913. J. L. JACKSON and W. WRIGHT. Lubricant for machinery. See U. S., 1,097,549 (C. A. 8, 2461).

23. CELLULOSE AND PAPER.

A. D. LITTLE.

Advances in the chemistry of cellulose (1913-1914). EMIL HEUSER. *Papier Ztg.* 40, 307-9, 355-6, 379-80(1915).—Review of the more important researches in pure chemistry. V. NUNEZ.

Determination of the "ripeness" of viscose. V. HOTTENROTH. *Chem. Ztg.* 39, 119-21(1915); *J. Soc. Chem. Ind.* 34, 274(1915).—Cellulose xanthate, in soln. as viscose, undergoes dissociation or hydrolysis on storage, with ultimate reversion to cellulose. The progress of this reaction is termed "ripening" and is usually measured by differential titrations with I, after adding HCl to one portion and AcOH to another; the difference represents the alkali combined as xanthate in the compd. XO.CS.SNa, and is proportional to the degree of esterification at any given stage. Since the detn. of this factor in works practice is not of the simplest order, and since the industrial importance of "ripeness" relates almost solely to the speed of coagulation of the viscose, H. has devised a rapid titrimetric method based on direct coagulation with 5% AcOH or preferably with 10% NH₄Cl or (NH₄)₂SO₄ soln.; dil. 20 g. of the viscose with 30 cc. of H₂O and titrate with 10% NH₄Cl at a standard temp. until coagulation takes place. The method is empirical and the best proportions of H₂O and viscose may be selected according to the alkalinity of the viscose, % of cellulose, and saline by-products. The NH₄ salt is preferable to AcOH as the coagulating agent, being less affected by small accidental variations in the amt. of caustic alkali present. The interpretation of the results must be founded on empirical observations to det. the optimum condition of "ripeness" for practical working. F. W. SMITHER.

The status of the celluloid industry during the war. M. L. *Kunststoffe* 5, 85 (1915).—A brief discussion. F. W. SMITHER.

The celluloid industry in Germany. H. BARTHELEMY. *Caoutchouc & Gutta-percha* 12 (133) 8604-7(1915).—A continued article in which are considered the economical and technical situation, manuf., raw materials, and the question of inflammability. EDWARD J. KELLEY.

The manufacture of celluloid. ANON. *Chem. Ind.* 38, 98-107(1915).—A review. Cuts are given. F. W. SMITHER.

Apparatus for measuring the glaze of papers. L. R. INGERSOLL. *Z. Beleuchtungs-w.* 21, 9(1915).—The characteristic property of glass surfaces which at an angle of 57.5° polarize reflected light has been found to hold for the surface of glazed papers. The polarization on such surfaces amounts to more than 99% of that produced by glass. With the instrument described the fraction of the light is measured which is reflected below 57.5°, the light being polarized when it strikes the paper at a similar angle. The absolute glaze is not measured but the fraction measured of the total light, is assumed to be glaze, since the legibility of a printed surface depends more on the relative proportion of the glaze to diffuse reflection than on the absolute amts. of these 2 factors. The % glaze does not depend upon the strength of the illumination as this is strongly influenced by the strength and character of the light source. It is necessary to use a definite form of illumination to which all measurements are referred. The instrument is described in detail. W. H. S.

The obtaining of turpentine and resinous products in the manufacture of paper pulp. A. LUTTRINGER. *Mah. grasses* 8, 4276-9(1915).—A continued article in which

are described 3 methods for the extrn. of the resins from the wood, depending upon the agent employed: steam, alkalis and resin solvents. The residue is made up into paper pulp, and the turpentine is obtained as a by-product by boiling the wood with solvents containing Na_2SO_4 .

EDWARD J. KELLEY.

Pigments. R. W. SINDALL AND W. BACON. *Paper Makers' Monthly J.* 53, 74 (1915).—S. and B. review and discuss the various pigments used in the manufacture of paper and give tests for them.

EDWARD J. KELLEY.

U. S., 1,137,779, May 4. H. K. MOORE. Recovering soda from waste liquor from the digestion of wood to obtain sulfate pulp. The liquor is mixed with Na_2SO_4 and sawdust, bark or coke and dried and burned and the soda recovered by smelting and causticizing with lime.

U. S., 1,137,780, May 4. H. K. MOORE. Evaporating and burning waste lignin liquor obtained in the manufacture of sulfate pulp from wood. The waste liquor is mixed with Na_2SO_4 and the mixt. sprayed into the upper part of a retort over a hot flame which evaps. the H_2O from the liquor. The residuum collects on a sloping floor of the retort and is burned with air under pressure.

U. S., 1,138,085, May 4. M. CLINE and C. F. RHODES. Removing ink from waste printed paper by pulping and treating the stock with about 2% of NaOH , absorbing the loosened ink by adding about 2% of fullers earth, kaolin or other clay, talc or soapstone and washing out the ink and absorbent.

U. S., 1,138,118, May 4. F. H. KENNARD. Reducing waste sulfite liquor to a powder without substantially changing the comp. of its constituents, by first concg. *in vacuo* to a viscous consistency at $96-59^\circ$ and then evapg. to dryness in a thin sheet on a heated drum, also *in vacuo*, at 57° .

U. S., 1,138,596, May 4. O. C. WINESTOCK. Separating the fiber and ink from printed paper by immersing the paper in a soln. formed of K soap, AlCl_3 , Na silicate and free alkali and passing the mixt. through screw propellers which are revolved so rapidly that they disintegrate the paper.

U. S., 1,138,907, May 11. J. H. THICKENS. Obtaining strong fibered wood pulp by steaming wood in a digester under pressure until it is thoroughly heated throughout, admitting an alk. soln. (e. g., NaOH) at the bottom of the digester to fill it quickly (the temp. of the soln. being slightly below the b. p.), withdrawing the excess soln. after the wood has become satd. with it and then alternately steaming to an acid condition and treating with the alk. soln. until the wood is in proper condition for mechanical pulping.

U. S., 1,139,002, May 11. F. W. WATERMAN. Apparatus for making plates from paper pulp.

U. S., 1,139,305, May 11. H. B. MACFARLAND and R. J. SHOEMAKER. Heat-insulating material formed of firmly united layers of felted cellulose fibers and hydro-cellulose.

24. EXPLOSIVES AND EXPLOSIONS.

C. E. MUNROE.

Old and new facts concerning priming compositions. A. STETTBACHER. *Z. ges. Schiess-Sprengstoffw.* 9, 341-4 (1914).—A general discussion of the properties of detonator or primer comps. in which special attention is called to the fact that theories derived from the behavior of ordinary brisant explosives cannot always be applied to this special class of primary explosives. The various theories to explain the action of

Hg fulminate are discussed at length. Comparison of Hg fulminate with picric acid and 75% dynamite fail to show cause for the great superiority of the former in producing detonation in other explosives. This effect is apparently due to the sudden production of an enormous pressure, which, however, cannot in the case of Hg fulminate be shown to result from either high rate of detonation or evolution of heat. It is possible that the course of explosion of endothermic explosives such as Hg fulminate is different from that of the ordinary exothermic brisant explosives. A comparison of calcd. values for explosion temp., pressure, "work-density," and density of loading, of fulminates of Hg, Ag and Cd with similar values for the azides of Hg, Ag, Pb and Cd, fails to show any reason why the azides should be superior to the fulminates in detonating efficiency, yet actual detns. of the minimum wts. of these substances which will produce detonation of various nitro-substitution compds. show the decided superiority of the azides. These practical tests show Ag fulminate to be a much better detonator than Hg fulminate while the calcd. consts. indicate that the former should be inferior. The prep. and properties of $\text{Pb}(\text{N}_3)_2$ are discussed and this substance compared with Hg fulminate as regards sensitiveness to heat and impact, stability in storage, decompn. on exposure to sunlight, action on metals, etc. The azides do not alter appreciably in sensitiveness from exposure to sunlight, although they darken in color. Wet fulminate of Hg corroded Cu, brass, Fe, Al and Sn quite rapidly while wet $\text{Pb}(\text{N}_3)_2$ acted only slightly on Cu, brass and Al, and had no effect on Sn and Fe. Tests showed that $\text{Pb}(\text{N}_3)_2$ does not lose in detonating efficiency when compressed at pressures as high as 10,000 kg. per sq. cm., while Hg fulminate and its mixts. with KClO_3 lose much of their brisance when compressed at more than 700 kg. per sq. cm. One % of H_2O in Hg fulminate greatly lessened its effects, while 5% H_2O did not diminish the effect of $\text{Pb}(\text{N}_3)_2$. Several organic compds. more recently proposed for use as detonators (nitrobenzenediazonium perchlorate and hexamethylenetriperoxidediamine) are briefly discussed. These are said to be much superior to Hg fulminate in detonating efficiency.

C. G. STORM.

Velocities of flame in mixtures of methane and air. II. ALBERT PARKER. Birmingham. *J. Chem. Soc.* 107, 328-37(1915); cf. *C. A.* 8, 2483; 9, 378.—The influence of the diam. of the explosion tube was investigated, using the same app. as before. The max. velocity was obtained with about 10% CH_4 , and this increased rather rapidly with the diam. of the tube from 2 to 14 cm., then slowly, apparently reaching a max. beyond which the walls of the tube were without influence at about 16 cm. By a variation of the type of spark it was possible to increase the initial velocity from 84 to 98.9 cm. per sec. With a still more powerful spark velocities as great as 113 cm. per sec. might be attained. In order to obtain normal initial velocities of flame in mixts. of CH_4 and air, it is necessary that the source of ignition should give no impetus to the propagation. There is evidence that an elec. spark induces a sharper initial inflammation in gases than other modes of ignition (adiabatic compression) and it is possible that the initial inflammation induced by a spark will always travel above "normal" velocity.

E. B. MILLARD.

U. S., 1,138,146, May 4. W. C. PIERSON. Ignition composition for forming match heads; composed of nitrocellulose 20, AgNO_3 2, KClO_3 90, $\text{K}_2\text{Cr}_2\text{O}_7$ 6, plaster of Paris 8, S 14, powdered glass 38 and glue 32 parts.

U. S., 1,138,916, May 11. R. WEYEL. Separating nitroglycerin from acid mixtures. The sepn. is hastened by generation of SiF_4 in the mixt. by the addition of about 0.01-0.015% of Na fluosilicate.

U. S., 1,138,917, May 11. R. WEYEL. Separation of nitroglycerin from residual nitration acids is hastened by adding about 0.02% of NaF and a combining proportion of SiO_2 (e. g., light kieselguhr) to the mixt. to generate SiF_4 .

U. S., 1,139,339, May 11. G. BUGGSCHMIET. **Explosive.** See Can., 157,518 (C. A. 9, 526).

Brit., 29,507, Dec. 22, 1913. PALA COMPANHIA HIMALAYITE. In explosives containing chlorates or perchlorates, a solid combustible such as starch, a liquid or pasty combustible such as oils, a metallic powder such as Al, and a "detonating" ingredient such as MnO_2 , employing less than 2% of the "detonating" ingredient, are used. As an example, the explosive may contain $KClO_4$ 81-4, starch 8-15, oil 4-8, Al 2-6%, and less than 2% of "detonating" ingredient.

Brit., 29,773, Dec. 24, 1913. SOC. L'AIR LIQUIDE (SOC. ANON. POUR L'ETUDE ET L'EXPLOITATION DES PROCÉDÉS G. CLAUDE). **Explosives.** See Fr., 463,876 (C. A. 8, 3366).

25. DYES AND TEXTILE CHEMISTRY.

L. A. OLNEY.

The coloring matter of tree moss. ALFRED EDGE. *J. Soc. Dyers Colorists* 31, 74-5(1915); cf. C. A. 8, 3369.—The coloring matter of tree moss, although giving brown shades similar to the ordinary dye lichens or crotches, possesses only $\frac{1}{4}$ the coloring power and exhibits very interesting differences. The color from tree moss is fixed on wool almost as quickly as an acid color, but the color changes from yellow to orange brown upon long boiling. The yellow color obtained possesses excellent fastness to scouring and milling and great fastness to alkalies and upon treatment with metallic salts gives pleasing shades of brown, but it does not appear suitable for dyeing on mordants. Fastness to light is fairly good. This yellow color of tree moss is interesting in that it is, with the exception of turmeric, the only natural direct yellow known.

LOUIS A. OLNEY.

Dyestuff manufacture in Russia. ANON. *Board of Trade J.* Mar. 11, 1915.—Extensive preliminary steps have been taken toward the establishing in Russia of works for the manuf. of dyes and other chem. products from native raw material. E. J. C.

The manufacture of dyestuffs in Britain. WALTER M. GARDNER. *J. Soc. Dyers Colorists* 31, 50, 1(1915); *Nature* 1915, 555-7.

LOUIS A. OLNEY.

British manufacture of dyestuffs. *J. Soc. Chem. Ind.* 34, 271-3(1915).—A discussion. E. J. C.

The war and the coal tar colors industry. K. PIETRUSKY. *Chem. Ind.* 38, 93-4(1915).

F. W. SMITHER.

Bleaching of wool fiber. A. F. MUSGRAVE. *Textile Colorists* 36, 337-8(1915).—A general discussion with recipes.

LOUIS A. OLNEY.

The use of bacterial rusts of flaxseed for determining fiber and waste of flax stems. E. A. DOMRACHEVA. *Russ. J. Expt. Landw.* 14, 155-66(1913).—A method for determining fiber, etc., in flax stems by use of a pure culture of bacterial rust is described in detail.

WM. P. GARRETY.

Fibers from various sources. ANON. *Bull. Imp. Inst.* 13, 20-4(1915).—Results are given of the chem. and phys. exam. of well known fibers from new sources: hemps from Egypt, Rhodesia and the Solomon Islands and *Hibiscus cannabinus* fiber from Rhodesia.

L. G. C.

Deterioration of canvas due to molds. F. GUEGEN. *L'union pharm.* 56, 55(1915); *Pharm. J.* 94, 357(1915).—The black spots and patches which tend to develop on tent cloth and sails when exposed to damp air and cause rotting of the fibers as if by H_2SO_4 , are due to the growth of molds, especially 2 species, *Pleospora infectoria*

and *P. herbarum*. The spores of these molds are rarely air-borne; they occur in the tissues of the textile fiber. Their presence may be shown by dipping the lower end of a strip of the cloth into sterile H_2O in a germ-free tube and incubating at 22° for 48 hrs. Bleached cloth is freer from living spores than unbleached. Waterproofing by immersing first into a 1:5 soap soln., then into a bath of 8% $CuSO_4$ tends to prevent subsequent growth. Probably sterilizing by dry steam under pressure for a short time will also protect the goods. S. WALDBOTT.

A new instrument for measuring the impermeability of cloth. N. WOJNESSENSKY. *J. Soc. Dyers Colourists* 31, 50(1915).—There are 2 ways of measuring the degree of impermeability: (1) making the cloth into a bag and measuring the time it takes water to percolate through; and (2) measuring the height of a column of water supported by the cloth before water drops through. The second method is quicker and more reliable; the instrument described is based on this principle. Also in *India Rubber J.* 49, 602 (1915). I. A. OLNEY.

Color and constitution (BALY) 2. Textile soft soaps (K. O.) 27. Substitutes for castor oil for the textile industry (HERBIG) 27. Catalytic reduction of indigo and vat dyes (BROCHET) 10. Organic chemical industry in Gt. Britain (PERKIN) 10.

U. S., 1,137,434, Apr. 27. P. F. VOGEL. Making a textile fabric by twisting together natural silk in the gum and artificial silk or cotton, knitting or weaving the composite threads, degumming the silk by boiling in a soap bath and then dyeing in a bath which will color the cotton or artificial silk but not the natural silk and finally boiling to remove any dye which may have adhered to the natural silk. Degumming after weaving gives the fabric a crinkled or wavy appearance.

U. S., 1,137,501, Apr. 27. M. LINFOOT. Ornamenting artificial silk or other textile fabrics by placing the fabric on a pattern fabric, which is supported on thick cloth or other pervious material and passing steam through the 3 superposed materials.

U. S., 1,138,670, May 11. G. KRÄNZLEIN, R. HAGENBACH and F. GILOY. Arylaminoanthraquinone dyes are made by nitrating the oxazole obtained from β -aminoalizarin and $BzCl$, *o*-chlorobenzoyl chloride, benzoin or bromoacetophenone, condensing the nitro compd. thus obtained with aniline, *p*-toluidine or other aromatic amine and sulfonating the condensation product.

U. S., 1,139,326, May 11. J. BARRINGTON. Alkali-free dye soap is made by boiling a neutral vegetable oil soap, castor oil and H_2O in the proportions of 16:2:16 parts, adding an aniline dye which will color both vegetable and animal fiber, *e. g.*, "substantive black," boiling the mixt. and then cooling it.

Brit., 29,359, Dec. 20, 1913. H. LEVINSTEIN and LEVINSTEIN, LTD. Obtaining fast prints on vegetable fiber by applying a printing paste containing a non-substantive azo dye capable of forming an insol. compd. with $HCHO$, and subsequently treating the print with $HCHO$; the treatment with $HCHO$ may precede or follow, or form part of the steaming operation; *e. g.*, $HCHO$ or a substance capable of yielding $HCHO$ may be printed on before steaming, or $HCHO$ spray or vapor may be mixed with the steam. Cf. C. A. 8, 2624.

Brit., 29,479, Dec. 22, 1913. B. LEECH. Treating textile fibers, before dyeing with basic dyes, first with an acid and then with a soln. of a silicate, such as Na or K silicate; tannic acid or other tannin materials, such as sumac or gall ext., are suitable acids. The process is particularly applicable to the fixation of basic dyes on cotton or art. silk or mixed fabrics containing cotton and art. silk. According to an example, such a mixed fabric is treated first with tannic acid, then with Na silicate soln., then

dyed by means of methylindone B and methyl violet 6B in presence of HCO_2H , and finally passed through a Na silicate bath. The Na silicate, if alk., is neutralized by HCl. Material dyed with indigo or other vat dyes may be after-treated first with tannic acid, then with Na silicate soln.

Brit., 29,512, Dec. 22, 1913. A. E. GARRETT. Treating wool and woollen fabrics to reduce their tendency to shrink, by means of the ordinary "unshrinkable" bath, and then in a comparatively weak bath of NH_3 and soap soln. to reduce the readiness with which they will otherwise absorb moisture. The goods, after passing through the first bath, may be passed through a clearing-bath, and are then immersed for a few mins. in a bath containing from 4 to 15 cc. of strong NH_3 per l. of soap soln. The goods may then be scoured and rinsed. White goods should preferably be bleached by oxidation after this treatment.

Brit., 29,852, Dec. 29, 1913. E. LODGE and J. M. EVANS. In dyeing union goods with sulfur dyes, Na or K sulfite is added to the hydrosulfite vats.

Brit., 30,055, Dec. 31, 1913. ANILINFARBEN- & EXTRACT-FABRIKEN v. J. R. GRIGY. The diazo compds. of arylsulfonic esters of aminophenols or their substitution products are employed in the production of azo and primary and secondary disazo dyes; the azo dyes from the arylsulfonic esters of *o*-aminophenol and its substitution products are excluded. Some of the dyes specified may be employed in the production of lakes.

Brit., 201, Jan. 3, 1914. G. STONE. App. for drying wool, etc., comprizes a support for the material, to which an evapg. agent is supplied, the supply being automatically cut off when the wt. of the material is sufficiently reduced.

26. PAINTS, VARNISHES AND RESINS.

A. H. SABIN.

Rapid test for the fineness of paint pigments. C. D. HOLLEY AND J. C. BRIER. *Oil, Paint and Drug Rep.* 87, 32H(1915).—The authors have succeeded in procuring satisfactory screens of 350-mesh. A 25 g. sample of the pigment is washed through the screen under the water tap, using a soft 1 in. brush to break up the lumps, brushing continually until only the coarse particles remain on the screen. The residue on the screen is dried and weighed. When abrasive pigments, such as silica and oxides of Fe, are tested, the amt. of service from a screen is limited and after 100 detns. the screen should be checked against a standard screen, reserved for that purpose. E. W. B.

Lessons from the 1906 test fence. E. F. LADD AND W. F. WASHBURN. N. Dakota Agr. Expt. Sta., *Paint Bull.* 1, 73-9(1915).—In mixed paints the addition of color considerably improved the wearing quality, and the darker colors showed better wearing qualities than the lighter. The character of the lumber influenced to a large extent the lasting qualities of the paints (ordinarily applied), soft pine being far better than hard pine or even than western cedar or fir. Test fences will by the end of 3 yrs. show about the same condition for av. paints as tests made on houses at the end of 5 yrs. Properly conducted fence tests constitute the most practical and satisfactory method yet devised for studying the wearing qualities of paints. Check tests should be made on houses. Substitution of benzine for turpentine does not appear to give the same results as in the cases where turpentine in moderate amts. is used. Sublimed lead has not been found inferior in wearing quality to basic carbonate white lead. The indications are that basic carbonate white lead chalks earlier than sublimed white lead, and that sublimed white lead chalks more and continues longer than basic carbonate white lead. Reproduced photographs of many panels are given. E. W. BOUGHTON.

Analyses of mixed paints. E. F. LADD AND W. F. WASHBURN. N. Dakota Agric. Expt. Sta., *Paint Bull.* 1, 85-108(1915).—Reports of analyses of various mixed paints on the market, giving label, brand and manufacturer. E. W. BOUGHTON.

Method of varnish analysis. R. W. DARNER. N. Dakota Agric. Expt. Sta., *Paint Bull.* 1, 108-111(1915).—D. points out the errors in several previously published methods and proposes the following procedure: Spread out 3-4 g. of varnish on an Adams filter coil, which has been dried and weighed with an extraction thimble. Coils and thimble must be weighed in a weighing bottle. Hold the coil in the mouth of a weighed 300 cc. Erlenmeyer flask and add slowly 100 cc. of petroleum ether (d. 0.670). A large portion of the varnish is washed out of the coil by this treatment. Place the coil in the extn. thimble and ext. for 36 hrs., or until extn. is complete. Add 150 cc. of petroleum ether to the contents of the flask and cool to 3°, until the gums settle and the liquid is clear. Pour off the liquid containing the oils and rosin and wash the gums several times with petroleum ether. The flask and thimble are dried at 105° to const. wt. The increase in wt. represents the wt. of the hard gums present and the metallic driers. Saponify the petroleum ether ext. with 0.5 N alc. KOH and ext. the unsaponifiable matter with ether. Add HCl to the soap soln. and ext. the fatty and rosin acids with ether. After distg. off the ether, det. the rosin by the Twitchell method. When Chinese wood oil is present, the polymerized portion is pptd. by the petroleum ether, but this ppt. does not stick to the flask as do the gums. The method depends for its accuracy on using the proper fractions of petroleum. Tables of results show the method to be very accurate. E. W. BOUGHTON.

The use of clays for paint manufacture. J. J. KOCH. *Clayworker* 62, 508(1914).—K. describes the manuf. of ochers, Venetian red, umbers and sienna paint pigments. Preheating and subsequent washing of certain clays removes sol. salts and produces clays of good value for painters' use. R. BACK.

U. S., 1,137,374, Apr. 27. J. W. AYLSWORTH. Varnish or enamel formed of a phenol resin free from uncombined CH_2O mixed with 4-10% its wt. of hexamethylene-tetramine, both dissolved in a volatile solvent, e. g., MeOH, EtOH or acetone.

U. S., 1,137,467, Apr. 27. A. EIBNER. Producing a light pigment from cinnabar or other ores containing mercury sulfide by treating the ores with K_2S soln. to form a soln. of $\text{HgS.K}_2\text{S.5H}_2\text{O}$, allowing the soln. to cool and introducing it into a cold, satd. soln. of liver of S and S to form black mercuric sulfide and K sulfides and heating the mass on a steam bath for 12-24 hrs. or until it assumes the desired color.

U. S., 1,139,427, May 11. R. B. LLOPART. Preparing an inalterable white pigment (lithopone) by treating a pure ZnSO_4 soln. with an aq. soln. of BaS , drying the ppt. and calcining it out of contact with air at 500-700°, chilling in H_2O , grinding, washing, heating to 80-100°, pressing and rapidly drying at about 80-100°.

Brit., 29,889, Dec. 29, 1913. A. NEFGEN. In transferring pigment prints to metal surfaces, the surface of the metal is moistened, and the tissue is applied in a dry state, whereby dragging of the print is avoided.

27. FATS, FATTY OILS AND SOAPS.

E. SCHERUBEL.

Bromides of fatty acids. MITSUMARU TSUJIMOTO. *Chem. Rev. Fett. Hars. Ind.* 1914; *Pharm. Zentralkalle* Jan. 21, 1915; *Pharm. J.* 94, 321(1915).—The quantity and the properties of the Et_2O -insol. bromide (octobromide) obtained from the fatty acids of train oil are influenced by the solvents used in the bromination. With

glacial AcOH, the bromide is gelatinous; with Et₂O, it is cryst. and the yield is greater. When mixts. of solvents are used, the yields and properties of the bromides are more or less influenced by each of the solvents. A table of bromides is given (in the original article) obtained from various train oils. The bromide standard of the bromide obtained from Japanese sardine train oil, with a mixt. of glacial AcOH and Et₂O as a solvent, was 70.12-69.79.

S. WALDBOTT.

The pharmacopeia test for the presence of sesame oil in olive oil. CHARLES E. SAGE. *Pharm. J.* 94, 128-9, 193(1915).—Baudouin's test adopted by the Brit. Pharm., 1914, excludes reliably pure olive oils. Many pure Spanish oils indicate at most 1% sesame oil by this test and are thereby excluded. Whatever else may be abnormal with a sample in showing the test, the cause is not the presence of sesame oil. With Villavecchia and Fabri's modification, no color in 10 min. shows absence of sesame oil; but pink in 10 min. does not prove its presence, since some genuine olive oils give a pink layer changing to lilac-blue lasting 1 hr., then turning dark olive green or brown.

S. WALDBOTT.

Some considerations affecting the growing of linseed as a farm crop in England. I. Variations in oil content. J. V. EYRE AND E. A. FISHER. *J. Agr. Sci.* 7, 120-34 (1915).—The authors confirmed the work of Ivanov (cf. *C. A.* 6, 1170) who proved that there is little difference in oil content of seed from the fiber crop and that from the linseed crop. The oil content of the seeds reaches nearly the max. value several weeks before the seeds ripen. A comparison of the oil content of several varieties of imported seed with the oil content of seed produced from them in different parts of England, showed close agreement. Of the 4 varieties used, Plate showed itself to be most profitable, Steppe, Moroccan, and Dutch following in order given. The larger seeds contd. a higher % of oil than the smaller ones. Repeated growth from the same stock of seed showed no diminution in the oil content while art. fertilizers had no appreciable effect on it.

O. F. MILLER.

The seeds of *trichilia* from the Nigerian Sudan. P. AMMANN AND J. VUILLET. *Agron. coloniale* 2, No. 14, 34-6(1914); *Bull. Agr. Intelligence* 5, 1593(1914).—The various species of *Trichilia* have not yet been thoroughly investigated, although they yield various interesting products; the bark of some of them is an excellent substitute for ipecacuanha, while their seeds contain varying quantities of fatty matter suitable for soap and candles. Six species are reported from West Africa proper and 6 from Equatorial Africa. The seeds of *T. emetica* have been exported from Mozambique to Marseilles for a long time under the name of "Mafuraires." To det. whether or not the W. African products gave seeds of equal value, seeds from various species found between Bamako and Koulikoro were studied. Types: (a) small, dark red seeds; (b) medium-sized seeds of orange vermilion color; (c) large, orange-colored seeds. Analyses of seeds: wt. of 100 seeds, g. (a) 12.7, (b) 29.4, (c) 79.1. Wt. of 100 kernels, g.: (a) 4.68, (b) 17.08, (c) 46.04. Percentage of kernels in seeds: (a) 36.9, (b) 58.1, (c) 58.2. Shells, %: (a) 63.1, (b) 41.9, (c) 41.8. Moisture in shells, %: (a) 6.42, (b) 4.16, (c) 4.74; in kernels: (a) 5.73, (b) 6.71, (c) 5.76. Fat in shells: (a) 41.50, (b) 38.10, (c) 51.90; in kernels: (a) 30.1, (b) 44.7, (c) 43.7. Analyses of the fats: *d* = fat of kernels from *b*; *e* = fat of kernels from *c*; *f* = fat of shells from *c*. Color: *d* and *e* light brown, *f* lighter brown. Solidification pt. of glycerides: *d* 18-19°, *e* 15-16°, *f* about 13°. Acidity % as oleic acid: *d* 5.60, *e* 2.82, *f* 3.05. Fixed insol. fatty acids, %: *d* 92.0, *e* 90.3, *f* 92.0. M. p. of insol. fatty acids: *d* 52°, *e* 51.5°, *f* 44°. Glycerol: *d* 6.3, *f* 5.8. The large seeds most nearly approach the "Mafuraires" from Mozambique as regards size and fat content. The medium seeds are identical with those of *T. prieureana*. French W. Africa should be able to export at least several hundred tons of the "Mafuraire" seeds each year.

F. W. SMITH.
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Can substitutes for castor oil be used in the textile industry? W. HERBIG. *Seifenfabr.* 35, 277-9(1915).—The chem. constitution of castor oil makes it doubtful whether there is available any real substitute which does not contain a considerable amt. of hydroxy-fatty acids of the type found in castor oil. Oils contg. oleic acids and fatty acids with more than 2 double C bonds when sulfonated produced Turkey red oils which are not usable. A mixt. of $\frac{1}{3}$ linseed and $\frac{2}{3}$ castor oil gives a cloudy soln. after sulfonation and neutralization with NH_4OH . By treating linseed or olive oil with 1% of osmic acid and H_2O_2 it is possible to reduce the I nos. of these oils to 0, and to make them sol. in alc. and in dil. alkali solns., but the cost would be too great for com. purposes. It appears that the most likely raw materials for substitutes are rape, fish and olive oil. E. SCHERUBEL.

Sulfonated naphthenic acids. J. DAVIDSOHN. *Seifensieder Ztg.* 42, 285(1915).—D. could not obtain a sulfonated product by the method described by Lidov (given). He found the following procedure successful: To 100 g. of the acids, 300 g. of fuming H_2SO_4 are slowly added and the mixt. allowed to stand overnight. The next day it is washed with a NaCl soln. until free from SO_4 . A dark-colored oil results which forms a fairly permanent emulsion with H_2O . The SO_4 content is about 7%, and the odor is disagreeable. E. SCHERUBEL.

Purification of soap lyess. B. LACH. *Seifensieder Ztg.* 42, 256-7(1915).—An Fe compd. known as "Persulfat" is being used as a substitute for $\text{Al}_2(\text{SO}_4)_3$ in purifying lyess. It is especially efficient in pptg. As. It is used as follows: The lyess are neutralized with acid at 90° to a point a little on the alkaline side, when the fatty acids sep. and are skimmed off. The lye is then brought to boiling and the "Persulfat" in colloidal soln. added a little at a time. The soln. is tested after each addition to see when pptn. is complete. The lye is next filtered and the acidity of the filtrate neutralized with $\text{Ca}(\text{OH})_2$ or $\text{Ba}(\text{OH})_2$, preferably the latter because Ca tends to remain in the glycerol. The evapn. of the lye is carried out in 2 stages; in the 1st it is brought to $22-4^\circ$ Bé. and allowed to cool in order to cryst. out NaCl. It is then evapd. to whatever density is desired. E. SCHERUBEL.

Textile soft soaps. K. O. *Seifensieder Ztg.* 42, 235-6(1915).—The following formulas are being used in Germany during the war: Bleached sulfonated olive oil 400 kg., linseed oil fatty acids 100 kg., bone grease fatty acids 500 kg., 50° Bé. KOH 400 kg. and K_2CO_3 80 kg. This soap is improved by adding artificial color. A green soap is made from green sulfonated olive oil 750 kg., linseed oil fatty acids 150 kg. and bone grease fatty acids 100 kg. In spring and fall 5% NaOH may be added to the KOH and 15-20% in summer. E. SCHERUBEL.

Oil from dog fish (YOUNG) 15. Hardened fats as foods (THOMS) 11E. Hard greases (FAUST) 29.

U. S., 1,138,201, May 4. C. ELLIS. Hydrogenating cottonseed oil or other oils or fats by the addition of Ni carbonyl and H or water gas and heating to about $150-200^\circ$ to decompose the carbonyl and effect hydrogenation by the combined action of the H and reduced Ni. During the latter part of the process the temp. of the material is reduced to about $85-125^\circ$.

U. S., 1,138,230, May 4. J. LEIMDÖRFER. Making hard paste soaps by adding Turkey red oil or other sulfonated oil to olive oil, tallow or other fatty soap stock to increase the resisting capacity of the alkali salts, subsequently formed from the fatty acids, in aq. solns., and then completely saponifying with an alkali soln. of $30-40^\circ$ Bé.

Brit., 21,853, Sept. 27, 1913. R. Russ. Sulfonated oils and fats are sepd. from the excess of acid used in the sulfonation process by the addition of a quantity of H_2O or salt soln., and subsequent treatment in a centrifugal machine. Products are obtained which have a high resistance to the action of acids and of Ca and Mg salts. They yield clear solns. with hard or soft H_2O either in a neutral or strongly acid condition.

28. SUGAR, STARCH AND GUMS.

A. HUGH BRYAN.

History of sugar. ANON. *Louisiana Planter* 54, 206-7, 270(1915).—Continuation of previous articles (cf. C. A. 9, 532 and 1130), covering periods from 1527 to 1581 and from 1582 to 1763.

A. GROSS.

Cupropotassic solutions, Barreswill's and Fehling's solutions. H. PELLET. *Bull. assoc. chim. suc. dist.* 31, 978-81(1914).—A brief history of the development of alk. Cu tartrate solns. for the detn. of reducing sugars. In 1843, Barreswill announced the use of $CuSO_4$ and alk. tartrate solns. for the detn. of reducing sugars. In 1849, Fehling perfected the proportions of the salts and also investigated the action on glucose. Since then Mohr, Bodecker, Violette, and others have varied the form and proportions of the alkali and tartrate used. But in view of the fact that the essential principles of this method were discovered by Barreswill, and indeed the method as used today is practically the one proposed by him, it is proposed that alk. Cu-tartrate solns., when used for detg. reducing sugars, be called "Barreswill's" soln. H. R. SMITH.

Determination of sucrose by double polarization employing a new method of clarification. NOEL DEER. *Intern. Sugar J.* 17, 179-82(1915).—The method of clarification is based on the pptn. of alumina within the soln. The reagents employed for both the direct and inversion readings are: (A) a satd. soln. of BaO and (B) a soln. of $Al_2(SO_4)_3 \cdot 10H_2O$ and H_2SO_4 made by dissolving 165 g. crystd. $Al_2(SO_4)_3 \cdot 10H_2O$ in water, adding 135 cc. $N H_2SO_4$ and making up to 1000 cc. A is titrated against B and B is dild. so that 25 cc. of A are equiv. to 15 cc. of B. For the *direct reading* 50 cc. of the material to be analyzed are placed in a 100 cc. flask, 25 cc. of soln. A are added and, after mixing, 15 cc. of soln. B are run in with agitation during the addition. The vol. is then completed to 100 cc. with the addition of 0.1 g. of Na hydrosulfite if needed for decolorizing effect. The filtrate is used to obtain the direct reading, which is increased by 0.7% to compensate for the vol. of the ppt. formed; or the vol. may be completed to 100.7 cc. or 49.65 cc. of the soln. may be taken. For the *inversion reading* 50 cc. of the material to be analyzed are placed in a 100 cc. flask, 15 cc. of soln. B are added, the flask placed in a water bath and the temp. maintained at 95 to 97° for 20 min. After cooling, 25 cc. of soln. A are added, and the inversion reading obtained exactly as for the direct reading. The sucrose is calcd. by the usual formula: $S = (D - I)/(C - (t/2))$. **Procedure for analysing molasses:** Dissolve 3.25 g. of molasses in 50 cc. of water and add 15 cc. of soln. B followed by 25 cc. of soln. A and about 0.1 g. of Na hydrosulfite. Complete the vol. to the mark, and filter, ascertaining the direct reading of the filtrate, and make the inversion, Na hydrosulfite being added after the addition of the BaO, and before filtration. With dark-colored molasses it is only possible to observe dil. solns., and with such Na hydrosulfite was found to have a considerable decolorizing effect. It was much easier to read an $1/8$ normal soln. of molasses in a 400 mm. tube than a $1/4$ normal soln. in a 200 mm. tube. The advantages claimed are that the direct and inversion readings are made under identical conditions; that the disturbing influence of Pb salts is eliminated; that it is particularly suited to analyses where sepn. of dextrose and levulose are required; and that a clarification is

obtained giving a filtrate well adapted for reducing sugar detns. and one without influence on the reducing sugars themselves. The results of a careful exam. of the method are given.

A. GROSS.

The deterioration of raw sugar samples. C. A. BROWNE. *Louisiana Planter* 54, 281-2(1915).—B. gives some data to clear up a current misunderstanding of the report of the New York Sugar Trade Lab. for 1914. The results in that report were based on expts. made with sugars kept in sealed glass jars and it should not be assumed that the same changes would occur in sugars stored in bags in a warehouse. In judging resistance of sugar, uniformity of character becomes a guiding principle. Moisture is not the only factor to be considered in the keeping quality of sugar. Expts. showed that the formation of invert sugar and other decomp. products during deterioration increase the percentage of non-sucrose ingredients to more than twice the moisture and so reach a point where deterioration automatically ceases. If the moisture content of raw cane sugars does not exceed $\frac{1}{3}$ of the non-sucrose solids, such sugars may be regarded as perfectly safe for dry storage. Tables of analyses of sugars are given to show the changes after different periods of time and under different storage conditions.

A. GROSS.

Varying concentration of the juice in the cells of the cane stalk. R. S. NORRIS. *Intern. Sugar J.* 17, 127-8(1915).—N. found that the juice extd. with a press from different parts of the cane increased considerably in density with each succeeding pressing. The explanation offered is that in the process of shredding, the cells with high density juice were ruptured along with the other cells, so that in pressing after shredding no increase in density of the juice was found at higher pressures. This would indicate that there is an advantage in the practical milling of cane in reducing it to a fine state of division, either by shredding or by the grinding action of the rollers in the early part of the process, so that none of this high density juice will be retained in the final bagasse.

A. GROSS.

Inversion in cut sugar cane. J. A. HALL, JR. *Louisiana Planter* 54, 269-70 (1915); cf. *C. A.* 8, 2633.—H. confirmed by expt. a previous suggestion that the inversion is due to enzymes and not to bacteria.

A. GROSS.

Use of hydrosulfites in manufacture of beet sugar. P. MARCUS. *J. fabr. suc.* 54, No. 47, 1; *Bull. Agr. Intelligence* 5, 130(1914).—A detailed account of the methods of application and the advantages realized by the use of hydrosulfites in the clarification of beet juice as practiced at the factory of Port-Salut-Verberie. 0.08 g. ZnSO_4 is added to the raw juice at the beginning of clarification, and the usual carbonation follows. This sulfitation costs about \$0.02 per ton of beets and allows a saving of 30% on limestone and 32% on coke. There is also a material decrease in the scums, in the loss of sugar in the cake, in the water required for washing, and in the cost of filtering. These savings total \$0.13 for each ton of beets treated. Account should also be taken of the more rapid evapn. and of the complete suppression of incrustations, which involves an economy of fuel. The successful application of this process demands an unusually close chem. control in the entire factory.

H. R. SMITH.

Catalysis in the oxidation of alkali sulfites. E. SAILLARD. *Compt. rend.* 160, 318-20(1915).—During the treatment of sugar solns. with SO_2 for clarification, some of the alkali sulfites formed are oxidized to sulfates. This action is thought to be due to the catalytic properties of some of the salts and other solids present. An exhaustive investigation of this subject has revealed the following facts: The oxidation of alkali sulfites in soln. is retarded by the presence of sucrose, invert sugar, nonsugar solids in general, NH_4 oxalate, glycerol, alkalis free from carbonates, asparagine, glutamic acid, and K lactate. The rate of oxidation increases regularly with rising temp. In the

presence of an increasing % of sucrose the effect of rising temp. diminishes. The curve which represents the retarding action of sugar rises rapidly and approaches an asymptote at about 60% sugar. The oxidation is very difficult with molasses. Oxidation is accelerated by the presence of powdered Zn, Ni, or Al, oxides of Fe and Mn, CaCO_3 , refractory bricks, CaSO_3 , CaSO_4 , CaC_2O_4 , $\text{Ca}_3(\text{PO}_4)_2$, MgCO_3 and AlPO_4 . Combination of circumstances which permit the appearance of any of these substances should be avoided whenever possible.

H. R. SMITH.

The sucrose content of scums. H. PELLET. *Intern. Sugar J.* 17, 132-3(1915).

—The insol. sucrose in scums is not all in the form of Ca sucrate but is also in an insol. form pptd. by the addition of lime, but not as sucrate. When found in an appreciable quantity in the scums (0.30-0.40% or more), there is cause to exam. the milk of lime. The diminution of polarization on liming is attributed to the entrainment of sucrose in the insol. state by the very bulky ppt. formed on adding lime to the already dense diffusion juice. Methods are given for the detn. of the total insol. sucrose and for conducting a liming test of the raw juice.

A. GROSS.

The Norit process of manufacturing white sugar. A. WIJNBERG. *Intern. Sugar J.* 17, 129-31(1915).—Continuation of a previous article (cf. *C. A.* 9, 1132). W. reports trials made in Natal and Scotland, advantages for the refiner and the application of the process in the beet sugar factory.

A. GROSS.

Frothy fermentation in the after-products of cane sugar manufacture. H. C. PRINSEN-GHEERLIGS. *Louisiana Planter* 54, 205-6(1915).—This phenomenon is ascribed to the decomp. of derivs. of sugars and not necessarily to the primary decomp. of glucose under the influence of alkaline matter. It is also produced by overheating. G. suggests that the best way to prevent the frothy fermentation is first to avoid any heating of glucose containing juices or sirups with lime at temps. above 60°. Next the vacuum in the pans should be a high one in order to have the after-products formed boil at a temp. below 70°. All products should be made to grain as far as possible in order to prevent the masseccutes remaining too long in the hot rooms.

A. GROSS.

The rational imbibition (maceration) of bagasse in the cane sugar factory. L. PELLET. *Intern. Sugar J.* 17, 123-7, 175-8(1915).—Continuation of a previous article (*C. A.* 9, 1130). A detailed study was made of the different arrangements for imbibition that may be adopted in practice according to the type of milling installation, detn. of the total water added to the bagasse, the amt. of imbibition and its relation to evapn.

A. GROSS.

Practical control of the density of fullmass or masseccute. F. E. COOMBS. *Louisiana Planter* 54, 203-4(1915).—The method is based upon the fact that a small drop of fullmass, free from bubbles, will float upon any liquid of greater density than its own, and will sink into this liquid as soon as its density becomes equal to or greater than that of the liquid. Pb subacetate soln. was found to be the best suited for the purpose.

A. GROSS.

The fiber content and the fuel problem. W. E. CROSS. *Revista agricola de Tucuman; Louisiana Planter* 54, 266(1915).—Owing to the low fiber content of the cane milled in Louisiana, Tucuman, etc., the bagasse produced is not sufficient to provide all the fuel necessary to run the factory.

A. GROSS.

The use of sweet sorghum as a source of commercial sugar or as fodder. H. E. ANNETT. *Agr. Res. Inst. Bull. (Pusa)* 41, 9 pp.(1914); *Bull. Agr. Intelligence* 5, 1596-7(1914).—A. describes a series of expts. made at Lyallpur and Gurdaspur, Punjab. As a source of sugar, saccharin jowar (sorghum) is not worth growing in India (no demand for the sirup). The high glucose ratio of the juice militates against the pro-

duction of good cryst. jaggery. The juice contains also substances which produce, at times, a very objectionable taste in the jaggery. Yield per acre = about 8 cwt. The total sugar content of the crop was highest when the seed contents began to dry. Thereafter until the seeds are dead ripe the total sugar decreases, mainly at the expense of the reducing sugar. As the plant approaches ripeness the amt. of juice expressed from it decreases. As a source of fodder this sorghum seems valuable.

F. W. SMITHER.

Tacca umbrarum. ANON. *J. agr. tropicale; Giorn. farm. chim.* 63, 116(1914).—The tubers of this plant (which is indigenous to Madagascar) give a yield of approx. 30% dry starch when treated by com. processes, as compared with a yield of 20-2% obtained from manioc. The native method of extg. starch from these tubers consists in a crude mechanical sepn. followed by washing (in order to remove toxic and bitter principles) and sun drying.

H. S. PAINE.

U. S., 1,138,608, May 4. L. G. G. DIBBETS. Centrifugal apparatus for filtering sugar juices.

Brit., 30,099, Dec. 31, 1913. C. D. VAN RAALTEN. Purifying sugar juice or similar liquid by means of a horizontal oscillatory sieve which receives a combined horizontal and vertical motion to cause the sepd. solids to travel along the sieve to a discharge spout.

29. LEATHER AND GLUE.

LLOYD BALDERSTON.

Detection of lactic acid in leather and tanning liquors. R. LAUFFMANN. *Leder-technische Rundschau* 9, 105-10(1915).—The lactic acid is decomposed by heating with PbO_2 into CO_2 and acetaldehyde, the latter distg. over into a mixt. of diethylamine and Na nitroprusside, producing a violet color.

L. B.

Hard greases. Committee report. T. A. FAUST. *J. Am. Leather Chem. Assoc.* 10, 238-42(1915).—A discussion of methods for m. p., with results of 8 analysts on 2 samples.

L. B.

Estimation of nitrogen in leather. E. NIHOUL. *Collegium (London)* 1915, 43-5; cf. *C. A.* 9, 977.—N. recommends the addition of $KMnO_4$ in the cold to the H_2SO_4 in the Kjeldahl process.

L. B.

Foot and mouth disease. JOHN H. YOCUM. *J. Am. Leather Chem. Assoc.* 10, 211-4(1915).—Criticism of government methods. Hides of condemned animals should be sterilized and used and carcasses made into fertilizer.

L. B.

Analysis of lactic acid. Committee report. L. BALDERSTON. *J. Am. Leather Chem. Assoc.* 10, 242-51(1915); cf. *C. A.* 9, 534.—Results of 5 analysts on 7 samples are given. Methods recommended: free acid and anhydride, Besson's method; volatile acid, a distn. method, following definite prescription as to size of apparatus, rate of distn., strength of acid distd., amt. taken and amt. distd. over; sulfuric acid, removal of sulfates by soln. in alc. and pptn. of free SO_3 as $BaSO_4$.

L. B.

Chemical data from the pickle solution. P. M. RANDALL. *J. Am. Leather Chem. Assoc.* 10, 171-4(1915).—Graphs show (a) loss of moisture in pelt during pickling, (b) absorption of SO_3 ions, (c) total Cl present, (d) H_2S present, (e) total Ca present in soln., (f) rate of formation of $CaSO_4$. The data are taken at 10 min. intervals from hides drummed 1 hour with H_2SO_4 and NaCl.

L. B.

Moellon analysis. Committee report. T. A. FAUST. *J. Am. Leather Chem. Assoc.* 10, 174-8(1915); cf. *C. A.* 9, 730.—Collaborative results are given for unsaponifiable matter and oxidized fatty acids. For moisture, heating in a Pt dish over a free flame is recommended. L. B.

Distinction between oak-wood and chestnut wood extract. J. JEDLIČKA. *Gerber* 41, 85-6(1915).—J. finds Eitner's reaction (*Gerber* 1885, 157) uncertain and Jean's (*Collegium* 1902, 283) quite misleading. The ash of chestnut ext. of 40% solids is from 0.4% to about 1%, that of oakwood ext. from 1.2% to 1.8%. Another test is as follows: In a dry test tube, to 5 cc. of a soln. containing 0.4% tannin add 10 cc. of 10% CH_3COOH and then 5 cc. of a 10% soln. of normal $\text{Pb}(\text{OAc})_2$; shake and filter through a dry filter; to 10 cc. of the filtrate add 0.5 cc. of 1% soln. of Fe alum and 0.5 g. of AcONa crystals. In general, chestnut exts. give a deep blue-violet coloration, oakwood yellowish. To most tests the two exts. react alike. L. B.

Analysis of cube gambier. H. G. BENNETT. *Collegium (London)* 1915, 13.—B. recommends grinding and extracting gambier as a crude material. Errors due to volume of insol. matter are serious when gambier is analyzed as an extract. L. B.

Tannery problems for tanners and chemists. W. R. COX. *J. Am. Leather Chem. Assoc.* 10, 183-5(1915); cf. *C. A.* 9, 870. L. B.

Potassium cyanide as a qualitative reagent for tanning materials. H. G. BENNETT. *Collegium (London)* 1915, 56-60.—Solns. of pyrogallol, gallic acid and gallotannic acid, shaken in a test tube after adding KCN, show a bright red color which soon fades. If an excess of a 10% soln. of KCN be added to a clear infusion of a tanning material and the mixt. poured into an excess of hard water, the pyrogallol tannins and some mixed tannins give a ppt.; catechol tans give no ppt. L. B.

Analysis of materials used in connection with beam-house procedure. Committee report. C. R. OBERFELL. *J. Am. Leather Chem. Assoc.* 10, 252-8(1915).—Discussion of methods of examination of lime liquors. L. B.

Tannin analysis. Committee report. F. O. SPRAGUE. *J. Am. Leather Chem. Assoc.* 10, 215-37(1915).—Collaborative results from 30 analysts on 4 exts. are given, showing lower insolubles by rapid cooling for quebracho and myrobalan. L. B.

U. S., 1,136,980, Apr. 27. A. THOMA. Plastic shoe-bottom filler formed of wax tailings, sol. silicate, china clay or infusorial earth and granular cork, with or without other pulverulent fillers or starch or dextrin.

U. S., 1,137,450, Apr. 27. A. G. BAKEVICH. Belt-dressing formed of kerosene 5, pine pitch 4, spruce pitch 2 and castor oil 2 parts.

U. S., 1,137,671, Apr. 27. H. SCHULZ. Drying patent leather in an oven and then subjecting it to the action of light and NH_3 simultaneously to avoid detrimental action by free acids formed in the material.

U. S., 1,137,679, Apr. 27. A. THOMA. Plastic shoe-bottom filler formed of wood tar mixed with S and granular cork.

U. S., 1,137,719, Apr. 27. W. W. SIBSON. Apparatus and method for drying long lengths of belting under tension to prevent shrinking.

U. S., 1,138,909, May 11. A. THOMA. Plastic filler for shoe-bottoms, formed of wax tailings, gum arabic and granulated cork.

U. S., 1,138,910, May 11. A. THOMA. Plastic filler for shoe-bottoms, composed of wax tailings, starch, Irish moss, Iceland moss, or flaxseed ext. or other mucilaginous ext., and granulated cork, with or without soap, Na silicate, glue, etc.

30. RUBBER AND ALLIED SUBSTANCES.

R. T. STOKES.

A study of some recent methods for the determination of total sulfur in rubber. J. B. TUTTLE AND A. ISAACS. Bur. of Standards, *Tech. Paper* 45, 16 pp.; *J. Wash. Acad.* 5, 235-6(1915); *J. Ind. Eng. Chem.* 7, No. 7(1915).—The investigation was undertaken to learn whether or not the methods recently published for the detn. of total S in rubber are any improvement over the method of Waters and Tuttle (*C. A.* 6, 1107). The methods investigated were those of Spence and Young (*C. A.* 6, 2545), of Deussen (*C. A.* 8, 261), of the Joint Rubber Insulation Committee (*C. A.* 8, 1214), of Alexander (*Gummi-Ztg.* 18, 729-30(1904)), of Kaye and Sharp (*C. A.* 7, 1107), of Frank and Marckwald (*Gummi-Ztg.* 17, 71(1903)), and of Waters and Tuttle. These were subdivided, according to the method of attack, into 3 classes: direct soln., direct fusion, and soln. and fusion methods. A large number of detns. were made on a number of samples, 2 of the latter being of known comp. (specially prepared). The methods may be divided into 2 classes, *vis.*, those for the detn. of total S and those for the detn. of S other than that present in the insol. sulfates. It was found that the second class could not be relied upon to give accurate results. The use of conc. HNO_3 , as in the methods of Spence and Young, and of Deussen, causes low results. The direct fusion methods of Alexander, of Kaye and Sharp, and of the Joint Rubber Insulation Comm. are reliable only when the free S content is low and are therefore not applicable to routine analysis. The soln. and fusion method of Frank and Marckwald was found to be unreliable when the free S was high. The Waters and Tuttle method was found to be satisfactory, and is recommended for general use. A new suggestion is offered, *namely*: to det. separately the free S, and the S remaining after the extn., reporting the sum of the two as total S. This eliminates the troublesome effect of the free S on the detn. of total S.

E. W. BOUGHTON.

The high tension test (WOODWARD) 4.

U. S., 1,137,461, Apr. 27. J. P. CLARE. Self-healing composition for the inner tubes of pneumatic tires, composed of reclaimed rubber 10, tar 2, petrolatum 1 and "vorite" (an oxidation product of linseed oil) 2 parts.

U. S., 1,138,250, May 4. A. W. SAVAGE. Forming rubber inner tubes for pneumatic tires by shaping on a mandrel coated with graphite, vulcanizing the tube under pressure and then reversing the tube upon the mandrel so that the inner surface becomes the outer surface.

U. S., 1,138,410, May 4. J. E. POINTON. Apparatus for masticating crude washed rubber. Cf. *C. A.* 8, 2497.

U. S., 1,138,791, May 11. T. H. RIEDER. Apparatus for vulcanizing rubber shoes, etc.

U. S., 1,139,341, May 11. F. A. CIGOL. Method of molding and vulcanizing hollow rubber articles, such as balls.

CHEMICAL ABSTRACTS

Vol. 9.

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No. 13.

I. APPARATUS.

L. C. JONES.

New type of apparatus for the reduction of iron solutions by metallic aluminium. C. L. SCHUMANN. *J. Ind. Eng. Chem.* 7, 431(1915).—An Al chain attached to a glass rod is used instead of an Al spiral. ISADOR MILLER.

Collodion diffusion cell for use in dialysis. T. R. BRIGGS. *Cornell. J. Phys. Chem.* 19, 377-80(1915).—It is difficult to prepare collodion membranes for dialysis by Novy's method (cf. Bigelow and Gemberling, *C. A.* 2, 618). Substitute cells may be prepd. very easily as follows: A large Soxhlet extn. cartridge is filled with collodion soln. (Kahlbaum's Ph. G. V.) and emptied as soon as the pores of the paper are completely impregnated. As soon as the collodion has set the process is repeated. Three coats are applied. The collodion cannot be allowed to dry in air as it becomes practically impervious to H_2O , but the cell is partially dried in a current of air, *i. e.*, until the ether is removed (about 10 min.). It is then put into H_2O , which displaces the alc., leaving the cell ready for use. If 6% glycerol (the amt. is established by comparative tests using different percentages) is added to the collodion before the cell is prepd. it may be completely dried in air and kept for a long time before using. Comparative tests, using NaCl, show this new form of diffusion cell to be more efficient than the ordinary type of parchment thimble but less efficient than collodion sacs prepd. by Novy's method. F. A. HARVEY.

Sand blast for marking glassware. G. SPITZER AND L. S. TRACHSEL. *J. Ind. Eng. Chem.* 7, 426-7(1915).—The app. is described with drawings. I. M.

Two more new specific gravity balances. M. V. SCHWARZ. *Centr. Min. Geol.* 1915, 97-106; *Chem. Zentr.* 1915, I, 517.—A model adapted for the purpose of instruction and demonstration is developed from the type previously described (*C. A.* 5, 1212) in which the scale is divided into 0.1 g., and with which it is best to use fragments weighing 10-20 g. Then for the smallest fragments, 0.01-0.02 g., a torsion balance with and without a reading mirror is shown and the method of using it described. Tables are given showing the value and size of the scale parts with the torsion balance and the exptl. results of d. detns. for the purpose of instruction, as well as with the precision balance. With some practice, the length of time required for a weighing with the last named balance (made by Hartmann & Braun, Frankfurt) is 5-10 sec. J. H. BOWER.

An aneroid calorimeter. H. C. DICKINSON AND N. S. OSBORNE. *J. Wash. Acad. S.* 337-8(1915).—(In full later as *Sci. Paper* 247, Bur. Standards). The term "aneroid calorimeter" is applied to a type of calorimeter in which equalization of temp. is secured by means of the thermal cond. of Cu instead of by the convection of a stirred liquid. The instrument consists of a thick-walled cylindrical Cu vessel, in the walls of which is embedded a coil of resistance wire to supply heat electrically, and of a Pt resistance coil for use as a thermometer. It has been found useful over a wide range of temps. and is applicable to a variety of problems. For use at low temps. the calorimeter is mounted in a jacket surrounded by a bath of gasoline, the temp. of which can be controlled thermostatically to within a few thousandths of a degree at any temp.

between -55° and $+40^{\circ}$, or it can be changed rapidly in order to keep it the same as that of the calorimeter when heat is being supplied to the latter. Differences in temp. between the surface of the calorimeter and that of the jacket are measured by means of multiple thermocouples which have 10 junctions distributed over the surface of each, thus making it possible to apply accurate corrections for thermal leakage between calorimeter and jacket even when the temps. of both are changing rapidly. The Pt resistance coil shows slight irregularities in its behavior, probably due to the difference in expansion between the Pt and the Cu which surrounds it. These uncertainties, while negligible, can be avoided by measuring the temp. of the outer bath with a standard resistance thermometer, using the thermocouples to measure the small difference, usually not more than a few thousandths of a degree, between the calorimeter and the jacket. Results of a series of expts. give the consts. of the resistance thermometer and the heat capacity of the calorimeter including a Sn-lined cell for use in detg. the sp. heat of ice and H_2O and the latent heat of fusion of ice. A series of check expts. on the sp. heat of H_2O show the order of reproducibility of results to be 1 part in 2000. Measurements made at temps. between 0° and 40° gave results which agree to within the limits of exptl. accuracy with the results of a series of expts. made in the usual form of stirred H_2O calorimeter. The results are also in satisfactory agreement with the most probable values deducible from the data of the most careful investigations published by other observers.

F. W. SMITHER.

Gas-fired industrial furnaces. ANON. *Engineering* 99, 460-2(1915). A description with drawings of a pressure-gas-fired annealing furnace, a natural draft gas-fired annealing furnace and a crucible furnace.

W. L. BADGER.

The "Bracq-Moritz furnace" for roasting pyrites and similar material. SEIG-FRIED BARTH. Düsseldorf. *Chem. App.* 2, 95-6, 105-7(1915).—A description, with 11 cuts, of this oven. It is simple in construction and operation and is said to give excellent results with regard to the solubility of the Cu in the roasted ores. J. H. M.

High-efficiency chimney-cooler with stepped-grate air-entrance. ANON. *Chem. App.* 2, 104-5(1915).—A cut and description of the Maschinenbau-Aktienges. Balcke, Bochum. water cooler, with 2 cuts of older forms for comparison. J. H. MOORE.

Grinding and crushing machinery. M. A. CROSBY. *J. Soc. Chem. Ind.* 34, 320-7(1915).—A discussion of types and principles.

W. L. BADGER.

A thermoregulator with water temperature control. L. v. HAYDENREICH. *Centr. Bakt. Parasitenk., Abt. I*, 73, 444-8(1914).—An app. is described which is designed to be used when gas and electricity are not available. The source of heat is an oil lamp.

J. H. LEWIS.

Recent progress in pyrometry. C. R. DARLING. *J. Roy. Soc. Arts* 63, 590-607 (1915); *Gas World* 62, 571-2(1915); *Engineering* 99, 564-5(1915); *J. Gas Lighting* 130, 457-8(1915).—The past few years have witnessed a great extension of the use of base metals in the construction of thermal junctions. Properly chosen base metal couples develop a relatively high e. m. f. and therefore make possible the use of a strong and cheap indicator in place of the sensitive instrument required for couples of the Pt series. New types of optical pyrometers have come into use, based on the principle of color extinction. Modern tendency is in favor of continuous inked records. Cf. *C. A.* 8, 2086.

M. L. TROWBRIDGE.

Recent advances in electrical pyrometry. R. W. PAUL. *Pat. Gas.* 39, 1278-81(1915).—It is pointed out that a thermo-couple circuit of high resistance, composed of wire of negligible temp. coeff., is necessary for a reasonable degree of accuracy of measurement of temp. Pt-Rh couples are more permanent than Pt-Ir, but produce a lower e. m. f.

C. S. K.

MURDOCH, W. H. F. AND OSCHWALD, U. A.: *Electrical Instruments in Theory and Practice*. London: Whittaker & Co. 306 pp. 10s, 6d.

U. S., 1,140,250, May 18. G. L. CABOT. Apparatus for handling and transporting liquefied natural gas or other liquefied gases in bulk.

U. S., 1,140,502, May 25. T. CRANEY. Apparatus for the destructive distillation of refuse organic matter. The production of alc. from garbage and of turpentine from wood are specified.

U. S., 1,140,701, May 25. A. F. MITCHELL. Electric pyrometer.

U. S., 1,140,726-7, May 25. W. F. WARDEN. Filters for purifying oil. Cf. C. A. 8, 3362.

U. S., 1,140,853, May 25. E. M. ROSENBLUTH. Acetylene generator.

Brit., 501, Jan. 8, 1914. G. R. SCHUELER. Construction of app. for expressing oil or liquids from seeds, nuts, fish, fruit, etc., or molding plastic materials. Cf. C. A. 8, 3254.

Brit., 707, Jan. 10, 1914. K. I. CROSSLEY, E. WHEELER and T. B. SMITH. A still for tar, oil, or other frothing liquids, is fitted above the level of the liquid with a superheater, so arranged that the liquid in the froth is partly evapd., the remaining raining back on to the whole surface of the liquid below. The superheater is heated by the flame or hot gases from a burner. The still is heated by furnace gases passing through flues fitted with baffles.

Brit., 1,123, Jan. 15, 1914. J. L. BRODIE. An electrically-heated vacuum pan or still is constructed with a heating belt having tubes either containing or surrounded by elec. resistances and arranged so that the heating belt as a whole or the sep. tubes thereof are readily removable.

Ger., 279,356, Mar. 10, 1914. Addition to 256,668 (C. A. 7, 2669). O. BÜHRING and WAGNER, G. M. B. H. Construction of app. for separating liquids from gases or vapors.

Ger., 279,462, Nov. 15, 1912. Addition to 235,442 (C. A. 7, 1997). P. GRAEFE. App. for separating liquids from gases and vapors.

Ger., 279,848, Nov. 8, 1913. Addition to 271,303 (C. A. 8, 2642). STEIN- UND TON-INDUSTRIE-GEH. BROHLTHAL. A mixer for materials of any degree of subdivision.

Ger., 279,919, Jan. 3, 1914. FOLDENÜTTE THEIHELGUSSTAHLFABRIK. Hardness tester.

Ger., 279,942, May 6, 1913. Addition to 277,714 (C. A. 9, 982). A. M. ANSCHÜTZ. GEH. ERNST. Automatic charging device for furnaces.

Ger., 279,976, Apr. 26, 1914. STEIN- UND TON-INDUSTRIE-GEH. BROHLTHAL. Charging rotary mixing drums.

Ger., 280,093, Oct. 24, 1913. WÄRME-VERWERTUNGSGES. M. B. H. A steam generator, heated with liquid slag or the like, with boilers above and below, and H₂O tubes connecting these.

Ger., 280,140, Feb. 22, 1914. GEBR. PIERRBURG. Hearth and muffle furnaces with firing for liquid fuel. Cf. C. A. 9, 907, 1172.

Ger., 280,274, June 4, 1912. Addition to 267,825 (C. A. 8, 1952). EIKAR-WERKZEUGE G. M. B. H. Blast lamp with O injector and regulating devices for both O and combustible gas.

Ger., 280,315, Jan. 16, 1913. O. EISENER. Feeding device for roll driers.

Ger., 280,320, Mar. 4, 1913. **AUTOGEN-WERKE FÜR AUTOGENE SCHWEISS-METHODEN.** Blast lamp with a jacketed mixing chamber for preheating the O.

Ger., 280,335, Sept. 20, 1912. Addition to 243,214 (C. A. 6, 2196). **H. LIESE.** App. for measuring gases, vapors, and liquids.

Ger., 280,385, Nov. 8, 1913. **AKT.-GES. DER CHEM. PRODUKTEN-FABRIK POM-MERENDORF.** App. for sifting and comminuting superphosphate, mixed fertilizers, salts, crystals, etc. Cf. C. A. 8, 3213.

Ger., 280,430, May 6, 1913. **A. ZETSCHKE.** Precision charging device for roasting furnaces and like purposes.

Ger., 280,681, Feb. 19, 1913. **BYER & CO.** Horizontal evaporator.

Ger., 281,001, July 19, 1913. **F. MAYN.** Reciprocating sieve with regulable mesh.

Ger., 281,282, Feb. 1, 1914. **MAGNET-WERK. G. M. B. H.** Constructional details of a ring-form magnetic separator for sepg. small amts. of finely divided magnetic material for slimes or the like.

Ger., 281,310, Feb. 9, 1913. **N. BRUTEL.** Construction of a machine for saturating liquids with gases.

Ger., 281,324, Feb. 7, 1913. **M. ERFURTH.** Construction of a machine for depositing suspended matter by sedimentation.

2. GENERAL AND PHYSICAL CHEMISTRY.

WILLIAM D. HARKINS.

Assistants: E. B. MILLARD and A. B. CARTER.

Otto Hauser. **R. J. MEYER.** Berlin. *Chem. Ztg.* 39, 273(1915).—An obituary. **J. H. MOORE.**

Ruggiero Bacone. I. GUARRESCHI. *Reale accad. Sci. Torino.* 1914-5, 4-84.—An obituary. **E. H.**

Life and works of E.-H. Amagat. **E. PERRIER.** *Rév. gen. chim.* 18, 53-5(1915).—M. Amagat was killed in battle. **E. H.**

Villette's burning-mirror experiment. **FELIX FRITZ.** *Chem. Ztg.* 39, 153(1915); cf. C. A. 2, 1246. **J. H. MOORE.**

An oxidizable variety of nitrogen. **T. M. LOWRY.** *Phil. Mag.* 28, 412-6(1914); see C. A. 7, 3922. **A. T. C.**

Valence of chemical atoms in connection with theosophical considerations as to their external form. **A. C. DE JONGH.** *Theosophist* 35, No. 10, July, 1914, separate, 1-35; *Chem. Zentr.* 1915, I, 519.—An attempt to bring modern chemistry to the aid of the clairvoyant discoveries of Besant and Leadbeater in "occult" chem. (1908). **E. B. MILLARD.**

Cyclical evolution of the chemical elements. II. **F. H. LORING.** *Chem. News* 111, 181-2(1915); cf. C. A. 9, 1413.—The speculations are resumed. Following L.'s idea that the elements are made up of mixts. of other "elements" with at. wts. which are whole numbers, Ne is imagined (on somewhat insecure ground) to be a mixt. of 10 ats. with at. wt. of 20 and one with an at. wt. of 22. This would be a mean at. wt. of 20.18, which is close to the accepted value. Cl is again assumed to be composite, contg. 10 ats. of wt. 35 and 1 with at. wt. of 40. **E. B. MILLARD.**

Reactions between two gases. **M. TRAUTZ.** Heidelberg. *Z. Elektrochem.* 21, 118-22(1915).—Theoretical. The mass action equation $k = \kappa \sqrt{T} \pi^{\pi} (c/e^{\pi})(1/e^{\pi})$

has been derived as a general case. (Details of the derivation are not given.) Here the power κ has the value $q_0/RT + \int_0^T dT/RT^2 \int_0^T c_p dT$; κ is a universal const. $10^{35} \pm 1$ for all reactions in which the course of the reaction is known, and is independent of wall-effects, etc. The Σq_0 for all such reactions is the sum of the heats of activation, and is const. for the reactions considered for all temps. (Cf. *Sitzb. Heid. Akad. Wiss.* (A) 1914, No. 1.)

E. B. MILLARD.

Potassium chloride concentration cells. D. A. MACINNES AND KARR PARKER. *J. Am. Chem. Soc.* 37, 1445-61 (1915).—Concn. cells of the type $\text{Ag} | \text{AgCl}, \text{KCl}(C_1) | \text{K}(\text{Hg})_x - \text{K}(\text{Hg})_x | \text{KCl}(C_2), \text{AgCl} | \text{Ag}$ have been measured at 25° , and the e. m. f. compared with cells in which transference took place. These cells were $\text{Ag} | \text{AgCl}, \text{KCl}(C_1) | \text{KCl}(C_2), \text{AgCl} | \text{Ag}$. With the same soln. in cells of both types, transference numbers were detd. as 0.498 from 0.5-0.05 *N*, 0.496 from 0.1-0.01 *N*, and 0.494 from 0.05-0.005 *N*; the Hittorf numbers for this range are 0.496, 0.496, 0.496. The measurements indicate that the "activities" of the ions from KCl are much lower than their concns. as calcd. from conductance measurements, but the activity approaches the same limit as the concn. at great dilns.

E. B. MILLARD.

Effect of light on chlorine water. A. BENRATH. *Z. wiss. Phot.* 14, 238 (1915).—A reply to Dawson's criticism (cf. *C. A.* 9, 748), denying its validity.

L. DERR.

Diffusion of carbon dioxide through rubber. V. RODT. *Chem. Ztg.* 38, 1249-51 (1914).—R. concludes that the diffusibility of gases through rubber depends upon the moisture content and the solubility of the gases in H_2O . The numerical values found in the literature for the diffusibility of gases through rubber vary, and R. considers them uncertain because the moisture content of the rubber was not considered.

EDWARD J. KELLEY.

Reciprocal solubility of liquids which are not miscible with water. W. HERZ. *Boll. chim. farm.* 54, 37 (1915).—The following figures represent the number of vols. of the substances indicated which are required to sat. 100 vols. of the solvent at 22° : CHCl_3 in H_2O , 0.420; H_2O in CHCl_3 , 0.152; CS_2 in H_2O , 0.174; H_2O in CS_2 , 0.961; ligroin in H_2O , 0.341; H_2O in ligroin, 0.335; Et_2O in H_2O , 8.110; H_2O in Et_2O , 0.930; benzene in H_2O , 0.082; H_2O in benzene, 0.211; amyl alc. in H_2O , 3.284; H_2O in amyl alc., 2.214; PhNH_2 in H_2O , 3.481; H_2O in PhNH_2 , 5.220.

H. S. PAINE.

Growing crystals for measurement. J. M. BLAKE. *Am. J. Sci.* 39, 567-70 (1915).—Attention is directed to the necessity of a carefully controlled temp. and slow rate of growth if large perfect crystals are to be formed. Some crystals may be grown from suspended smaller ones. Weeding out imperfect crystals was also mentioned.

E. B. MILLARD.

Method of reducing some metals in crystallized form on glass slips as permanent microscopic mounts. J. H. BOWMAN. London, Ont. *J. Am. Chem. Soc.* 37, 1468-71 (1915).—A 10% soln. of AgNO_3 was mixed with a concd. soln. of $\text{Zn}(\text{NO}_3)_2$ to prevent drying, and spread upon a slip. Fine Zn dust was then sprinkled over the soln. by filing a Zn rod over it, and crystals of the Ag commenced to form on the Zn particles. Satisfactory crystals of Ag, Au, Cu, Pb, Bi, and Cd were obtained by this method. Photomicrographs showing the crystals are given.

E. B. MILLARD.

Photochemical sensitiveness and photochemical conductivity. M. VOLMER. Leipzig. *Z. Elektrochem.* 21, 113-7 (1915); cf. *C. A.* 7, 1136, 3901; 8, 613.—Using the app. of Pauli (*C. A.* 7, 3900) the photoelec. effect has been measured for AgCl , AgBr , AgI , S, Se, P (yellow), Sb_2S_3 , Cl, Br, HgCl_2 , HgI_2 and several organic compds. There must exist a connection between photochem. sensitiveness and cond. The primary mol. change which is responsible for the cond. must be independent of the

state of aggregation of the substance. Anthracene (*c. g.*) shows the same resonance electrons whether in the solid, dissolved or gaseous state. Several theories are discussed, but no definite conclusion is reached.

E. B. MILLARD.

Progress of physical chemistry in 1914. W. HERZ. *Chem. Ztg.* 39, 133-5, 151-3 (1915).

J. H. MOORE.

Physicochemical kinetics. R. MARCELIN. *Ann. phys.* 3, 120-84(1915).—An extended mathematical discussion of kinetics. Formulas are derived for transformations at const. temp. An attempt was made to derive the expression for the speed of a reaction from the distribution law, and equations showing the influence of temp. on the speed of a reaction were given. Several applications were given, first the general case, then the sublimation of I, of $C_{10}H_8$, and the evapn. of $C_6H_5NO_2$. The mathematical treatment must be obtained from the original.

E. B. MILLARD.

Atoms and ions. J. J. THOMSON. *Engineering* 99, 413-5(1915); cf. *C. A.* 9, 1560.—Concluding lecture. The carriers of electricity in a gas could be charges or larger systems, and perhaps only the latter have sufficient energy to ionize the other mols. with which they collided. This was tested by expt., and it was shown that either the negative charges or the positive particles could split the mols. into ions. When a Ra salt was dissolved in H_2O , the gases given off contained less O than they should, and it was found that the O from the negative particles had gone to oxidize the H_2O , and peroxides were in soln.

E. B. MILLARD.

Mobilities of ions in air. E. M. WELLISCH. *Yale Univ. Am. J. Sci.* 39, 583-99 (1915).—Expts. have been made on the velocities of positive and negative ions in air under a variety of exptl. conditions. From 1 atm. to 0.05 mm. the mobility of the positive ion varied inversely as the pressure, showing that the nature of this ion remained essentially unchanged over this wide range of pressure. The negative carriers were of 2 kinds, electrons and ions, the former increasing in number relative to the latter as the pressure was diminished. Each kind possessed its characteristic velocity in an elec. field, and there was no evidence of the formation of any intermediate stage. Electrons appeared in measureable amts. at pressures below 80 mm. The negative ion remained unaltered over a range of pressure from 1 atm. to 0.15 mm. The view was expressed that all previous expts. on the velocity of ions at low pressures are based on the untenable assumption of the presence of an "average" ion and are thereby invalidated.

E. B. MILLARD.

Osmotic compressibility of emulsions and the influence of adjacent surfaces upon Brownian movements. R. COSTANTIN. *Ann. phys.* 3, 101-20(1915); cf. *C. A.* 8, 2514.—Two sets of expts., one on distribution with height and the other on av. condensation, showed that the law of van der Waals could be applied to concd. emulsions. There was evidence of the existence of a negative interior pressure, a repulsion between the grains of the emulsion which acted at distances of the order of their radii. The verification of the formula of van der Waals and the general theory of Smoluchowski shows that colloids have all the properties of fluids required by the kinetic theory. A value of Avogadro's N of 64.5×10^{23} was found.

E. B. MILLARD.

Osmotic pressure and concentration in solutions of electrolytes, and the calculation of the degree of dissociation. STUART J. BATES. *J. Am. Chem. Soc.* 37, 1421-45 (1915).—Assuming that the 2 ions of a di-ionic electrolyte behave similarly, and that the degree of dissociation can be calcd. from conductance and viscosity data, methods were developed and applied for computing the osmotic pressure of the ions of a salt. The osmotic pressure of an ion was in general a few % less than that calcd. from van't Hoff's law; that of an undissociated mol. was considerably greater; even at 0.0001 N the deviation was about 15%. The bivalent ions deviate from van't Hoff's law more

than the univalent ones. On the other hand, the undissociated mols. of the bi-bivalent salts obey that law rather closely. At concs. up to about 0.05 *N* the various univalent ions behave practically the same as regards their osmotic pressure-conc. relations; the same applies to the bivalent ions. The relation between osmotic pressure and concn. for both univalent and bivalent ions may be expressed by an equation of the form $d\pi/dC_i = RT(1 + bC_i^m)$. In dil. solns. a similar equation represents the undissociated mols. For KCl between 0.001 and 0.5 *N* the total pressure calcd. from such relations agreed with the exptl. values to within 0.10% on the average. Calcn. of the degree of dissoc. from f. p. data by the aid of the mol. number *i* assumes that both the ions and undissociated mols. are "normal," and hence is theoretically incorrect.

E. B. MILLARD.

The thermionic current. A. S. EYE. MCGILL UNIV. *Nature* 95, 174(1915).—A simple method is suggested for exptg. with the thermionic current; the equipment consists of a filament lamp silvered inside; a Pt wire which passes through the side of the glass and makes elec. connection with the belt of Ag, is connected to one terminal of a telephone receiver, the other terminal being connected to the water mains. With an a. c. at 110 v., a loud note is heard depending on the frequency of alternation. With a d. c. from a dynamo, there is sufficient variation in the voltage to obtain a sound just audible at 100, loud at 110, very loud at 130, and still louder at 140. Above 142 v. there is silence. In explanation of this result it is pointed out that the thermionic current does not increase with the temp. according to Richardson's law unless the vacuum is of a high order (Langmuir, *C. A.* 8, 1230). With a moderate vacuum the vol. charge between the filament and Ag causes the thermionic current to remain at a value nearly const. as the temp. is raised above a certain value. The thermionic current begins by obeying Richardson's law and then later approximates to a steady value. Thus at low voltages variations of voltage cause variations of temp. and consequent fluctuations of thermionic current heard through the telephone. Above 140 v., for the particular lamp used, a change of voltage and of temp. produces no change of current, and hence no sound can be heard in the phone.

W. H. ROSS.

The neutralization of adsorbed ions. W. D. BANCROFT. *J. Phys. Chem.* 19, 363-76(1915); see *C. A.* 9, 1265.

E. J. C.

Unique geophysical phenomenon, Trinidad asphalt, interesting from the point of view of dispersoid chemistry. CLIFFORD RICHARDSON. *J. Phys. Chem.* 19, 241-9 (1915).—A description of this asphalt from the point of view of dispersoid chemistry.

E. B. MILLARD.

Tyndall phenomenon. E. WILKE. Heidelberg. *Z. Elektrochem.* 21, 117-8 (1915).—By means of a polarization photometer (to be described later) it was shown that the intensity of light from a Tyndall cone changed with increasing thickness of the film of colloid according to an exponential law $I = I_0 \int_0^x e^{(\omega - x)} dx = (I_0 / \omega)(1 - e^{(\omega - x)})$, where *x* was the thickness of the film. Further, ω had an abnormally high value, about 200 times the value of β of the normal exponent of absorption. It was found that ω depended somewhat on the intensity of the light, and both ω and I_0 were governed by specific properties which characterized the colloid. The abnormal light weakening was found only when the wave length of the light radiated was the same as that of the original light source. There was a similarity between the light from the colloid and that radiated from a glowing body. The work will be continued.

E. B. M.

Thermal effect of solution. M. LEVAL-T-EZERSKII. *J. Russ. Phys. Chem. Soc.* 47, 177-85(1915).—The simple assumption that when soln. is accompanied by a contraction of vol. there is evolution of heat, while with dilatation of vol. there is absorption

of heat, is not borne out by expts. A correct relation between vol. changes and thermal effect of soln. is to be found by comparing the heat effect with the changes in vol. which take place when the soln. is made at different temps. Regarding dilatation as negative contraction, one has the following equation: $k = 1 - V/(v_1 + v_2)$, where k is contraction, V = vol. of soln., v_1 = vol. of solvent, and v_2 = vol. of solute. By comparing the values of k for solns. made at 2 different temps., it was found that in all the cases examd. there is evolution of heat when k increases with an increase of temp., and absorption of heat when k is smaller at the higher temp. This was corroborated by expts. with $MgCl_2 \cdot 6H_2O$, H_2SO_4 , K_2SO_4 , NH_4Cl , $CaCl_2 \cdot 6H_2O$, $Pb(NO_3)_2$, $NaNO_3$ and $ZnSO_4 \cdot 7H_2O$. The 1st 2 dissolve with evolution of heat, and the contraction of vol. (in some cases positive, in others negative) increases with the temp., while the other 6 compds. dissolve with absorption of heat, and k is smaller at the higher temp. For numerous other substances the above relation could not be verified, owing to a lack of data in the literature. For these another relation was established. On comparing the values of k at 2 different concns., but at the same temp., one gets, by subtracting the k for the greater from the k for the smaller diln., the value of k_1 , due to diln. at that temp. A similar comparison made at a higher temp., using the same initial and final concns., gives the value of k_2 , due to diln. at the higher temp. It was found that when for a given substance k_2 is greater than k_1 , that substance dissolves in H_2O with evolution of heat, and *vice versa*. This rule seems to hold good for substances which do not participate in the formation of vapor above the soln. Further work is promised.

H. M. GORDIN.

Viscosity of liquid mixtures. II. A. N. SAKHANOV AND N. A. RYAKHOVSKIY. *J. Russ. Phys. Chem. Soc.* 47, 113-33(1915); cf. *C. A.* 8, 1532.—Further expts. with numerous org. substances gave the following results: The viscosity η of a mixture of 2 non-interacting liquids having the viscosities η_1 and η_2 , resp., is given by the equation: $\eta = H - kx(1 - x)$, where x and $1 - x$ are the molar concns. of the components, $H = \eta_1(1 - x) + \eta_2x$, and k = const. The greater the difference between η_1 and η_2 the greater is k , i. e., the greater is the digression from the law of additivity. When the components do not interact chemically k is always positive. When there is interaction, e. g., ketones or ethers with the halogen derivs. of hydrocarbons, the viscosity curve is above that of non-interacting liquids. The character of the curve when there is interaction depends both on the intensity of the latter and the ratio $\eta_1 : \eta_2$. The varieties of curves are: the curve of Kurnakov and Zhemtchuzhnyi (*C. A.* 7, 1126), curves with max., convex curves, concave curves and straight lines. Many of the systems in which there is interaction also obey the above equation. This happens when the compd. produced is of simple compn., consisting of 1 mol. each of the components. Only halogen derivs. of the $CHCl_3$ type, i. e., such as are poor in H, ($CHCl_3$, $C_2H_2Cl_4$, C_2HCl_3) are capable of interacting with ketones or ethers.

H. M. GORDIN.

The total luminous efficiencies of present-day illuminants. H. E. IVES. *Phys. Review* 5, 390-4(1915).

E. J. C.

Calculation of the column correction for standardized thermometers. H. SCHLÜTER. Kgl. Materialprüfungsamt, Berlin. *Chem. Ztg.* 39, 177-8, 197-8, 202-4 (1915).—Descriptions of various methods with formulas for calcg. the corrections.

J. H. MOORE.

Characteristics of radiation pyrometers. GEORGE K. BURGESS AND PAUL D. FOOTE. *J. Wash. Acad.* 5, 233-4(1915).—(In full later as Sci. Paper, Bur. Standards.) The complete paper (about 100 pp., 32 figs.) contains an account of the principles which form the basis for the operation of total radiation pyrometers, descriptions of the various types of the instrument, and results of an exptl. study of their calibration and behavior under various conditions of use. The thermoelec. radiation pyrometer

follows the law $\epsilon = aT^b$ where ϵ is the e. m. f., T the abs. temp., and a and b are consts., b having a value ranging from 3.5 to 4.5. The somewhat selective absorption of the receiver is not of serious importance below 2500°. Galvanometers and auxiliary app., recorders, etc., as constructed at present, are not in general a source of serious error. The main errors lie indirectly in the receiving system and consist of stray reflection, convection currents, improper geometrical construction, dirt on mirrors, lag, focusing distance and size of source. With care temp. may be measured with accuracy of 5 to 10°, but the instruments as ordinarily used are likely to be in error by 50 to 100°. Methods of calibration (two primary and one secondary) are given. Proper methods of use of the instruments for both tech. and lab. practice are discussed. The detn. of total emissivity and the measurement of the temp. of nonblack materials are treated. Correction tables are given for use with molten Fe and Cu, oxides of Cu, Fe, and Ni, and Pt.

PAUL D. FOOTG.

Drop weight method for determining the surface tension of a liquid. J. L. R. MORGAN. *J. Am. Chem. Soc.* 37, 1461-7(1915); cf. *C. A.* 7, 3604, 3879; 8, 1041-2. —An outline of the exptl. conditions which must be fulfilled if the law of Tate is to hold. The tip must have a diam. of 4.5 to 5.5 mm., and the vol. of the drops from these tips must be at least 0.0196 and 0.0239 cc., resp. The actual tip diams. are not necessary for the calibration of the tip and are not used in it. The criticism of Lohnstein (*C. A.* 8, 1041) was unjustified. Drop weight and surface tension as found by the capillary rise method are proportional.

E. B. MILLARD.

Double bands in the residual rays of diatomic substances. W. C. MANDERSLOOT. Utrecht. *Physik. Z.* 16, 36-7(1915); cf. Rubens and Wartenburg, *C. A.* 8, 2302. —There is a close similarity between the double bands in the visible range bordering the ultra-red for gases and those of the residual rays of solid substances. This is explained by the linear vibrations of the electrically charged atoms perpendicular to the axis of rotation. Distances between atoms (l) calc. from the double bands of residual rays of diatomic solid substances and those calc. for gases with double bands are of the same order of magnitude. *E. g.*, the values of l obtained for CO, HCl and HBr, resp., are 1.14, 1.34 and 1.49×10^{-8} cm.; those for NaCl, KCl, KBr and AgCl, resp., are 1.67, 2.08, 1.31 and 1.46×10^{-8} cm.

E. B. MILLARD.

Influence of molecular constitution and temperature on magnetic susceptibility. III. Molecular field in diamagnetic substances. A. E. OXLEY. *Trans. Roy. Soc. London (A)* 215, 79-103(1915); see *C. A.* 9, 1426.

E. B. MILLARD.

An aneroid calorimeter (DICKINSON) 1. Collodion diffusion cell (BRIGGS) 1.

CRAIG, J. W. AND WOODWARD, W. P.: Questions and Answers about Electrical Apparatus. 3rd ed., revized. New York: D. Van Nostrand Co. 256 pp. \$1.50.

FINDLAY, A.: The Phase Rule and its Applications. 4th ed. London: Longmans, Green & Co. 6s.

Handbook of Chemistry and Physics. Cleveland, Ohio: Chem. Rubber Co. 322 pp. \$2.00.

JULIAN, H.: Memorial of Henry Forbes Julian. Philadelphia: J. B. Lippincott Co. 310 pp. \$2.50.

MICHAELIS, L.: The Dynamics of Surfaces. Trans. by W. H. Perkins. New York: D. Van Nostrand Co. 118 pp. \$1.25.

MORGAN, W. C. AND LYMAN, J. A.: An Elementary Text-book of Chemistry. New York: Macmillan Co. 429 pp. \$1.25.

NOYES, A. A. AND SHERRILL, M. S.: *A Course of Instruction in the General Principles of Chemistry*. Boston: Todd & Co. 130 pp. \$2.00.

PERKINS, F. M. AND JAGGERS, E. M.: *Text-book of Elementary Chemistry*. London: Constable & Co. 3s.

RANSOM, J. H.: *General Chemistry*. Lafayette, Ind.: Murphy-Bivins Co. 312 pp. \$1.75.

SMITH, S. W.: *Roberts-Austen, a Record of His Work*. Philadelphia: J. B. Lippincott Co. 382 pp. \$6.00.

TURNER, W. E. S.: *Molecular Association*. New York: Longmans, Green & Co. 170 pp. \$1.40.

VARLEY, T.: *Progressive Course of Chemistry*. 2nd ed. London: A. & C. Black. 2s, 6d.

WILLIAMS, R. H. AND WHITMAN, W. G.: *Laboratory Exercises in General Chemistry*. New York: American Book Co.

3. RADIOACTIVITY.

WILLIAM H. ROSS.

Practical methods for the determination of radium. I. Interchangeable electro-scope and its use. S. C. LIND. *Bur. Mines. J. Ind. Eng. Chem.* 7, 406-10(1915).—L. describes a new electroscope of very simple construction and made in 2 detachable parts, the upper the telescope and leaf system, and the lower the discharge chamber. The former can be used on any number of sep. lower parts. The method of procedure in making detns. by the emanation method is described. ISADOR MILLER.

Radioactive springs. H. VON HÖFFER. *Vienna. Intern. Z. Wasser-versorg.* 1, 52-5, 90-3(1914).—Data obtained by the several investigators, who use the Engler and Sieveking fontactoscope, show (1) that cold springs are more active than hot springs; (2) that waters high in salts are very low in activity; (3) that the presence of active or inactive minerals in the earth's strata influences the activity; and (4) that deep wells are more active than shallow wells. The results are only qualitative. C. S.

The intensity of X-ray spectra. DAVID L. WEBSTER. *Harvard Univ. Physic. Rev.* [2] 5, 238-43(1915).—A mathematical paper showing that the presence of the factor $\sin^2 \theta$ in Bragg's equation for the intensity of the reflection of homogeneous X-rays from a crystal indicates that the train of waves emitted by an atom in the radiator is short compared to the distance the rays travel through the crystal. G. L. WENDT.

Some secondary effects from Röntgen rays. PAUL T. WEEKS. *Cornell Univ. Physic. Rev.* [2] 5, 244-8(1915).—Gorton's anomalous observations (*C. A.* 8, 1700) are attributed to a general scattered radiation. It is necessary to screen a sensitive plate from all sides when in the vicinity of an active X-ray tube. A metal backing on the plate improves the contrasts by eliminating the scattered rays, but introduces secondary rays from the metal itself. The emission of secondary rays varies widely among different metals with the penetration of the primary rays. G. L. WENDT.

The extraction and purification of radium emanation. WILLIAM DUANE. *Harvard Univ. Physic. Rev.* [2] 5, 311-14(1915).—A description is given of a method for collecting daily accumulations of Ra Em, the app. for which consists of a small glass bulb containing a Ra salt in water soln. and connected to a large glass reservoir through a U-tube which functions as a stopcock when Hg is introduced from below. The Ra Em collects in the evacuated bulb and reservoir. Raising the Hg closes the bulb and forces the Ra Em from the reservoir into a system of purifying tubes. A partially

oxidized Cu wire coil is heated to redness electrically and serves to recombine the H and O formed from the water of the Ra soln.; about 0.13 cc. per millicurie of Ra Em are formed. P_2O_5 removes water and KOH the CO_2 . By means of another exhaustible reservoir, and U-tube connection, the purified Ra Em can now be drawn from the tube system and forced into any desired vessel. All contact with stopcock grease is avoided. The advantages of the method are: that the purification does not require liquid air; that a large number of millicuries of Em can be purified and compressed into a small fraction of a cu. mm., in 10 or 15 min. of time; that no Em is lost except that due to its natural decay; and that the process may be repeated a great many times without removing parts of the app. G. L. WENDT.

The absorption of homogeneous Röntgen rays. II. W. KOSSEL. *Verh. deut. physik. Ges.* 16, 953-63(1914).—On the basis of Bohr's atom model (C. A. 7, 3712; 8, 461), K. accounts for the appearance of fluorescence and the increase of absorption of X-rays at a frequency close to that of the second strongest line of the emission spectrum. The absorbed radiation is assumed to remove an electron from the innermost K-ring of the atom. Its replacement by an electron from the second ring is accompanied by an emission of energy which corresponds to the K- α line in the spectrum. This is itself replaced from the third ring, giving the L- α line, and the series is thus continued in the direction of longer wave-lengths until the outer valence-ring and visible light waves are attained. When replacement occurs from the third ring directly to the first, the emission corresponds to the K- β line, the frequency of which is expressed, both theoretically and practically, by $\nu_{K\beta} = \nu_{K\alpha} + \nu_{L\alpha}$; similarly, $\nu_{K\gamma} = \nu_{K\alpha} + \nu_{L\beta}$, etc. G. L. WENDT.

Ion clouds in moist expanded air. G. QUINCKE. Heidelberg. *Ann. Physik* 46, 39-67(1915); *Verh. deut. physik. Ges.* 16, 421-3(1914).—Detailed study of the plates of C. T. R. Wilson (C. A. 7, 932) shows, by analogy with Q.'s photographs of the "vegetation" of salts pptd. from soln., that the clouds formed by the expansion of ionized air have a foam structure, each bubble or chamber containing one or more ions in the form of an "oily" soln. Differences in the foam structure are due to surface tension differences with ions from different sources. The clouds are not composed of droplets; they do not fall vertically, nor with a constant velocity. This invalidates all detns. of the ionic charge by the cloud method. G. L. WENDT.

Polarization and index of absorption of Röntgen rays from platinum and carbon. H. KIRSCHBAUM. Aachen. *Ann. Physik* 46, 85-129(1915).—The intensity of X-radiation from a Pt anticathode is 17 times that from C at the same potential. The absorption-index measured photographically differs from that obtained with an ionization chamber because Ag and Br have a different selective absorption from N and O. The absorption in Al is greater for C radiation than for Pt in the ratio 100 to 77. Absorption varies rapidly with the tension between 12000 and 15000 v., but at higher voltages is stable. The azimuth varies slightly with the voltage below 25000 v.; but at 28000 v. it is about 66°. G. L. WENDT.

X-Ray photographs of the diamond. ERNST KELLER. Munich. *Ann. Physik* 46, 157-75(1915).—Analysis of Laue's, Friedrich's and Bragg's crystal photographs, confirms both Bragg's structure for the diamond (C. A. 8, 599) and Laue's theory that a crystal reflects from the continuous spectrum impinging upon it only the wave-lengths capable of passing between its lattice structure. The abnormally wide dispersion given by the diamond is due to its small lattice constants, its small absorption of the rays, and its wide deviation from the law of Dulong and Petit. G. L. WENDT.

A count of the electrons emitted from metal foils under weak Röntgen radiation. ERICH HOEPFNER. Univ. Greifswald. *Ann. Physik* 46, 577-604(1915).—The number

of electrons emitted by a Pt foil (as detd. by the collision-ionization method) per sq. cm. per sec. is $10 \times 10^{-10} i$, where i is the intensity of the X-radiation. This is $1/150$ of the value found by Carter (*Ann. Physik* 21, 995(1906)). The fact that electrons are emitted at once, without an induction period, is taken as proof that Sommerfeld's quantum theory (*C. A.* 6, 2029) is inapplicable, and that the energy of the electron is derived from the atom itself. The X-ray simply "calls forth" the already imminent explosion of the labile atom.

G. L. WENDT.

The production of Röntgen rays by slow cathode rays. ELIZABETH R. LAIRD. Univ. Würzburg. *Ann. Physik* 46, 605-22(1915); cf. Thomson, *C. A.* 9, 21.—By the use of a celluloid window the production of X-rays could be proved for primary potentials as low as 220 v. Below 450 v. the relation between the intensity of the X-radiation and the potential becomes irregular. The material of the anticathode has little influence on the intensity of the radiation. Expts. on the polarization of the rays and the velocity distribution of the secondary electrons were inconclusive. Whiddington (*C. A.* 7, 1671) considers that the production of X-rays at potentials lower than 200 v. is doubtful.

G. L. WENDT.

The radioactivity of minerals. I. Pyromorphite. M. BAMBERGER AND G. WEISSENBERGER. Vienna. *Monatsh.* 36, 169-74(1915).—The detn. of the Ra and Th content of various pyromorphites from Saxony and Hessen-Nassau shows the same variation in the Ra content and the same absence of U as was found by Danne in pyromorphite from Issy-l'Éveque. The Ra varies between 1.3×10^{-9} and 3.04×10^{-10} g. per g. Danne's suggestion that the presence of Ra is due to absorption from the radioactive ground waters is rejected, since crystalloids do not absorb from such very weak solns. The Ra is supposed to have been included in the crystals at the time of their pptn. The neighboring waters contain Ra but no U. The active crystals showed in every case a green color, the others being brown.

G. L. WENDT.

Adsorption and precipitation of the radioelements. F. PANETH. *Monatsh.* 36, 303-15(1915); see *C. A.* 9, 553.

E. J. C.

The behavior of the radioelements in precipitation reactions. II. K. FAJANS AND F. RICHTER. Karlsruhe. *Ber.* 48, 700-16(1915); cf. *C. A.* 8, 623.—The radioelements can be carried down very completely by other ppts., even though present in quantities far below the solubility value. The degree of extn. of Th B by numerous ppts. is parallel to the solubility of the Th B (or Pb) salts with the pptg. anion, being practically complete with the sulfide, carbonate and sulfate. But the solubility of the common metal ppt. also influences the degree of extn.; and incomplete pptn. of the common metal gives incomplete extn. of the radioelement. These data accord with Haber's theory of crystal growth (*Z. Elektrochem.* 20, 521(1914); cf. *C. A.* 9, 1264). If mols. in crystals are connected on all sides by partial valence bonds there is a layer of free valences at the surface of the crystals to which other mols. become attached. Isomorphous substances fit smoothly into the crystal lattice, forming solid soln.; but when a dissimilar mol. becomes attached, as (Th B)Cl₃ on AgCl, the crystal growth is arrested and adsorption results. Thus either solid soln. or adsorption removes the radioelement from soln. according to the nature of the main ppt.

G. L. WENDT.

The alpha radiation of bismuth from pitchblende. L. MEITNER. Berlin-Dahlem. *Physik. Z.* 16, 4-6(1915).—Fajans has proposed (*C. A.* 9, 1147) the hypothesis of a genetic relationship at the end of the Ra family according to the scheme, $Pb \xrightarrow{\beta} Bi \xrightarrow{\alpha} Tl$. Owing to the apparent long life of Pb and the weakness of its supposed β -radiation one would not expect to throw any light on the truth of the hypothesis by an exam. of the activity of Pb. But Bi might well show an α -ray activity that could be detected. Fajans and Towara (*C. A.* 9, 1147) made some expts. with Bi from Joachimsthal and

found evidence of such an α -radiation. A suspicion that this activity may have been due to an impurity led the author to further expts. with crude Bi from Joachimsthal ore. The purification of the Bi was first made by adding a small quantity of Th to act isotopically with the possible Io; and in fact on removing the Th the α -activity of the Bi was greatly reduced. A series of nine such sepn. reduced the activity to 0.1% of its original value, and even this small remainder of activity was found to have come from the Th and was removed by means of a Zr sepn. The conclusion was reached that Bi does not possess an activity that could be detected by the electroscope used, and certainly does not have an α -radiation of more than 1/10,000 that of U, and all conclusions drawn from its supposed α -activity are invalidated. S. C. LIND.

The magnetic spectrum of the beta rays of radiothorium and thorium X. O. v. BAEYER, O. HAHN AND L. MEITNER. Berlin-Dahlem. *Physik. Z.* 16, 6-7(1915).—The far-reaching parallelism in properties between the members of the Th and Act families which must exist according to the modern views of isotopism has already been demonstrated with respect to the α -radiations of corresponding members of the 2 families. In the β -radiations an apparent difference was reported by the authors (*C. A.* 6, 2356) in that a strong β -radiation was found for Radio-Act which seemed to be lacking in the case of Radio-Th. Since the method of photographing the magnetic spectrum is much more sensitive than the electroscopic method, the question of β -radiation has been again investigated for both Radio-Th and Th X. The latter for photographic purposes can be easily deposited electrolytically on a thin Pt wire as cathode. Radio-Th presents more difficulties and must first be sepd. from Th X and other decomp. products by repeated pptn. with ammonia, followed by addition of a small quantity of Ba salt which is electrolytically deposited with Radio-Th cathodically, using 50-100 v. and 0.01-0.02 amps. In this way a deposit equiv. in β -radiation to about 0.01 mg. of RaBr₂ was obtained on a length of wire of about 0.8 cm. and of 0.15 mm. diam. A 12 hr. exposition of this Radio-Th in a field of 100 Gauss gave a sharply defined reproduction of 2 lines due to β -rays of 0.51 and 0.47 of light velocity, resp. These 2 lines had previously been wrongly ascribed to Th X by the authors, but the discrepancy now is removed. The spectrum of Th X showed 2 strong lines, 0.72 and 0.63 of the velocity of light. S. C. LIND.

A variable resistance for radioactive measurements. M. SIEGBAHN. Univ. Lund. *Physik. Z.* 16, 10(1915).—The variable resistances that have been used in radioactive measurements all have the disadvantage that the electrical capacity also varies when the resistance is changed. S. proposes a vertical cylindrical condenser, consisting of 3 plates arranged horizontally like the 2 plates in an ordinary condenser except that the lower plate is split into 2 slightly sepd. halves, making 2 plates each of which has its own insulation through the case by means of which they are grounded separately. The upper circular plate is also carefully insulated and provided with a handle projecting up through the cover by means of which it can be horizontally rotated to any angle with respect to the 2 lower half-plates. A pointer extending out to the edge of the cover provided with a graduated circular scale provides for setting the plate at any desired position. The lower side of the upper plate is just half covered by a layer of the black oxide of U. It is then, by rotating this active half circle, charged to a suitable potential to produce satn. above the 2 half electrodes; the strength of the current in each of the latter varies in a complementary manner between a max. and minimum which differ from each other by about ten fold and enables the resistance to be varied at will between these limits without changing the electrical capacity. Except near the points of max. and minimum, the current varies proportionally to the angle of rotation. S. C. LIND.

Remarks upon the paper of B. Winawer and F. Pfeiffer on "branching sparks on

Röntgen tubes." B. THIEME. *Physik. Z.* 16, 15(1915); cf. *C. A.* 9, 552.—T. calls attention to his previous description of the same phenomenon under somewhat different exptl. conditions (*C. A.* 6, 1706). S. C. LIND.

The Röntgen ray spectrum of platinum. E. WAGNER. Munich. *Physik. Z.* 16, 30-2(1915).—W. expresses the view that the line spectrum of Pt photographed by Seemann (*C. A.* 9, 175) using a stationary salt crystal as reflecting surface was due to imperfections in the surface of the crystal magnified by its stationary position during the exposure. S. C. LIND.

Röntgen ray spectrography. H. SEEMANN. Würzburg. *Physik. Z.* 16, 32-3 (1915).—S. is not prepared to admit the correctness of Wagner's criticism (preceding abstr.) regarding the line spectrum of Pt. He maintains that the stationary crystal gives much sharper resolution of the lines and attributes the bands obtained when using rotating crystals as reflector to unavoidable vibration and consequent blurring and displacement. S. claims a perfect crystal in his original work and that the crystal employed must have been very defective to give the spectrographs obtained by Wagner. S. C. LIND.

The corpuscular radiation liberated in vapors by homogeneous X-radiation. H. MOORE. King's Coll., London. *Proc. Roy. Soc. London (A)* 91, 337-45(1915).—In a former paper (*C. A.* 8, 1059) it was shown that for C and O, the number of corpuscles liberated from an atom by a beam of X-rays was the same whether the atom is in combination or not. This conclusion has been extended to the cases of N, S and Cl, a close agreement being obtained for each of these in 2 or 3 different combinations, resp.; the values previously obtained for C and O have also been corroborated. In addition it is shown that the at. corpuscular radiation, *i. e.*, the corpuscular radiation from an atom, is approx. proportional to the 4th power of the wt. of the atom, the deviation in the observed values from this 4th-power law being of such a character as to suggest that they are merely due to exptl. errors. From the observations of Barkla and Simons (*C. A.* 6, 1242), and Barkla and Philpot (*C. A.* 7, 3077), it is shown that the coeff. of absorption of a beam of X-radiation in a gas is proportional to the quantity of electronic radiation liberated from the gas, and hence the X-radiation absorbed by an atom of a given element will also be proportional to the 4th power of the wt. of the absorbing atom. Recent expts. of Bragg and Pierce (*C. A.* 9, 21) show that a similar law holds good for elements in the solid state, and is therefore probably of universal application. It is therefore considered that it should be possible to calculate the absorption coeff. of any material, provided its homogeneous radiation is not excited. W. H. ROSS.

Brit., 1,173, Jan. 15, 1914. E. EBLER. Radium and mesothorium salts. Crude sulfates containing Ra or Meso-Th sulfates are reduced to sulfides by heating with CaC_2 or its ingredients. The reaction may be effected without heating if a part of the carbide is replaced by CaH_2 , Ca, Mg, Al, or other substance that will react with sulfates in the manner of an aluminothermic mixt.; or CaH_2 or Ca together with an equiv. quantity of a sulfate, may be added to the mixt. of CaC_2 and crude sulfates. The reduced mass is dissolved in H_2O , HCl , or HOAc , and the Ra or Meso-Th and Ba are pptd. by satg. the soln. with HCl or HNO_3 . Practically all the Ra or Meso-Th salt is deposited before the whole of the Ba salt. Cf. *C. A.* 9, 1150.

4. ELECTROCHEMISTRY.

COLIN G. FINK.

Progress of the electrochemical industry. K. ARNDT. *Chem. Ztg.* 39, 39-41 (1915); cf. *C. A.* 8, 2980. J. H. MOORE.

The electric power industry. DAVID B. RUSHMORE. *Gen. Elec. Rev.* 18, 427 (1915). C. G. F.

Otto Sackur. HANS PICK. *Chem. Ztg.* 39, 13(1915); W. HERZ. *Physik. Z.* 16, 113-5(1915). J. H. MOORE.

Electric melting of ferro-alloys. R. S. WILE. *Iron Age* 95, 1068-9(1915).—Addition of melted alloy is preferred because the temp. of the metal in the ladle is not reduced, and the metal is saved. The elec. furnace is best adapted to melting the alloys. See C. A. 9, 1581. H. V. MAIN.

Steel from ore. C. OTTO. *Feuerungstechnik* 3, 129-31(1915).—A criticism of a process for producing steel directly from the ore by means of an elec. furnace as advanced by Humbert and Hethey (cf. C. A. 8, 2848). H. R. GUNDLACH.

The fixation of atmospheric nitrogen. W. S. LANDIS. *Met. Chem. Eng.* 13, 213-20(1915); *J. Ind. Eng. Chem.* 7, 433-8(1915); *Am. Fertilizer* 42, No. 9, 21-6(1915).—An illustrated lecture. The present com. methods of N fixation are first described. The cyanamide reaction and the properties, uses, and manuf. of cyanamide are then taken up with special reference to the Niagara Falls plant of the American Cyanamid Co. The plant at present has an output of 64,000 tons of cyanamide per year. The CaC_2 required is manufactured in eight 20-ton, 3000 h. p. three-phase continuous electric furnaces. The lime is burned in twelve Doherty-Edwards lime-kilns operated with induced draught. N was formerly obtained from air by absorbing the O_2 in Cu sponge which was then regenerated by coal-gas. The latest extension is supplied with N_2 obtained by the fractional distn. of liquid air produced by the Claude process. The coal-gas plant, which furnishes part of the coke needed for the carbide, has a capacity of 500,000 ft. per 24 hrs. The retort benches are run very hot to produce a gas rich in H_2 and coke low in volatile matter. The cyanamide reaction is carried out in small individual ovens holding 0.5-2.5 tons of carbide each. The product from the ovens analyzes about 22% N and 1% un-nitrified carbide. This material is ground, partially hydrated to decompose carbide, oiled to render dustless, and then is ready for use in mixed fertilizers. The production of other N compds. from cyanamide is discussed briefly. Many illustrations of plant details are given. F. A. STRAUSS.

The cyanamide process. FRANK S. WASHBURN. *Met. Chem. Eng.* 13, 309-14 (1915); *Elec. World* 65, 729(1915); see C. A. 9, 1362. F. A. S.

The cathodic deposition of metals in the presence of organic bases. I. Zinc. ARRIGO MAZZUCHELLI. *Univ. Rome. Atti accad. Lincei* 23, II, 503-8(1914).—M. recently observed (C. A. 9, 1008) that quinine has the same effect as gelatin and other colloids on the cathodic deposition of Sb and now reports the same effect with other organic bases. The electrolytic ptn. of Zn from portions of solns. of 150 g. cryst. $\text{ZnSO}_4 + 50 \text{ g. } (\text{NH}_4)_2\text{SO}_4$ in 1 l. H_2O was studied. An As-free Zn rod was the anode and a brass plate the cathode. Quinine, cinchonine, quinoline, dimethylaniline, α -naphthylamine, lutidine, aniline and pyridine were the bases added. In general when a small amt. of the base was added, or, in all cases during the first moments of electrolysis, a uniform, homogeneous, fine-grained deposit of microscopic crystals was formed. On continuing the electrolysis or with larger c. d. the Zn is sepd. unevenly in cryst. warts. In the case of gelatin the first effect is more pronounced. The mechanism of the process in general is this: the base or its cation is absorbed by the metallic granules that are first pptd. and keeps the granules fine according to the theory of Muller and Bahntje. On continuing the electrolysis the organic compd. covers the cathode like a varnish and makes it passive except at a few thinly covered spots. At these the deposition continues and produces the warty deposits. It depends on the amt. of the base absorbed in the beginning, on its capacity for redissolving in part

and on its greater or less impermeability whether the favorable influence exercised at first is changed to a harmful one. Since no similar retardation of the rate of soln. of the Zn anode takes place, the electrolytic soln. of the anode is an irreversible process in the presence of organic bases; a soln. containing such a base when electrolyzed between 2 Zn electrodes will give a continuous stream of H_2 with an a. c. (42 cycle). Measurements showed that this evolution of H proceeds at an overvoltage of 0.130-0.180 v. The author intends to extend the expts. to various bases and metals. II. *Ibid* 626-33. M. here reports quant. data. A careful review is given. M. has measured the voltage during the passage of a current of known d. and also the voltage when the soln. is at rest, using a Zn coated brass cathode and a solid Zn anode in the $ZnSO_4 + (NH_4)_2SO_4$ soln. The expts. were made at 11° in contact with the air, without a diaphragm, but with constant stirring. The electrode potential was measured by the usual compensation method, using a Weston cell and measuring the v. between the electrode and a 9% Zn amalgam in an equiv. N $ZnSO_4$ soln. The $ZnSO_4$ soln. was electrolyzed without additions, with 5×10^{-5} parts of quinoline sulfate, with 5×10^{-4} parts quinine bisulfate and with 1% quinine bisulfate and with 1×10^{-4} gelatin under various c. d.'s and at a max. v. of 0.022. The potentials of the anode and cathode were measured before passing the current, during the passage of the known current and after shutting off the current. The individual potentials are higher during electrolysis than when the soln. is at rest. With gelatin the excess potential is comparatively small which is in accordance with the fact that it shows less tendency to give a warty deposit.

E. J. WITZEMANN.

The electric lamp industry. G. F. MORRISON. *Gen. Elec. Rev.* 18, 497(1915).—Illus. In 1914, 110,000,000 incandescent lamps were made in U. S., 250,000,000 in the world. In 1881, the world's production was 35,000 lamps. Historical data are included.

C. G. F.

A brief review of the electric lighting industry. C. W. STONE. *Gen. Elec. Rev.* 18, 439(1915).

C. G. F.

Carborundum cutout for series tungsten lamps. H. LUX. *Z. Beleuchtungsw.* 21, 4(1915).

C. G. F.

Unit of candle power in white light. C. C. PATERSON AND B. P. DUDGING. *Electrician* 75, 251(1915); *J. Gas Lighting* 130, 448-9(1915).

C. G. F.

Direct measurement of power factor. R. D. GIFFORD. *Electrician* 75, 47-50, 82-5(1915).

C. G. F.

Determination of phosphorus pentoxide in limestones (for carbide factories) (HINDEN) 7. Luminous efficiencies (IVGS) 2. Electrical coagulation 30. Combating dust by electrical precipitation (SCHMIDT) 20.

BEDDELL, F. AND PIERCE, C. A.: *Direct and Alternating Current Manual with Directions for Testing and a Discussion of the Theory of Electrical Apparatus.* 2nd ed. New York: D. Van Nostrand Co. 360 pp. \$2.00.

BENNETSCH, A.: *Economic Importance of Peat Bogs and Water Power in Relation to the Fixation of Atmospheric Nitrogen (German).* Berlin: F. Siemenroth. 229 pp. 6.50 M.

CUSHING, H. C., JR.: *Standard Wiring for Electric Light and Power. As Adopted by the Fire Underwriters of the U. S.* 21st ed. New York: D. Van Nostrand Co. 224 pp. \$1.00.

MCBAIN, J. W.: *The Electro-Chemistry of Non-Aqueous Solutions.* New York: Longmans, Green & Co.

U. S., 1,139,686, May 18. M. H. KEYT. Apparatus for cleaning and removing tarnish from metals electrolytically. Cf. C. A. 9, 1009.

U. S., 1,140,135, May 18. B. E. ELDRED. Making leading-in wire for electric incandescent lamps, etc., of a desired coefficient of expansion, by forming the wire from a core of Ni-Fe alloy (having a lower coeff. of expansion than desired) coated with a sheath of Cu (which has a coeff. of expansion higher than desired in the wire). The thickness of the sheath, relative to that of the core, determines the coeff. of expansion of the composite wire.

U. S., 1,140,136, May 18. B. E. ELDRED. Copper-coated nickel-steel wire for use as leading-in wire of electric incandescent lamps. The core and coating are welded together and their relative thicknesses are so proportioned that the wire has a lower rate of expansion than Pt.

U. S., 1,140,403, May 25. C. B. SCHOENMEHL. Primary battery negative electrode in plate form, composed of compressed CuO enclosed within retaining walls of wire gauze. The latter is coated with CuO to form a smooth surface on the plate.

U. S., 1,140,682, May 25. N. V. HYBINETTE. Treating copper sulfide ore containing iron. The ore is mixed with about 2-5% of Na₂SO₄ and the mixt. roasted and leached with dil. H₂SO₄. The soln. obtained is electrolyzed to sep. the Cu, form free H₂SO₄ and convert the FeSO₄ into Fe₂(SO₄)₃. The electrolyte is repeatedly used for leaching fresh roasted ore-sulfate mixt. after electrolysis until it is highly charged with Na₂SO₄. It is then mixed with raw ore and the mixt. roasted to eliminate excess of Fe from the soln. without removing other valuable metals. Cf. C. A. 9, 438.

U. S., 1,140,826, May 25. W. HOPPIE. Primary "dry" battery with a casing of laminated cardboard lined with Zn foil and reinforced with wound wire embedded in the cardboard. An electrolyte formed of glycerol 1, gelatin 8, NH₄Cl 8, AlCl₃ 2 and ZnCl₂ 8 parts is used in part but the main filling of the battery is made from MnO₂, C, ZnCl₂, NH₄Cl and HgCl₂, covered with a layer of sawdust and sealing compd.

Brit., 441, Jan. 7, 1914. H. F. BIGGE and F. R. BUTT. A mercury-jet interrupter.

Brit., 570, Jan. 8, 1914. J. HARDEN. Induction furnaces have their primary coils arranged so as to counteract the ordinary leakage field and thus to prevent "rolling" of the molten charge, by gradual widening of the coils above and below the bath.

Brit., 742, Jan. 10, 1914. F. KRUPP AKT.-GES. In electric furnaces, a charge is mixed by means of a magnetic field traversing the whole or most of its surface approximately perpendicularly, a. c. being employed for heating, or superposed on a direct heating current. The invention is applicable to steel and other smelting furnaces, to elec. furnaces, to fused-salt furnaces for hardening, and to the elec. heating of heads of castings in order to reduce piping and crystn. and the quantity of metal required.

Brit., 754, Jan. 10, 1914. HENKEL ET CIE. A cathode for use in an electrolyte containing O dissolved under pressure, as described in 8,582, 1913 (C. A. 8, 3155), consists, according to the present invention, of Ag-Hg or Cu-Hg.

Brit., 1,062, Jan. 14, 1914. SVENSKA ACKUMULATOR AKTIEBOLAGET JUNGNER. Positive electrodes for alk. accumulators, are made from higher O compds. of Ni, mixed with dry finely-divided substances such as beet sugar, Zn, or Al, by which they are reduced to lower oxides on immersion in H₂O or alkali or other suitable liquid, immediately before the accumulator is charged for the 1st time. Cf. C. A. 9, 1585.

Brit., 1,252, Jan. 16, 1914. GEN. ELEC. CO. An oxide of P, preferably P₂O₅, is placed in a metal filament lamp to prevent blackening, any deposit being colorless.

The P_2O_5 may be crystalline or amorphous, or fused by heating under pressure, the last named variety having a lower vapor pressure than the others.

Brit., 1,437, Jan. 19, 1914. E. F. K. HARBECK. A soln. of ferrous silicofluoride or fluoride is used for the production of malleable iron from anodes of wrought, cast, or scrap Fe or steel. Such an electrolyte is not rapidly oxidized, remains neutral, and can dissolve any basic salts which may be formed. A soln. containing 100-175 g. of Fe per l. may be electrolyzed at a temp. of 70-80° with a c. d. of 200-300 amp. per sq. dm. The cathode or electrolyte may be moved. The silicofluoride or fluoride may be produced in the electrolyte from the acid and metal in other forms.

Fr., 469,045, Feb. 12, 1914. J. H. LIDHOLM and DETTIFORS POWER CO., LTD. Calcium cyanamide. See C. A. 9, 686.

Fr., 469,046, Feb. 12, 1914. J. H. LIDHOLM and DETTIFORS POWER CO., LTD. In mfg. calcium cyanamide, the reaction is completed instantly at 1500°. In order that the molten cyanamide may have no action upon the reaction mass, the carbide is introduced as a dust into the current of N heated to 2000°, and the cyanamide falls into a cooled chamber.

Ger., 281,144, June 20, 1912. BROCKDORFF-WITZENMANN. Electrical heating apparatus, the heating element of which forms the rotor of an asynchronous motor.

5. PHOTOGRAPHY.

LOUIS DERR.

Retardation of development by sodium phosphate. H. LÜPPO-CRAMER. *Phot. Korr.* 52, 35-6(1915).—A marked retardation (about equal to that produced by K citrate) is caused by adding Na_2HPO_4 to either hydroquinone or pyro developers.

L. DERR.

Acceleration of reduction of ferrous sulfate-silver salts by acids. H. LÜPPO-CRAMER. *Phot. Korr.* 52, 36-7(1915).—The acceleration of development caused by acetic acid is the more remarkable because oxalic and tartaric acids have the opposite effect.

L. DERR.

Testing of paper for the blue print process. E. VALENTA. *Phot. Korr.* 52, 57-8 (1915).—One part green ammonio-ferric citrate in 4 of water is added to 1 of $K_4Fe(CN)_6$ in 7 water, and the whole diluted 3- to 4-fold. Strips of the paper to be tested are immersed in the soln., which is then brought to a boil. Good paper will show little or no blue coloration; unsuitable paper will be more or less strongly dyed blue.

L. DERR.

Developers giving brightly tinted images on silver bromide dry plates. E. VALENTA. *Phot. Korr.* 52, 58-60(1915).—The best results were obtained by the following: 0.5 g. hydroquinone, 4 g. Na_2SO_3 crystals, 6 g. $(NH_4)_2CO_3$, 100 cc. water. This gives a practically white image, which on a black background shows good gradation and no fog. Pyrocatechol and glycine are less satisfactory. These are available for tintype work.

L. DERR.

4-Hydroxyphenylmethylglycine as a developer. E. VALENTA. *Phot. Korr.* 52, 90-2(1915).—In developing properties, this new Agfa product lies between metol and glycine. It gives clear negatives of good gradation, and is well adapted to both gelatin and collodion plates.

L. DERR.

Photography, American Annual of, 1915. Vol. 29. London: Routledge. 3s. 6d.

Photomicrography. 3rd ed. London: Kodak, Ltd. 36 pp. 3d.

PIZZIGNELLI, G.: *I processi fotografici.* Milano: 398 pp. 4 L.

U. S., 1,139,633, May 18. R. G. BRADSHAW and J. C. LYELL. Preparing films for color photography and cinematography. Different colors, preferably green and red, are applied to the opposite sides of the film and then portions of the color, in narrow parallel stripes, are scraped away so as to leave alternate lines of different colors.

U. S., 1,139,679, May 18. F. W. HOCHSTETTER. Mixture for restoring brittle, scratched or dust-specked moving picture films; composed of glycerol 1, ether 0.5, spirits of camphor 2 and petrolatum 6 parts.

U. S., 1,139,680, May 18. F. W. HOCHSTETTER. Mixture for restoring brittle, scratched or dust-specked moving picture films; composed of alc. 2, glycerol 1, ether 0.5, camphor 0.625 and beeswax, paraffin, tallow, lard or spermaceti 6 parts.

U. S., 1,139,681, May 18. F. W. HOCHSTETTER. Mixture for restoring brittle, scratched or dust-specked moving picture films; composed of glycerol 1, ether 0.5, spirits of camphor 2 and olive oil, linseed oil, naphtha or other oil 6 parts.

U. S., 1,139,682, May 18. F. W. HOCHSTETTER. Mixture for restoring brittle, scratched or dust-specked moving picture films; composed of alc. 2 and lard or other unguent 6 parts.

U. S., 1,139,683, May 18. F. W. HOCHSTETTER. Mixture for restoring brittle or scratched moving picture films; composed of ether 1 and paraffin, tallow, spermaceti or other unctuous substance 6 parts.

6. INORGANIC CHEMISTRY.

H. I. SCHLESINGER.

Graphite, diamond and amorphous carbon. W. A. ROTH AND H. WALLASCH. Greifswald. *Z. Elektrochem.* 21, 1-5(1915); cf. *C. A.* 7, 2507.—Additional measurements, now including 15 different specimens of graphites, confirm the higher heat of combustion of diamond (7869 ± 3). Two varieties of graphites are now with certainty differentiated: α (7830-40), which includes natural graphites, formed probably at high pressure and moderate temp.; β (7856), including all artificial graphites (high temp., low pressure). A very pure but imperfectly cryst. specimen from Ticonderoga gave 7848 ± 1 , independent of preliminary treatment for removal of impurities, indicating either a third variety or a mixt. of the α and β varieties. Pure, amorphous, thermally well defined carbon cannot be prepd. A qual. discussion of the stability relations of the various forms of C is presented; more definite data on the compressibilities are required before the equil. conditions can be accurately defined. The distinction between α and β graphites is in no way related to the older distinction of graphite and graphitite.

A. R. MIDDLETON.

Photochemical reactions of compounds of the rarer elements. A. BENRATH. *Z. wiss. Phot.* 14, 217-22(1915).—Thallium bromide and iodide are unaffected by exposure to light; TiCl_3 either dry or under water, assumes a brown color, due probably to the formation of the insol. sesquichloride $\text{TiCl}_3 \cdot 3\text{TiCl}$. Reducing agents, such as oxalic, tartaric and citric acids, and alcohols reduce Tl halides to metal, the chloride rapidly though incompletely, the bromide less rapidly, and the iodide very slowly; the sulfate is stable. Oxalic acid is reduced by TiCl_3 into CO_2 and H in 3 stages. Thallous salts are more easily reducible than thallic salts. The reduction of Ce salts is accelerated by light. Titanium oxide, sulfate and tetrachloride in alc. or $(\text{COOH})_2$,

slowly turn blue or brown, as simple or complex salts are formed. Compds. of Te and Se are reduced by $(\text{COOH})_2$ to metal, and SO_2 is slowly reduced to S. Iridium ammonium chloride slowly dissolves in $(\text{COOH})_2$, giving first a brown tint, then a clear soln. with black Ir powder.

L. DEER.

Action of titanium tetrachloride on organic compounds containing oxygen (ROSENHEIM) 10.

7. ANALYTICAL CHEMISTRY.

E. G. R. ARDAGH.

Gibbs medal award. W. D. HARKINS. *J. Ind. Eng. Chem.* 7, 449(1915).—Presentation address. J. STIEGLITZ. *Ibid* 7, 449-50.—Address of acceptance. A. A. NOYES. *Ibid* 7, 450-1(1915).

ISADOR MILLER.

The preparation of a finely porous asbestos filter and its use. J. GROSSFELD. *Z. Nahr-Genussm.* 29, 67-8(1915).—G. advises the use of com. infusorial earth (which has been ignited and boiled with HCl) over the asbestos mat in the Gooch crucible. He finds that a crucible so prepared will filter BaSO_4 pptd. in the cold, S from thiosulfate, etc. He recommends its use in the detn. of Ca as $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$, which can be filtered directly and dried at 120° and weighed as such.

H. L. LOURIE.

The value of counting particles of finely divided substances. CURT KÜHN. *Z. angew. Chem.* 28, I, 126-8(1915).—The Zeiss-Thoma hemacytometer employed in counting blood corpuscles may be used to advantage in examg. paint pigments and similar substances. A sample of 1-5 g. is shaken for 15 min. in a 10 cc. measuring cylinder with the proper liquid (turpentine, glycerol, H_2O or hydrocarbons) and 0.01 cc. of this removed with a micro-pipet. This is dild. to 1 cc. and shaken for 15 min. One drop of this is put upon the object glass and allowed to stand from 1 to 12 hrs. to settle. The best results are obtained with 10-20 particles to 0.00025 of a cu. mm. The method is adapted to the detn. of the efficiencies of grinding machinery and of ignition processes, to the grading of paint pigments, to the estn. of impurities in dry mixtures, and the like, as well as to measurement of the vol. and wt. of single particles. The order of magnitude of measurable units reaches 1 g. = 2000×10^8 .

H. L. OLIN.

Metal titration with arsenic acid. J. VALENTIN. Tilsit. *Z. anal. Chem.* 54, 76-89(1915).—The method is based on the pptn. of the metal as an insol. arsenate with excess K_2AsO_4 soln., and titration of the excess in an aliquot portion of the filtrate. Mg is pptd. as $\text{MgNH}_4\text{AsO}_4$; the best conditions for the estn. of up to 0.04 g. Mg are to add to 50 cc. standard 1% K_2AsO_4 soln., 10 cc. 10% NH_4OH soln., 10 cc. 5% NH_4Cl soln., heat to boiling, add the Mg soln., let stand 2 hrs. and titrate. For Ca, pptd. as $\text{CaNH}_4\text{AsO}_4$, add to 50 cc. K_2AsO_4 soln. 10 cc. 10% NH_4OH , filter and titrate after 24 hrs. In each of the above cases excess acid must be removed by evapn. before the titration. For Sr and Ba the procedure is the same as for Ca, except that the soln. may be titrated after 12 hrs., and that excess acid may be neutralized by evapn. Zn and Cd are pptd. as $\text{Zn}_3(\text{AsO}_4)_2$ and $\text{Cd}_2(\text{AsO}_4)_3$, resp.; to 50 cc. arsenate soln. add 0.5 g. NaHCO_3 and 10 cc. of the acid-free (neutralize with NaHCO_3) Zn or Cd soln., containing up to 0.1 g. Zn or 0.2 g. Cd, titrate after a few min. Pb is pptd. as PbHAsO_4 ; add NH_4OH to the Pb soln., containing up to 0.3 Pb, until alkaline, acidify with AcOH , add to 50 cc. 1% arsenate soln. and titrate after 3 hr. Bi is pptd. as BiAsO_4 in the presence of a little free HNO_3 ; free HCl or H_2SO_4 give low results. Al is pptd. as $\text{Al}(\text{AsO}_4)_2(\text{OH})_3$; make the Al soln., containing not more than 0.05 g. Al, ammoniacal, acidify with AcOH , add 50 cc. 1% arsenate soln. containing 5 g. NaOAc , and titrate

after 12 hrs. Cr is pptd. as CrAsO_4 ; make the Cr soln. alk. with NH_4OH , acidify with AcOH , add 50 cc. arsenate soln., heat 10 min., cool, titrate. Mn is pptd. as $\text{MnNH}_4\text{AsO}_4$; add the Mn soln., containing up to 0.1 g. Mn, to 50 cc. arsenate soln., add a few cc. 5% NH_4Cl , neutralize carefully with NH_4OH , heat 30 min. on the water bath to remove excess NH_4OH , cool and titrate. Ni and Co are pptd. as HNiAsO_4 and HCoAsO_4 ; add the soln. containing not more than 0.05 g. Ni or Co to 50 cc. arsenate soln. containing 10 g. NaOAc , heat 1 hr., cool and titrate. Results given are in general a little low.

G. W. MOREY.

Analysis of nitrites. N. BUSVOLD. *Chem. Ztg.* 39, 214(1915).—B. proposes the following modification of Raschig's method: Add 50 cc. 0.1 N KMnO_4 to 34–35 cc. of nitrite soln. (5 g. per l.) and acidify with 20 cc. 0.2 N H_2SO_4 added drop by drop with shaking. Allow the soln. to stand 2–3 min. to complete the oxidation of HNO_2 , add 5 cc. of 10% KI soln. and titrate the free I_2 with 0.7 N $\text{Na}_2\text{S}_2\text{O}_3$ of which not more than 1–3 cc. should be used. The acid must be added with care; no evolution of oxides of N (indicated by starch iodide paper) must take place. As an alternative B. uses the (AgBrO_3) method; cf. C. A. 8, 1250.

H. L. OLIN.

The separation of the alkaline earth metals and the alkalis. R. GILMOUR. *Chem. News* 111, 217(1915).—Evap. the filtrate from the Fe group to dryness and ignite residue. Dissolve in 10 cc. H_2O with 2 drops of HCl . Heat to boiling. Add 5 cc. NH_4Cl soln., 5 cc. NH_4OH and 10 cc. $(\text{NH}_4)_2\text{CO}_3$ soln., heat for a few min., filter and wash. Filtrate = Group V. Ppt. = BaCO_3 , SrCO_3 and CaCO_3 . Dissolve the ppt. in 4 cc. hot AcOH , neutralize with NH_4OH and add an excess of 2 cc. AcOH . Dil. to 20 cc., heat to boiling and add an excess of K_2CrO_4 soln. Heat for 2 min. and filter. Ppt. is BaCrO_4 . Heat filtrate to boiling, add $(\text{NH}_4)_2\text{CO}_3$ soln. until soln. is yellow and then 4 cc. excess. Heat for a few min., filter and wash. Ppt. is SrCO_3 and CaCO_3 . Dissolve in hot AcOH and make alk. with NH_4OH . The vol. of the soln. should now be about 4 cc. To half the soln. add a satd. soln. of CaSO_4 and heat to boiling. Ppt. is SrSO_4 . To the other half add a strong soln. of $\text{K}_4\text{Fe}(\text{CN})_6$ and boil. Ppt. is Ca K ferrocyanide. Evap. filtrate containing Group B to 10 cc. Add 4 cc. $(\text{NH}_4)_2\text{CO}_3$ soln. and 15 cc. EtOH . Allow to stand 15 min. Rub with glass rod if necessary to start crystn. Ppt. is MgCO_3 . Identify K and Na in filtrate as usual.

E. W. BOUGHTON.

A new method for the analysis of the copper and tin groups. R. GILMOUR. *Chem. News* 111, 206–8(1915).—The objectionable features of existing methods are discussed. An outline of G.'s new method is as follows: Ppt. the metals of Group II as usual with H_2S . Treat the sulfides with boiling 5 N HCl , which decomposes all except HgS , CuS and As_2S_3 . Sep. the As_2S_3 by treating with NaOH . Boil the filtrate containing Pb, Cd, Sn, etc. to remove H_2S , add 15–20 cc. of H_2O_2 soln. and evap. the mixt. nearly to dryness to remove excess of acid. Any Sn^{IV} is in this way oxidized to Sn^{IV} . Dissolve the residue in H_2O and ppt. the metals with H_2S . Remove Sb_2S_3 and SnS_2 by treatment with NaOH . In sepg. Bi and Pb advantage is taken of the insolubility of BiCrO_4 and the solubility of PbCrO_4 in NaOH . Details for detecting all the metals of Group II are given.

E. W. BOUGHTON.

Precipitation of phosphorus as ammonium phosphomolybdate in the presence of sulfuric acid. K. G. FALK AND KANEMATSU SUGIURA. *J. Am. Chem. Soc.* 37, 1507–15(1915).—The ppt. of NH_4 phosphomolybdate in the presence of H_2SO_4 (as in Neumann's method) contains sulfate, apparently as an essential part of the mol., together with excess of MoO_3 and no HNO_3 . The comp. of this phosphosulfomolybdate ppt. may vary with the concn. of the different constituents of the soln. For a certain set of conditions the ppt. was found to be $4[(\text{NH}_4)_3\text{PO}_4 \cdot 12\text{MoO}_3] + (\text{NH}_4)_2\text{SO}_4 \cdot 5\text{MoO}_3$.

E. B. MILLARD.

After-coloring in iodometric titrations. A. KOLB. *Chem. Ztg.* 39, 299-300(1915); cf. C. A. 2, 2525; Müller, C. A. 9, 768. J. H. MOORE.

Application of entrainment reactions to the detection and determination of traces of substances in mixtures; application to researches on the toxicology of lead. G. MEILLÈRE. *Ann. chim. anal.* 20, 73-7(1915).—A general discussion of the application of entrainment to chem. analysis is given. M. states that he has been able to det. Hg in chloride waters by adding a salt of Cu and pptg. with H_2S , subsequently sepg. the Cu and Hg in the ppt. If a Zn salt is used instead of Cu, the subsequent sepn. of Zn and Hg can be conveniently made electrolytically. Similarly Zn in a water was detd. by pptg. with Fe or Cu, finally sepg. the Zn electrolytically. The detn. of Pb in waters is made as follows: Add to the sample exactly 25 g. of a Cu salt for each liter of sample. Pour the soln. into the pptn. flask and rinse the original container with 10 cc. of HCl for each liter of sample. Pass H_2S into the cold soln., at first avoiding an excess. Finally warm on the steam bath and pass in a rapid current of H_2S . Filter through a pad of filter paper or asbestos and wash with warm H_2O . Dissolve the ppt. in concd. HNO_3 and evap. the soln. to dryness, finally heating until the $Cu(NO_3)_2$ is all decompd., thus destroying org. matter. Add HNO_3 and electrolyze a soln. containing not more than $1/11$ its vol. of free HNO_3 at a temp. not above 40° , using about 2 v. and less than 0.2 amp. Spirals of Pt wire weighing 2-4 g. may be used as electrodes. When Pb is pptd. with CuS in dil. HCl soln., as above, Zn, Fe and Mn, if present, are not pptd. The method is especially applicable to studies on the toxicology of lead.

E. W. BOUGHTON.

The volumetric determination of the higher oxides of lead and manganese with titanium trichloride. L. MOSER. *Chem. Ztg.* 39, 245-7(1915).—(1) *Detn. of PbO_2 and Pb_2O_4 .* $TiCl_3$ reduces the higher oxides of Pb according to the equation: $PbO_2 + 2Ti^{+++} + 4H^+ = Pb^{++} + 2Ti^{++++} + 2H_2O$. Should the concn. of H^+ be too high, Cl_2 is liberated. Shake the sample with 100 cc. H_2O and boil to expel dissolved O_2 . Pass in CO_2 and add an excess of standard $TiCl_3$ soln. (1 cc. = 0.005 g. Fe) quickly with shaking. Titrate the excess of $TiCl_3$ with standard $FeCl_3$, using KCNS or methylene blue as indicator. (2) *Detn. of MnO_2 .* To 0.1-0.3 g. pyrolusite add a large excess of $TiCl_3$ soln., and run through a current of CO_2 ; add 40-50 cc. HCl (d. 1.19) from which air has been boiled out. Boil the mixt. gently until the MnO_2 is in soln.; then titrate with $FeCl_3$ soln. using methylene blue.

H. L. OLSEN.

Electrolytic separation of palladium and tin. A. GUTBIER, C. FELLNER AND R. EMSLANDER. *Z. anal. Chem.* 54, 208-13(1915).—A combination of the methods of Wöhler and Spengel (C. A. 5, 2047, 2474) and Amberg (*Z. Elektrochem.* 10, 386, 853 (1904)) gave good results for Pd, but there was some loss of Sn due to the colloidal character of the stannic acid, even after long boiling with NH_4NO_3 . The following method based on G.'s previous work and that of Langness (C. A. 2, 45) gave excellent results for Pd and fairly good for Sn; let the soln. of the 2 metals flow slowly with vigorous stirring into an excess of NH_4OH and heat with stirring to incipient boiling to effect a complete soln. of the Pd compd. Cool to 60° , hold at this temp. and electrolyze, adding NH_4OH from time to time to replace that evapd. Use Pt electrodes and rotate at 2400 r. p. m. with at least 2 v. and 0.2 amp. Owing to the rapid stirring, the H bubbles developed on the cathode are immediately removed, resulting in a very adherent deposit of Pd. The Sn is pptd. by NH_4NO_3 from the residual soln. and detd. in usual manner. Results are reported by both of the above methods. In H_2SO_4 soln. at 18° with 2400 r. p. m. it was found that 0.27-0.41 amp. and 1.9-3.0 v. gave adhering deposits of Pd; with 0.69 amp. and 3.6 v. the deposit flaked off somewhat; with 0.75 amp. and 4.0 v. decided scaling occurred. Adhering deposits of Pd were obtained in

NH₄OH soln. at 65° and 2400 r. p. m. with 0.14 to 1.65 amp. and 1.2 to 7.0 v. Results are reported. F. W. SMITHER.

The separation of palladium and tin by means of dimethylglyoxime. A. GUTBIER AND C. FELLNER. *Z. anal. Chem.* 54, 205-8(1915).—Dissolve the Pd containing Sn in *aqua regia*, expel free Cl and dil. the soln. of PdCl₂ and SnCl₄ to at least 150 cc., heat on water bath and add 1% dimethylglyoxime soln. (in alc. or HCl), with stirring till ppt. no longer forms, and heat till settled. Cool to room temp., filter and wash with dil. HCl (not over 2%), ash and burn in a Rose crucible, finally igniting in H₂; weigh as Pd. In the filtrate from the C₄H₉N₄O₂Pd ppt., sep. the Sn as metastannic acid, finally weighing as SnO₂ in usual manner. Excellent results are reported on known mixts. of Pd and Sn. F. W. SMITHER.

Gravimetric determination of selenium. A. GUTBIER AND F. ENGEROFF. *Z. anal. Chem.* 54, 193-205(1915).—A critical review and discussion of the subject, especially of a paper by J. Meyer (cf. *C. A.* 8, 1721). It is stated that the work of G. and his co-workers antedates that of M. A study of the detn. of Se in the presence of org. protective colloids is the basis of the present paper; such materials require the use of HNO₃. In some cases a simple heating with concd. HNO₃ suffices to yield a colorless soln., while others require treatment by the Carius method. KCl added to concd. HCl solns. of SeO₂ does not form K₂SeCl₄ or prevent volatilization of Se. The formation of H₂SeCl₄ by action of concd. HCl on SeO₂ is improbable or the hydrolysis of the H₂SeCl₄ is practically instantaneous. Exptl. proof shows the impossibility of forming H₂SeCl₄ from SeCl₄ by action of concd. HCl; therefore equil. in the system SeO₂-concd. HCl may be expressed: $\text{SeO}_2 + 4\text{HCl} \rightleftharpoons \text{SeCl}_4 + 2\text{H}_2\text{O}$ and $\text{SeCl}_4 + \text{H}_2\text{O} \rightleftharpoons \text{SeOCl}_2 + 2\text{HCl}$. In pptg. Se by means of a reducing agent it does not sep. first in the red amorphous form, but as red colloidal Se, which, according to the temp., quickly or slowly coagulates into the red amorphous form; on continued heating the latter is transformed into the gray or black modification. Most of the ppt. settles, but a "skin" of gray Se floats on the soln. G. prefers to add the reducing agent and then heat, working in an Erlenmeyer flask or covered beaker. Expts. are reported on a specially prepd. SeO₂ soln., using varying concs. of HNO₃ and reducing with hydrazine hydrate (10% soln.) and with a cold satd. soln. of hydrazine sulfate; same after neutralizing with NH₄OH; also after neutralizing with NH₄OH and then adding varying amts. of 10% HCl. These expts. give excellent results, confirming previous work (*Z. anorg. Chem.* 41 291(1904)). Results are reported showing loss with varying concs. of HNO₃ and varying time periods up to 6 hrs. on the water bath before reduction. The numerous references to and quotations from the literature are noteworthy. Cf. *C. A.* 7, 3697; 9, 1142. F. W. SMITHER.

The estimation of pentavalent vanadium by means of sodium thiosulfate. G. O. OBERHELMAN. *Yale Univ. Am. J. Sci.* 39, 530-4(1915).—The method is based on the reduction of V₂O₅ salts to V₂O₄ by excess Na₂S₂O₃ in the presence of a Cu salt as accelerator, and titration of the excess Na₂S₂O₃ with I soln. In HCl soln. the best conditions were found to be the following: The vanadate soln. is brought to a vol. of 800 or 400 cc., 10 or 5 mg. CuSO₄·5H₂O and 3 or 1.5 cc., resp., of 32% HCl added, 0.1 N Na₂S₂O₃ run in until an excess of 15 or 7.5 cc., resp., are added, the soln. let stand until the color is a pure sky blue, KI added to amt. of 0.1 g. per 100 cc. of soln., and excess Na₂S₂O₃ titrated with I soln. The V blue does not interfere with the starch end point. Results given are satisfactory. G. W. MOREY.

Simplified ferrous sulfate method for the determination of vanadium in steel. G. T. DOUGHERTY. *J. Ind. Eng. Chem.* 7, 419-20(1915).—Treat 2-4 g. drillings in a 500 cc. Erlenmeyer flask with 60 cc. H₂O and 10 cc. concd. H₂SO₄. After heating the soln. nearly to boiling, until the reaction is complete, add 40 cc. HNO₃ (1.20) and boil

10 min. Cool, add 60 cc. cold H_2SO_4 (1:2) and dil. to 450 cc. Add 3 cc. 1% $\text{K}_2\text{FeC}_2\text{N}_6$ and titrate rapidly (with stirring) with 0.05 N $\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4$ to the appearance of the first dark blue color. Deduction of a blank of 0.4 cc. is necessary up to 0.5% C, and more with higher C content. In the latter case masking of the end point may be avoided by adding to the soln. after boiling with HNO_3 , 60 cc. H_2SO_4 (1:2) and 5-8 g. $(\text{NH}_4)_2\text{S}_2\text{O}_8$ and boiling for 15 min. Cool, dil. and proceed as above. The method is accurate to 0.01% V.

ISADOR MILLER.

Permanganate and iodometric determination of iodine in the presence of bromides and chlorides. O. L. BARNEBEY. *J. Am. Chem. Soc.* 37, 1496-507(1915).—Results obtained by the original Pean de St. Gilles method for I in the presence of bromide or chloride are incorrect because of the formation of free Br and Cl or HClO . The presence of MnSO_4 and H_3PO_4 in the ferrous soln. allows the removal of the excess KMnO_4 and MnO_2 without liberation of free Cl or Br from the halides, and insures a correct titration of the ferrous Fe excess. I may be detd. in the presence of bromide or chloride by addition of KI to the final soln., and titration of the liberated I with $\text{Na}_2\text{S}_2\text{O}_3$. Both titrations can be made on a single sample.

E. B. MILLARD.

Permanganate determination of iron in the presence of fluorides. Analysis of silicates and carbonates for their ferrous iron content. O. L. BARNEBEY. *J. Am. Chem. Soc.* 37, 1481-96(1915); cf. *C. A.* 8, 2989.—Titration of ferrous Fe by KMnO_4 in the presence of fluorides gives an unstable end point, the instability increasing with increased concns. of Fe and HF. H_2SO_4 at N to 5 N permits a good titration; H_3PO_4 cannot be substituted for H_2SO_4 in the titration. $\text{Fe}_2(\text{SO}_4)_3$ and MgSO_4 check the influence of HF in the titration, and MoO_3 and TiO_2 also help, the TiO_2 being better than MoO_3 . Boric and silicic acids also prevent the action of HF, H_2BO_3 being the best reagent tried. Ferrous solns. in the presence of fluoboric acid are stable in air.

E. B. MILLARD.

Estimation of cobalt in high-speed steels. L. DUFFY. *J. Iron Steel Inst.* 90, 52-65(1914); *J. Chem. Soc.* 108, II, 69-70(1915).—Neither the cyanide nor the nitrite method gives good results for Co in high-speed steels. D. recommends the following method: Dissolve 3 g. of drillings in 50 cc. conc. HCl , oxidize with a slight excess of HNO_3 , and evap. to a sirup with an additional 20 cc. conc. HCl . After mixing with 5 vols. of 5% HCl , filter through pulp and wash the tungstic acid with dil. HCl . Neutralize the filtrate, while hot, with NH_4OH and $(\text{NH}_4)_2\text{CO}_3$, add 20 cc. of 33% AcOH and add boiled AcONH_4 soln. to the boiling soln. Make vol. up to 750 cc., filter and collect 500 cc. of filtrate. Ppt. contains Cr, Mo, V and Fe. Filtrate contains Co, Ni and Mn. Remove last traces of Fe from filtrate by adding 5 cc. HCl , evapg. and pptg. with NH_4OH . Repeat this pptn. Neutralize united filtrates with AcOH , adding 4 cc. excess and 15 cc. of AcONH_4 soln. Ppt. Co by passing rapid stream of H_2S for 15 min. Wash CoS with H_2O containing AcONH_4 . Mn may be detd. in filtrate. Dissolve CoS in HNO_3 , any residue being ignited, dissolved and added. To soln. add 20 cc. HCl , and, after evapg. to 10 cc., dil. and ppt. by adding 1 g. $(\text{NH}_4)_2\text{HPO}_4$ and just enough NH_4OH to give a ppt. in hot soln., followed by 15 cc. of AcONH_4 soln., after which NH_4OH is added drop by drop until soln. is faintly alk. On stirring the flocculent blue ppt. becomes pink and cryst. After heating for 15 min. on the steam bath, filter and ignite ppt. of CoNH_4PO_4 to $\text{Co}_3\text{P}_2\text{O}_7$. A minute amt. of Co remains in the filtrate and may be recovered by H_2S . Ni, if present, is sepd. by means of dimethylglyoxime after the acetate sepn. The excess of dimethylglyoxime is removed by HNO_3 before pptg. Co.

E. W. BOUGHTON.

Rapid electrolytic determination of copper. WALTER THEEL. *Chem. Ztg.* 39, 179(1915).—The deposition is very rapid at ordinary temp. if strong solns. are used: 1 hr. for 1.3 amp., 45 min. for 2 amp. Dissolve 1 g. brass in 8.5 cc. H_2SO_4 (1:4) plus

2.5 cc. concd. HNO_3 . Heat gently to boiling till nitrous fumes are driven off, cool, dil. to 25 cc. and electrolyze with gauze electrode. Cf. C. A. 7, 3584. J. H. M.

New test for copper. W. G. LYLE, L. J. CURTMAN AND J. T. W. MARSHALL. *J. Am. Chem. Soc.* 37, 1471-81(1915).—An aq. soln. of $\text{CH}_3(\text{CH}_2)_4\text{CHNH}_2\text{COOH}$ was found to give a positive test for Cu when 1 part in 353,000 was present. With this reagent 0.004 mg. may be detected with certainty, and small amts. of Fe do not interfere as with the ferrocyanide test. Hg and Zn are the only common metals which yield a ppt. under the conditions specified; the interference of the former may be overcome by the addition of NaCl, and the latter may be prevented from pptg. by adjusting the acidity of the soln. E. B. MILLARD.

Brass analysis. BERTHOLD KOCH. *Chem. Ztg.* 39, 215(1915).—Treat 1 g. of brass turnings with 15 cc. H_2SO_4 (1:1) and 10 cc. HNO_3 (d. 1.20) and dissolve over the water bath. Then heat over a flame to expel the HNO_3 fumes, continuing with a low flame until most of the HNO_3 has been expelled and ZnSO_4 begins to sep. After cooling the soln., add 150 cc. H_2O to dissolve the crystals and then heat soln. to the temp. necessary for the Cu detn. as outlined in the preceding paper (C. A. 7, 3584). After sepg. the Cu, cool the soln. to 30-35° and add 18 g. solid NaOH. After dissolving the $\text{Zn}(\text{OH})_2$, add 5 g. KCN, heat to 70° and ppt. Zn on a coppered or silvered electrode at 3-5 amp., 6 v. H. L. OLIN.

Determination of zinc in ores and pyrites cinders. HANS RUBRICIUS. *Chem. Ztg.* 39, 198(1915).—The method is rapid and accurate with small amts. of Zn. Dissolve 5 g. pulverized ore in 15 cc. concd. HCl in a 200 cc. beaker on hot plate for 15 min., then add a few cc. concd. HNO_3 and evap. soln. carefully to a small vol. (not to dryness), cool, add 30 cc. conc. NH_4OH and stir well with a "policeman." The ppt. is treated with NH_4OH 2 or 3 times, the exts. filtered into a 400 cc. beaker and the ppt. washed with hot H_2O . If the filtrate is not blue from the presence of Cu add a few drops of dil. CuSO_4 soln., heat to boiling and ppt. with a little Na_2S , let settle, filter promptly, wash sulfides with hot H_2O , treat at once with hot dil. HCl to dissolve the ZnS, wash remaining CuS, ppt. Zn from the boiling soln. with Na_2CO_3 and weigh as ZnO. If Mn is present it is removed from the mixed sulfides by treating with dil. AcOH before treating with HCl. J. H. MOORE.

Solution control in ferric chloride leaching of sulfide copper ores. F. N. FLYNN AND R. H. HATCHETT. *Met. Chem. Eng.* 13, 291(1915).—When chalcocite is decomposed by FeCl_3 , the resulting soln. may contain Fe' , Fe'' , Cu' and Cu'' . The method for the analysis of the soln. is as follows: **Total Fe:** To a measured quantity of the neutral soln. add a little HCl. Boil with test Pb to ppt. Cu and to reduce Fe. Filter and titrate the Fe in the filtrate with standard soln. of $\text{K}_2\text{Cr}_2\text{O}_7$ or KMnO_4 . **Fe'' and Fe' :** To a second measured portion of the cold neutral soln. add an excess (2 or 3 g.) of pptd. CaCO_3 and stir vigorously for 2 or 3 min. Fe'' is pptd. Filter and det. Fe in the ppt. and in the filtrate, the latter being Fe' . This sepn. with CaCO_3 must be made cold. **Total Cu:** Det. total Cu by any reliable method. A rapid method is as follows: Measure a third portion of the original soln. and oxidize it with KClO_3 and HCl. Neutralize with Na_2CO_3 , acidify with AcOH, and add 2 or 3 g. of Na_2HPO_4 to ppt. Fe. Add 3 or 4 g. of KI and titrate with a standard soln. of $\text{Na}_2\text{S}_2\text{O}_3$. **Cu' and Cu'' :** To a fourth measured quantity of the soln. add HCl and 3 or 4 g. of KI. Dil. and det. total oxidizing power by titrating with standard soln. of $\text{Na}_2\text{S}_2\text{O}_3$. This titration measures Fe'' and Cu'' together. From the buret reading subtract the equiv. of the Fe'' already detd. and calc. the difference as Cu'' . Sometimes the end point is not permanent in the $\text{Na}_2\text{S}_2\text{O}_3$ titration for Fe and Cu. To check the result another sample may be measured and the total reducing power detd. by titrating in a H_2SO_4 soln. with a standard soln. of KMnO_4 . This titration gives Cu' and Fe' together. The equiv. of Fe' ,

already detd., is deducted from the buret reading and the difference calc. as Cu' present as CuCl. When Fe salts alone are to be detd., the sepn. with CaCO_3 can be made so quickly that the oxidation is inappreciable. If Cu' or Cu'' salts are present, some Cu is usually pptd. with the Fe and the filtration is slow. The addition of NH_4Cl makes filtration more rapid.

E. W. BOUGHTON.

Fluoboric and fluosilicic acids in the qualitative analysis of sodium. F. C. MATHERS, C. O. STEWART, H. V. HOUSEMAN AND I. E. LEE. *J. Am. Chem. Soc.* **37**, 1515-7 (1915).—The filtrate contg. Na, K, NH_4 and Mg was evapd. to dryness and the NH_4 salts removed by ignition, part of the soln. tested for K, and the remainder for Na by adding an excess of fluoboric acid in 50% EtOH. The K was completely pptd. as KBF_4 , which was easily filtered. The Na may be pptd. in the filtrate with H_2SiF_6 . It is not necessary to remove Mg as with the pyroantimonate test. The test is well adapted for class work in beginning qual. analysis.

E. B. MILLARD.

Method for the determination of phosphorus pentoxide in limestones low in phosphoric acid content. F. HINDEN. *Z. anal. Chem.* **54**, 214-6 (1915).—To 25 g. of the powdered material and 100 cc. H_2O in a liter covered beaker, gradually add 120 cc. dil. HNO_3 (1:1) and heat to boiling. Filter and wash with hot H_2O . Heat the filtrate in a liter beaker to boiling; add NH_4OH (1:1) till slightly turbid. (If Al and Fe are not present in appreciable amts., add a few drops of FeCl_3 soln.) Add 0.5 g. of pure pptd. CaCO_3 , boil for 5 min. and let settle. Filter, wash with hot H_2O and dissolve ppt. on paper in 5-10 cc. of dil. HNO_3 (1:1); evap. soln. to dryness on the water bath, take up with 30-40 cc. of H_2O and a little HNO_3 , filter out SiO_2 and ppt. P_2O_5 in the filtrate by Woy's method (cf. *Z. öffent. Chem.* **3**, 321 (1897); *Analyst* **22**, 333 (1897); also Treadwell's "Lehrbuch der analytischen Chemie" 1907, Bd. 2, 330) with MoO_3 soln. The method was devised for the examn. of limestone for carbide factories. Results are reported on a number of samples by the above method and are shown to average 17.5% more P_2O_5 than the usual method gives when a 10 g. sample is employed. The main advantage of the method is the small vol. of soln. for pptn. (50-100 cc.), as against 5 to 10 times this vol. in the usual methods.

F. W. SMYTH.

The determination of sulfuric acid and of potassium, especially in potassium salts. I. W. VAUBEL. *Z. öffent. Chem.* **20**, 426-34 (1914).—A comprehensive detailed review of methods. II. The determination of sulfuric acid according to the barium and the benzidine methods and of potassium according to the perchlorate method. *Ibid* **21**, 1-6 (1915).—V. concludes that the detn. of H_2SO_4 by Ba pptn. in the presence of K is accompanied with large negative or positive errors, the chief ones being due to the simultaneous pptn. of K_2SO_4 or the solubility of some BaSO_4 . The detn. of K by the perchloric acid method does not give accurate results in the presence of H_2SO_4 . The pptn. of H_2SO_4 is best carried out by benzidine hydrochloride in the presence of K, while K in the presence of H_2SO_4 can be pptd. by sodium cobaltic nitrate and the ppt. titrated. In the direct detn. of K and Na results can only be obtained by the employment of benzidine pptn. for the H_2SO_4 and the $\text{Co}(\text{NO}_3)_2$ pptn. for the K. In cases where H_2SO_4 is to be detd. by Ba pptn. Na_2CO_3 or NaNO_3 is to be preferred to KNaCO_3 , KNO_3 or K_2CO_3 as a flux.

H. A. LEPPER.

A method for the determination of carbon dioxide in baking powder and carbonates. H. W. BRUBAKER. *J. Ind. Eng. Chem.* **7**, 432-3 (1915).—This simple rapid method is based on the liberation of CO_2 which displaces its own vol. of a satd. soln. NaCl and measurement of the vol. displaced. The method is fairly accurate. Details are given.

ISADOR MILLER.

Quantitative micro-analysis of organic substances according to Fritz Pregl. J. V. DUBSKY. *Chem. Ztg.* **38**, 505-6, 510-1 (1914).—D. describes in detail the micro-

methods developed under the supervision of Pregl for the elementary analysis of org. compds. *Detn. of N* by the micro-Dumas method: 2-7 mg. of material used; the combustion tube is 34 cm. long and 10 mm. in diam., and is drawn out 5 cm. with a diam. of 5 mm. at one end. The vol. of N is detd. in the micro-azotometer which can be read to 0.002-0.005 cc.; an empirical correction of +2% is made on account of capillarity of the 50% KOH soln. One filling suffices for 15 or more detns. The micro-Kjeldahl method may also be used for N. For the *detn. of C and H* 4-7 mg. of material are used; the combustion tube is 9-10 mm. in external diam. and 25 cm. long and is drawn out at one end for 10 mm. with 4 mm. diam. Granulated PbO_2 is used in addition to CuO , CuO -gauze, etc. The H_2O is absorbed and weighed in a tube 7 mm. in diam., with a 9 cm. layer of $CaCl_2$ of the fineness of millet seed and containing a packing of glass wool to prevent loss by "dusting." The CO_2 absorption tube (7 mm. in diam.) contains a 4 cm. layer of $CaCl_2$ and 6-7 wads of glass wool moistened with 50% KOH soln. Special directions are given for cleaning and charging this tube; one charge suffices for 2 detns.; $CaCl_2$ tube above will last for 10-15 detns. Each of these tubes is drawn out about 3.5 mm. at each end for making connections. The $CaCl_2$ may be regenerated by heating the tubes in a Cu block or by connecting one end to a vacuum pump and other end to a $CaCl_2$ tube with capillary opening. The $CaCl_2$ tube weighs about 3 g., the KOH- $CaCl_2$ tube about 5 g. S and halogens are detd. by Donau's methods (cf. *C. A.* 4, 1002; 6, 1417). It is stated that 1 mg. of substance suffices for detg. N; 1-2 mg. for C and H. Results for C, H, and N are reported for a number of org. compds. These show in most cases very good agreement with theory. (Cf. *Monatsh.* 23, 1(1902); *C. A.* 4, 3066; 6, 763). F. W. SMITHER.

Reduction of iron solutions (SCHUMANN) 1.

MOODY, H. R.: *College Text-book of Quantitative Analysis*. Reprint, 1914. New York: Macmillan Co. 165 pp. \$1.25.

TALBOT, H. P.: *An Introductory Course of Quantitative Analysis*. 5th ed. New York: Macmillan Co. 176 pp. \$1.50.

WHITTE, C. H.: *Methods of Metallurgical Analysis*. New York: D. Van Nostrand Co. \$2.50.

8. MINERALOGICAL AND GEOLOGICAL CHEMISTRY.

EDGAR T. WHERRY.

Noteworthy crystals from Austria. ALOIS CATHERIN. *Neues Jahrb. Min. Geol.* 1915, I, 28-34; *Chem. Zentr.* 1915, I, 630.—The following crystals are described: A gypsum cryst. and a twin with (101) as the twinning plane which has grown from an ellipsoidal group of lenticular crystals from a sandpit at St. Agatha. A black tourmaline from Katsbach near Linz with lustrous prisms and dull terminal faces under a cover of stilbite. A pseudo-orthoclase (anorthoclase) from Reichensteim of the rare square-column type. White, lustrous plagioclase from the Wilheringer road, and also a twin according to the Carlsbad law, in which both individuals are twinned similarly according to the albite law. J. H. BOWER.

The previous condition of the silica in agate porphyries. R. E. LIESGANG. *Silikat-Z.* 2, 167-73(1914).—The previous hypothesis set forth by L. (*C. A.* 5, 3667) that the agates existing in porphyries were caused by the rhythmic pptn. of a pre-existing silicic acid gel, is applicable only to a part of the occurrences. In many others it is necessary to assume that the silicic acid was present in the sol. form, e. g., as water

glass. This is supported first by the occurrence of agates in Uruguay, etc., with the material deposited in horizontal strata under the influence of gravity, and also by the existence of numerous tubular ones which may have been formed in a manner similar to the "silica plants" from water glass and sol. Fe salts. C. S. KINNISON.

Brazilian monazite. A. L. GOTTSCHALK. *Chem. Eng.* 21, 169-70(1915); *Mining Engineering World* 42, 903-4(1915).—The following analysis of monazite sand was furnished by F. H. Lee of the Brazilian Geol. Service: P_2O_5 29.28, Ce_2O_3 31.28, La_2O_3 , etc., 30.88, SiO_2 1.40, ThO_2 6.49, loss on ignition 0.20, sum 99.53%. The mean ThO_2 content of the product regularly marketed from the only sources thus far found to be commercially payable, ranges from 5.75 to 7.1%. The general character and location of the Brazilian monazite deposits are given, also those of ZrO_2 .

L. W. RIGGS.

The formation of sodium carbonate and sodium sulfate in nature. A. LUCAS. *Cairo Sci. J.* 8, 185-8(1914).—Four possible explanations for the formation of Na_2CO_3 in nature are: (1) by the action of water containing CO_2 upon rocks containing Na_2SiO_3 or products of its alteration; (2) by the interaction of $NaCl$ with the carbonates or bicarbonates of Ca or Mg; (3) by the interaction of $CaCO_3$ with Na_2SO_4 ; and (4) by the reduction of Na_2SO_4 to Na_2S and the conversion of the latter to the carbonate by CO_2 . Na_2SO_4 may be produced by the action of $NaCl$ upon $CaSO_4$ or $MgSO_4$. Another method for the formation of both Na_2CO_3 and Na_2SO_4 is through the agency of zeolites. The zeolites are alteration products formed from the decomposition of other minerals—especially the feldspars—and consist of Al silicates united with an alkali or alkaline earth. The zeolites will exchange all their Na for an equivalent amt. of alkaline earth or even of heavy metals and are therefore suitable for water softening. By such an exchange with the sulfate or bicarbonate of the alkaline earths or heavy metals are $NaHCO_3$ and Na_2SO_4 formed. The presence of zeolitic material explains the formation of Na_2CO_3 in the cultivated lands. Such material is of widespread occurrence in both Upper and Lower Egypt.

R. L. SIBLEY.

The use of the microscope in mining engineering. F. W. APGAR. *Trans. Am. Inst. Mining Eng.* 47, 65-77(1914).—A discussion of the use of the petrographic microscope. Cuts are given showing: the mineralogic changes that may be found in a vein from the surface downward; rock alteration; changes in rock texture produced through differences in the rate of cooling, etc.

F. W. SMITHER.

The silver content of the lead ores of the East Alpine Triassic limestones. RICHARD CANAVAL. *Z. prakt. Geol.* 22, 157-63(1914).—A review of the literature pertaining to the Ag and Pb production of the region.

H. L. OLIN.

Geology of the Burro Mountains copper district, New Mexico. R. E. SOMERS. *Bull. Am. Inst. Mining Eng.* 1915, 957-96.—This region, in the s. w. part of the state, contains 2 classes of ore deposits: (1) quartz veins with Au and Ag, and (2) Cu deposits in fracture zones with a disseminated replacement of the walls. The Big Burros consist of a pre-Cambrian granite complex into which has been intruded a mass of quartz monzonite of post-Cretaceous age. The Cu occurs in 3 stages, (1) the upper oxidized zone from which most of the mineral has been leached but which still retains some azurite and malachite; (2) the enriched zone of chalcocite, 200-300 ft. thick, developed by replacement of primary pyrite, and the only one of commercial importance; (3) the primary zone of unaltered minerals. The district is comparatively undeveloped and prospecting will probably disclose new ores.

H. L. OLIN.

Geology and ore deposits of Copper Mountain and Kasaan Peninsula, Alaska. C. W. WRIGHT. U. S. Geol. Survey, *Professional Paper* 87, 110 pp.(1915).—Petrographic description and chem. analyses of the rocks of the district are given, and from

them the geologic history is deduced. W. describes a diopside-orthoclase containing over 73% orthoclase, a higher content than for any rock in Washington's tables, also a syenite porphyry containing phenocrysts of calcite which apparently crystd. directly from the magma. The ores are of the contact type, comprizing chalcopyrite, pyrrhotite, pyrite and magnetite. There is no enrichment. R. C. WELLS.

The copper pegmatite lode of Otjozonjati, German-Southwest Africa. H. WESTPHAL. *Z. prakt. Geol.* 22, 385-416(1914); *Chem. Zentr.* 1915, I, 271.—This Cu pegmatite is a new type. It is distinguished from the Telemarken-Monte Mullato type by a considerable rutile content and is to be classed as intermediate between the rutile veins of the Alps which have no Cu, and the quartz-Cu veins of the Butte, Mont., type. W. C. WHEELER.

The Gross-Fragant pyrite deposits. W. F. v. REITZENSTEIN. *Z. prakt. Geol.* 22, 197-212(1914).—R. describes in detail the petrography and geology of this ore zone, which consists of 2000 m. of micaceous schist, gneiss, carbonate rock and pyrite, underlying an intrusion of gneiss. The ores are Fe and Cu pyrite and magnetite, of varying structures. Their Cu content ranges from 7 to 10%, Fe, from 31 to 38%, and S from 33 to 42%. H. L. OLIN.

The geology and petrography of the South Norway pyrite deposits with special reference to their origin. OTTO FALKENBERG. Christiania. *Z. prakt. Geol.* 22, 105-54(1914).—F. describes in detail the pyrite-bearing rocks of the Norwegian Silurian, classifying them in the following zones: the Christiania region with alum shales containing small amts. of macroscopic pyrite but no workable deposits; the blue-quartz region of metamorphosed sandstones and igneous rocks; the Meldalen region lying in a great syncline 150 km. wide, which is the chief pyrite-bearing section; the west coast formations of diorite, gabbro, and granite; and the Söndfjord zone of conglomerate and sandstone several thousand m. in depth. With respect to the origin of the pyrites, he supports the views of Durocher, Kjerulf, and others, who consider them the products of metamorphosis of various minerals absorbed by intrusions of molten gabbro, and thinks that most of the Norwegian pyrites were formed in this way. H. L. OLIN.

The formation and distribution of residual iron ores. C. L. DAKE. *Bull. Am. Inst. Mining Eng.* 1915, 937-46.—Residual soils rich in Fe are produced both by weathering and by hydrothermal decay. In regions of heavy rainfall important accumulations may be formed by the decompn. of the relatively sol. limestones and basic igneous rocks with subsequent conc. of Fe, while in polar and arid regions only mechanical disintegration takes place. Laterites (mixts. of $\text{Fe}(\text{OH})_3$, $\text{Al}(\text{OH})_3$, and SiO_2), developed only from basic igneous rocks, are common in the tropics and are the most important residual ores. The action of steam on hot lava is probably a factor in the formation of Fe beds in volcanic regions. H. L. OLIN.

Potash in the Texas Permian. J. A. UDDEN. Texas Bureau Econ. Geol. *Bull. Univ. Texas* No. 17, 59 pp.(1915).—Two important features which this bulletin announces are the discovery of K-bearing salts in depth and the extent of the area in which this salt occurs. The K-bearing material is a solid and not a brine. One well at a depth of 875 to 925 feet contained 87.24% sol. material and of this 9.23% was "potash." Another well at a depth of 1700 feet contained 51.72% soluble material and of this 10.50% was "potash." Borings from two wells contained a bright salmon-red substance which upon analysis showed about 14% KCl and resembled carnallite. This occurred at a depth of 900 feet below the surface in a bed of rock salt, which overlies 3 other salt beds measuring jointly several hundred feet in thickness. There are several circumstances which suggest that an isolated basin existed in the region at the period when

the salts were deposited. Twenty-six samples taken from depths varying from 800 to 1700 feet showed potash content from 0.31 to 10.50%. The figure 0.44% seems to represent the average potash contents of the main salt beds in the region. One significant feature of the occurrence of the red K-bearing rock (carnallite?) is that it is found near or in the upper part of the principal salt beds exposed. This suggests that the deposition of K was preceded by a long period of progressive concn. of the seawater, at the end of which the point of satn. for K salts was reached, and these salts began to separate from the brine in the sea. This is the first time that such salts have been observed in association with the rock salt in the Permian red-beds. R. L. S.

Fissure coals of the western province. W. VERSFELD. *S. Afr. J. Sci.* 11, 165-68(1914).—The deposits of secondary coal in rocks not of contemporaneous age occur in divisions of Sutherland, Fraserburg, Lainesburg, Prince Albert, and Beaufort West, S. Africa. The fissures vary from 1 inch to 6 feet in width, in widely varying depths, and in direction from vertical to almost horizontal. The calorific value is high, ash sometimes as low as 0.20%, moisture 2 to 15% and the material is thus of anthracite quality. From the knowledge at hand it seems that the fissures were filled from above and that the mother deposit no longer exists. An attempt is being made at commercial development. W. C. WHEELER.

Contributions to Sardinian petrography. I. Rocks of Monte Ferru. H. S. WASHINGTON. Geophysical Lab., Washington. *Am. J. Sci.* 39, 513-29(1915); cf. *C. A.* 2, 1678, 3045; 8, 311, 482, 649, 1078.—Chem. analyses of these rocks by W. are shown in the table below. A = trachyte (I." 5. 2. 3); B = phonolite (I(II). 5. (6). 1,3). C = basalt ("III. 5. 3. 4"). D = analcite basalt (III. (5) 6. 2. 5). E = olivine nodule in analcite basalt. F = augite nodule in analcite basalt. Many other analyses are given or quoted.

	A.	B.	C.	D.	E.	F.
SiO ₂	58.43	60.43	52.40	44.85	41.24	50.13
Al ₂ O ₃	18.58	18.35	15.26	12.55	0.21	7.08
Fe ₂ O ₃	3.00	1.64	0.74	3.33	0.48	1.10
FeO.....	1.22	0.91	8.33	5.30	8.36	4.41
MgO.....	0.13	0.17	7.45	10.27	49.90	13.73
CaO.....	3.50	1.41	7.33	8.32	0.12	20.06
Na ₂ O.....	4.78	6.15	3.54	4.77	....	1.88
K ₂ O.....	5.82	8.68	0.99	0.72	....	0.25
H ₂ O +.....	0.94	0.62	0.29	2.01	....	0.11
H ₂ O —.....	1.63	0.34	0.06	0.95	....	....
TiO ₂	1.11	0.36	3.12	5.07	0.10	1.91
ZrO ₂	0.24	0.21	....	....	....	....
P ₂ O ₅	0.19	Trace	0.49	1.17	....	....
SO ₃	0.11	0.22	....	....	....	....
MnO.....	0.09	0.16	0.08	0.07	Trace	0.05
BaO.....	0.14	0.08	NiO 0.06	0.23	0.21	0.02
SrO.....	0.06	0.02	....	....	....	....
	99.97	99.75	100.14	99.60	100.62	100.73

L. W. RIGGS.

Primary analcite of the Crownst volcanic. J. D. MACKENZIE. *Mass. Inst. Tech. Am. J. Sci.* 39, 571-4(1915); cf. *C. A.* 9, 582.—M. presents additional reasons in favor of his previous conclusions, with reference to the primary nature of the analcite of this locality, and against the suggestion that the analcite may have been originally leucite but had been converted to analcite by the agency of Na solns. L. W. R.

The Scottish oil shales. G. BURG. Berlin. *Z. prakt. Geol.* 22, 98-103(1914).—The Lothian oil shale group which forms a 900 m. division of the calciferous sandstone series of the Scottish Carboniferous, is made up of bituminous and marly shales, sandstones, limestones, and tuffs, together with some coals of poor quality. A soft blue shale known as "blaes" contains no oil but is rich in NH_3 and the light hydrocarbons. The raw oil content of the better shales is 135-200 l. per ton. The oil has a sp. gr. of 1.8-2.2, a S content of 1.5%, and yields on distn. 7% naphthalene, 29% illuminating oil, and 17% fuel oil, besides lubricants and paraffin. The production in 1910 was 273,000 ton of raw oil and 54,000 tons $(\text{NH}_4)_2\text{SO}_4$, valued at \$8,000,000. H. L. OLIN.

The value of certain criteria for the determination of the origin of foliated crystalline rocks. J. D. TRUEMAN. *J. Geology* 20, 228-58, 300-16(1912).—Foliated crystalline rocks are of 2 types: (1) those which received their foliation during consolidation from an igneous melt (primary gneisses), and (2) those in which foliation is a secondary structure. The typical texture of primary gneisses is intermediate between the igneous and the metamorphic types, but owing to the conditions of formation a crystalloblastic or even cataclastic texture may be superimposed on the original, and therefore texture as a means of identifying primary gneisses is of only limited application. It has been suggested that the presence of zircon be used for the identification of igneous or sedimentary origin. T. concludes that the presence of abundant minute zircons indicates that the original rock was either igneous or an arenaceous sediment; when grains are uniform in character, well crystd., and fresh an igneous rock seems likely; when well rounded and lacking in luster the original rock was probably sedimentary. Chem. analysis has frequently been used as a means of detg. the original igneous or sedimentary character of metamorphic rocks. Its use is based on the supposition that a rock as a whole undergoes no significant chem. change during development of schistosity. In some instances important chem. changes do take place. The case of the quartzite at Waterloo, Wis., is discussed. Here the zircon and ilmenite content of the schist is much greater than that of the quartzite. W. F. HUNT.

Metamorphic studies. C. K. LEITH AND W. J. MEAD. *J. Geology* 20, 353-61 (1912).—The succession of katamorphic and anamorphic changes constitutes a metamorphic cycle, and the recurrence of cycles constitutes great earth pulsations. The changes involved in the metamorphic cycle result in a permanent net loss of energy from the system in the form of heat. The incompleteness of the cycle as inferred from energy changes is also indicated by field evidence: (1) Completion of the cycle would involve reproduction of igneous rocks from sediments by sub-crustal fusion, but within the zone of observation this has been accomplished only on a small scale. (2) Certain salts split off from the cycle and remain in the ocean. (3) Segregation of CaO near the earth's surface as the result of its expulsion in the zone of anamorphism and its conc. in the zone of katamorphism occurs, the schists and gneisses containing a minimum of CaCO_3 or even Ca silicates. (4) MgO persists through the cycle to a much larger extent than CaO , and dolomites are therefore more abundant in the older and more highly metamorphosed terranes. (5) Al_2O_3 and SiO_2 are not only redistributing substances but by their combinations are the carriers of the energy involved in the changes. W. F. HUNT.

Ground-water resources of the Niles cone and adjacent areas, California. W. O. CLARK. U. S. Geol. Survey, *Water-Supply Paper* 345-H, 127-68(1915).—It is shown that the ground water in the vicinity of Niles has the same source as the surface waters, that is, it originates in the rain. A dense bed of impervious clay prevents loss of fresh water by seepage into California bay, as well as the encroachment of sea water in dry times from the bay toward the land. R. C. WELLS.

- The age of the earth. F. A. LINDEMANN. Sidmouth. *Nature* 95, 203-4(1915).
 —A defence of Lord Kelvin's estimate of the age of the earth. W. H. ROSS.
 The age of the earth. C. E. STROMEYER. West Didsbury. *Nature* 95, 259-60
 (1915).—A criticism of the arguments advanced by Lindemann (preceding abstr.).
 W. H. ROSS.

Trinidad asphalt (RICHARDSON) 2. New specific gravity balances (SCHWARZ) 1.

CALVERT, A. F.: *Salt in Cheshire*. London: Spon & Co. 21s.

CROWELL AND MURRAY: *The Iron Ores of Lake Superior*. Cleveland, Ohio: Penton Pub. Co. 258 pp. \$3.50.

9. METALLURGY AND METALLOGRAPHY.

WILLIAM BRADY, WILLIAM T. HALL.

Carl Schnabel. R. HOFFMANN. *Chem. Ztg.* 39, 53-4(1915).—An obituary.

J. H. MOORE.

Julius Weeren. MATHESIUS. *Chem. Ztg.* 39, 21-2(1915).—An obituary.

J. H. MOORE.

The iron industry and the war. W. BEUMER. *Stahl u. Eisen* 35, 163-71(1915).

CARLE R. HAYWARD.

Notes on the reverberatory furnace. FRANCIS R. PYNE. *Met. Chem. Eng.* 13, 292-3(1915).—A general description is given of the construction and the principles of working a reverberatory furnace.

L. A. TOUZALIN.

Note on the heating of an open hearth furnace by means of tar. A. GREINER. *Engineering* 99, 558(1915); *Iron Age* 95, 1072-3(1915); *Iron Trade Rev.* 56, 1017-8 (1915).—Notes on a 10-weeks expt. at the plant of the Cockerill Co. The tar is delivered to the sprayers (one only in each burner) with a regular feed and under a uniform pressure of 0.5 atm. It is sprayed by means of air compressed at about 3 atms. The hot air of combustion is admitted above the injector through the existing port, inclined at an angle of 45°. The av. consumption during the period was 293 lbs. (133 kg.) per ton of steel, including that required for lighting up and for heating during stoppages. With an uninterrupted run this av. falls to 253 lbs. (115 kg.) per ton. The av. wt. of the charges had to be diminished in order to avoid any deflection of the jet of flame issuing from the pulverizer towards the crown of the furnace. Several charges of 15 tons were successfully worked. The proportion of pig Fe found necessary in the charge rose to 28%. After 215 charges, producing 1986 tons of steel, the furnace was in an excellent working condition; the roof appeared even less damaged than after a similar campaign with coke-oven gas; only the chambers became encrusted. The bricks of the checker-work became covered with a carbonaceous substance. Some means will have to be devised to remedy this inconvenience. A new 25-ton furnace has been built and put into operation as a result of the above tests. A table is given showing results of expts. with producer gas, coke-oven gas, and tar. F. W. SMITHER.

The use of coal in blast furnace practice. FR. LANGE. *Stahl u. Eisen* 35, 265-8 (1915).—Anthracite coal, dried, finely powdered and introduced into the furnace through the tuyères, was found to greatly reduce the coke required. In some cases the saving is more than enough to offset the cost of drying and pulverizing. An intense heat is obtained in the hearth; this is particularly favorable when smelting for Fe-Si, Fe-Mn, and Fe-Cr, which require a high temp. It is also possible to treat high S ores

and obtain a low S-Fe because the slag can be run higher in CaO with the increased temp. Small furnaces are recommended for treating unbriquetted fine ores. More satisfactory results will be obtained with the old fashioned pipe stove because of the more even blast temp.

CARLE R. HAYWARD.

Areagrams of open hearth furnace flues. A. R. MITCHELL. *Iron Age* 95, 607-8 (1915).—M. shows graphically that certain passages are too small for efficient service.

H. V. MAIN.

Heat energy of the Bessemer process. G. BUTZ. *Iron Age* 95, 618-9 (1915).—Mathematical.

H. V. MAIN.

Recovery of flue dust iron. R. BAGGLEY. *Iron Age* 95, 1109 (1915).—Molten Fe poured into funnel with flue dust burns out impurities and melts the Fe.

H. V. MAIN.

The duplex process of steel manufacture. F. F. LINES. *Bull. Am. Inst. Mining Eng.* 1915, 679-94.—A detailed description of the methods employed at the Maryland Steel Works with a combination of acid-lined converters with basic open-hearth furnaces.

H. L. OLIN.

Smelting in a cupola furnace. OSKAR D'ASSE. *Stahl u. Eisen* 35, 207-12 (1915).—Some expts. were made in an iron foundry cupola eliminating the upper row of tuyères and putting an extra tuyère in the other row. The result was better Fe and smoother running of the furnace. This was especially true when the tuyère area was further reduced and the blast pressure increased. Criticisms by well known foundrymen follow the paper and the general opinion is that the tabulated results showed a "sick" furnace.

CARLE R. HAYWARD.

Heat record of a cupola. K. I. GUERDZRAVSKII. *Rev. soc. russe metall.* 1913, I, 163-84; *Rev. metal.* 11, II, 727-9 (1914).—Tables are reported giving the compn. of charge, metal and slag of a cupola furnace as well as a summary of the thermal work done. The coeff. of available thermal work of the furnace investigated is about 70%.

L. T. FAIRHALL.

Precision in foundry cupola operation. D. TOWNSEND. *Iron Age* 95, 590-1 (1915).—The Philadelphia Foundrymen's Assoc. suggests the design of a cupola to utilize the waste heat for preheating the blast, and advises gas analysis to control the combustion.

H. V. MAIN.

Liquid fuel for foundry cupola. E. F. CONE. *Iron Age* 95, 1038-9 (1915).—Oil used in cupola according to Stoughton patent reduces cost and S, and increases rate of melting.

H. V. MAIN.

Flotation in gold metallurgy. W. B. BLYTH. *Aust. Inst. Min. Eng., Bull.* 16; *Met. Chem. Eng.* 13, 308 (1915).—It is only a question of time until flotation of Au ores will be generally practiced. A few plants for this process are already in successful operation. The method is especially valuable for the treatment of Cu-bearing gold ores since it is desirable to remove the Cu before cyanidation in order to decrease the amt. of cyanide consumed.

L. A. TOUZALIN.

Metallurgical practice in the Witwaters Rand District, South Africa. F. L. BOSQUI. *Bull. Am. Inst. Mining Eng.* 1915, 997-1033.—The ores of the Rand range from 4 1/2 to 9 dw. Au per ton. Before the introduction of cyaniding (1890) the av. recovery was about 60%. At present it attains a max. of 96%. The chief contributing factors were: slime treatment (1894); tube mills (1904); improvements in classification, cones, etc. (1907 to 1910); the vacuum slime filter (1909). In sorting, the belt is most generally used. For crushing, stamp mills are preferred. In the newest mills battery plates are dispensed with, amalgamation being used only after tube milling. In treating the

sand with KCN, the tendency is to use a weaker soln. than formerly. The "strong solns." of most mills range between 0.10 and 0.25%. Contact of 6 to 8 days is the av. period. Slimes are treated in Pachuca tanks. For pptn. Zn shavings wet down with PbOAc are used, 1 cu. ft. of same lying loosely being allowed per ton of soln. B. regards the Zn dust method as a decided advance. In cleaning up the Zn-Au slime the NaHSO₄ which is a by-product in the manuf. of nitroglycerin (about 30% available acid) is most commonly used. Both direct crucible smelting, and Pb smelting are used to obtain the bullion. E. WALLER.

Mill and cyanide plant of Chicksan Mines, Korea. C. W. DEWITT. *Bull. Am. Inst. Mining Eng.* 1915, 931-6; *Mining Press* 110, 731-2 (1915).—The ore is a quartz. The av. value is a little under \$7 per ton. The ore is passed through grizzlies, the oversize to Blake crushers, then to the stamps. Both inside and outside amalgamation is used. Then it passes to concentrating tables, the concentrates being shipped to U. S. The cyanide plant is in process of expansion. After desliming, the sands are treated for 7 hrs. in a leaching vat with 0.2% KCN. When that is run off, 0.10% KCN is run on, followed by at least 2 washes of H₂O. The vats are freshly charged every 4 days. The soln. is pptd. by Zn shavings. The Zn-Au slimes are treated 3 days with H₂SO₄, then dried, etc., and smelted. E. WALLER.

Reclaiming brass sweepings. A. W. LEMME. *Iron Age* 95, 946 (1915).—Sweepings collected at night are hand-picked for large pieces of metal. The tailings from 1 in. mesh screening of the sweepings are crushed. The product is jigged on 100-mesh for 30 min. with H₂O and hand-picked for Fe, then concd. on an Overstrom table. The concentrates are briquetted with stucco. Chem. control of products is used. H. V. MAIN.

Simple and efficient precipitant for copper from acid solutions. W. THOMPSON. *Mining Eng. World* 42, 810 (1915).—Based on lab. expts. with a carbonate ore, the use of FeS is recommended, as by it a lb. of Cu may be pptd. more cheaply from the leach soln. than by any other means under av. conditions. The process is suggested for the low grade oxide and carbonate ores and small deposits of similar ores that cannot be economically worked by present methods. The ores are leached with dil. H₂SO₄ and the pptn. effected according to the equation: $2\text{CuSO}_4 + \text{H}_2\text{SO}_4 + \text{FeS} \rightleftharpoons \text{Cu}_2\text{S} + \text{FeSO}_4 + 2\text{H}_2\text{SO}_4$. Scrap Fe is more expensive as a precipitant than FeS, a minimum of 1.5 lbs. being consumed for each lb. of Cu pptd. as cement Cu. F. W. SMITHER.

Reverberatory smelting practice of Nevada Consolidated Copper Co. R. R. H. POMEROY. *Bull. Am. Inst. Mining Eng.* 1915, 445-53.—Data are given of the performance of a reverberatory furnace for a period of 4 months, together with a description of the plant. P. gives the following as the vital points: *Factors affecting efficient combustion of the fuel* (Calif. crude oil): (1) The use of a burner to give a proper atomization of the oil so as to obtain a long, uniform flame without overheating any portion of the furnace. (2) Regulation of the draft so as to furnish the proper mixt. of gases for complete combustion in the furnace. *Factors affecting the operation of the furnace proper*: (1) Careful prepn. of the charge by adequate mixing of all ingredients before charging. (2) Addition of enough CaCO₃ rock, preferably coarse, to produce an active boiling in the furnace. (3) Maintaining a deep bath of molten mat to equalize and distribute the heat over the whole of the hearth. (4) Frequent skimming so as to carry only a thin layer of slag over the mat bath. (5) Operating the furnace for the best smelting conditions, ignoring the waste heat boilers as factors in the power supply. *Factors affecting the life of the furnace*. (1) The furnace roof set high over the hottest portion of the hearth. (2) Frequent fettling to protect the side walls. (3) Frequent charging and active charge mixts. to avoid floater and blanket formation requiring excessive firing. Diagrams, curves, tables, and analyses are given. F. W. SMITHER.

Metallic copper from an iron blast furnace. P. W. HEIKE. *Stahl u. Eisen* 35, 313-6(1915).—After blowing out an iron blast furnace some Cu was found under a furnace sow. The metal was found to contain some Pb. It is possible that the presence of Pb has prevented the Cu from dissolving in the Fe. The latter contained only 0.25% Cu.

CARLE R. HAYWARD.

The progress of zinc blende roasting, mechanically, since 1911. E. SCHÜTZ. *Metall u. Erz* 3, 109-18(1915).

CARLE R. HAYWARD.

The metallurgy of zinc. FRANZ JURETZKA. *Metall u. Erz* 3, 63-9, 94-102(1915).—The high price of Zn has caused considerable activity in devising methods for recovering the metal from waste products, for the treatment of complex ores and for improving standard processes. Several of these processes are outlined under: *wet concentration, leaching, and pyro-chemical processes*. Wet concn. has been successful in treating muffle residues from Pb-Zn-Ag ores. One such process is outlined. Galvanized Fe scrap is being treated by heating, the Zn being recovered as oxide, or by leaching with HCl. Some ores are given a chloridizing or sulfatizing roast and leached with H₂O. Zn has been recovered from slags by passing CO or oil into the molten material. Another process for treating slags is to melt them in a reverberatory furnace and stir in coke to reduce the Zn. The fumes are recovered in bag filters. Muffles form a large item in Zn smelting processes, partly due to the time (90 days) it takes to cure them. The time has been materially cut with apparently no bad effects on the product by blowing air through a perforated tube placed inside the muffle. By thus having a current of air both inside and outside the muffle, rapid drying is effected without causing cracks. In some cases the time required is only 24 hrs. An improved form of muffle furnace is described and illustrated. The muffles each take about 500 lbs. charge and operate with 86% recovery. An app. for treating Zn ores by mixing them with C and blowing air through the mixt. is also described. The construction is simple and the exptl. work has proved successful. The Zn may be recovered either as metal or oxide.

CARLE R. HAYWARD.

The mining and reduction of quicksilver ore at the Oceanic Mine, Cambria, Calif. C. A. HEBERLEIN. *Bull. Am. Inst. Mining Eng.* 1915, 497-504.—Owing to the demand for Hg due to the European war (price has risen from \$35 to about \$50 per flask of 75 lbs.) the low-grade ores of Calif. are being worked. The low-grade mud rock of the Oceanic Mine, near San Luis Obispo, varies from 6 to 8 lbs. of Hg per ton. The pay vein averages 20 ft. in width, and has its own local characteristics. The method of mining employed is described; cost is \$1 to \$2 per ton of ore. Wet ores are first concd. and then treated in the Scott furnace; but the dry ores are directly charged into the Scott furnace of the usual type. The ore is crushed at the mine to about 1½ in. diam. and delivered to plant by a bucket tramway. The wet ore is fed by a challenge feeder into 3½ ft. Huntington mill provided with 16 mesh screen. Without settling the under-size passes directly to a Deister table. The charge contains about 0.3% Hg, or 6 lbs. per ton, and the concentrates carry about 5% Hg. The extn. is about 80% and the conc. ratio 20:1. Cost is about 50 cents per ton. The conc. of the wet ore is successful at the Oceanic but more costly than direct furnace treatment. The concentrates are dried and then charged into the Scott furnace, but not into the retort, as this would prove too expensive. The furnace plant consists of a 50-ton Scott tile furnace, one brick condenser, and 3 wooden (redwood) condensers. In the last 2 yrs.' operations many improvements have been made, among which are the automatic sealing of the charge; the reinforcing of the tiles; and radical changes in the firing and the system of condensing. About 110 flasks per month is the av. yield and the av. extn. = 90.8%. With a recovery of 91%, or 5.91 lbs. of Hg per ton, at 50 cents per lb., the value recovered would

be \$2.95 per ton at a total cost of \$1.50. Detailed descriptions with cuts are given.

F. W. SMITHER.

Recovery of mercury from residues of amalgamated cobalt ores. E. B. THORNHILL. *Can. Mining Inst. Bull.* 36, 263-8(1915).—Much Hg, chiefly as HgS , is retained in the amalgamation residues of cobalt high-grade Ag ores and concentrates in strong cyanide soln. The cake of residue from the cyanide soln., washed free of Ag with H_2O , is immersed in the filter basket in soln. of alk. Na_2S , which is slowly drawn through the cake till the effluent shows only a trace of Hg. The filtrate is then agitated with metallic Al, the ppt. of Hg allowed to settle, and the clear soln. decanted. The ppt. is washed with H_2O , the fluid Hg sepd. by raking, and the powdered remainder is retorted to recover Hg in the usual manner. A soln. of 4% Na_2S and 1% NaOH gives best results. The Al used is a waste product from Al casting foundries. One ton of soln. is used per ton of residue.

R. B. DOLE.

The reduction of manganese in the blast furnace. H. THALER. *Oesterr. Z. Berg-Hüttenw.* 62, 621-8(1914).—A comprehensive investigation which T. summarizes as follows: (1) The reduction can be done directly or indirectly. (2) The fuel consumption increases with rising % of Mn. (3) The extrn. rises with increasing Mn content of the Fe and purity of ore. (4) Hot running is favorable for Mn reduction. (5) The loss of Mn by slagging decreases with rising Mn content of Fe. (6) The basicity of the slag must approach 0.8-1.0. (7) The Mn content of the slag ranges from 8 to 10%. (8) The relation of Mn to Si in the charge must not exceed a certain limit or reduction of SiO_2 takes place. (11) The loss of Mn by volatilization amounts to 7-8% in a 20% spiegel.

E. J. ERICSON.

Titanium and titaniferous ores. PAUL H. BERGGREEN. Sibley Coll. *Chem. Eng.* 21, 168-9(1915).—B. gives a review of various researches on the reduction of these ores and on the effect of the presence of Ti in Fe and steel. Large future possibilities of Ti-Fe ores are suggested.

L. W. RIGGS.

Recent progress in flotation. O. C. RALSTON AND F. CAMERON. *Eng. Mining J.* 99, 937-40(1915).

E. J. C.

Metallurgical treatment of the low-grade and complex ores of Utah. D. A. LYON, et al. Dept. Interior, Bur. Mines, *Tech. Paper* 90, 39 pp.—A preliminary report under the captions: (a) review of mining in Utah (Au, Ag, Pb, Cu, Zn); (b) situation and extent of the low-grade ores; (c) examination of the mining districts; (d) chemical characteristics of the Utah ores (analyses of 60 samples reported); (e) types of ores analyzed: (1) Cu carbonate ores. (2) Oxidized ores carrying PbCO_3 and Ag. Most of the ores contain over 50% of insol. matter, but the amt. of sol. Fe and CaO presents some difficulties to the application of hydrometallurgical processes. (3) Oxidized ores carrying small amts. of Cu and Pb as carbonates and also Au and Ag; most of these ores are siliceous, but some of them are high in Fe and CaO and might be classed as basic. (4) Oxidized ores with Zn as the chief constituent; and carrying occasionally Au and Ag. Most of these ores are too low in Zn for the smelters, and the oxidized Zn minerals present frustrate attempts to recover the Au and Ag alone. Zn is too high for smelting in a Pb or Cu blast furnace. (5) Oxidized ores with Zn and Pb as the 2 chief valuable constituents, and occasionally carrying some Ag and Au. (6) Oxidized ore containing Zn, Pb, Cu, Au, and Ag. (7) Any of the above groups only partly oxidized. (8) Complex sulfides of Zn, Pb, Cu and Fe carrying Ag and Au. (f) Metallurgical treatment of the ores: no commercially successful process is known whereby the valuable minerals may be concd. out of the low-grade oxidized ores. Hydrometallurgical processes offer most promise. None of the concentrating processes in use effect as close a sepn. of the Zn and Pb in complex sulfide ores as is desirable. Under chloridizing

processes the Holt-Dern and the Knight-Christensen are briefly described and their operation at Park City and Silver City discussed. (g) Processes having a possible application to Utah ores: a brief discussion of processes, e. g., the Murex, sulfidizing and flotation, electrostatic sepn., chloridizing and leaching, Mosher-Ludlow process, Slater process, igneous conc., leaching with $(\text{NH}_4)_2\text{CO}_3$, leaching with acid and electrolytic pptn. of Zn, bisulfite process, etc. (h) Raw materials in Utah for use as reagents: NaCl and Na_2SO_4 (from which Na_2CO_3 , HCl, HClO_4 , FeCl_3 , etc., could be produced); Fe ore suitable for the production of sponge Fe, etc. (i) Allied problems, cheap power, fuel, utilization of by-products, etc. F. W. SMITHER.

Hall process for desulfurizing ores. ALFRED W. G. WILSON. *Summary Rept. Mines Branch, Canada Dept. Mines* 1913, 27-30.—The process consists in subjecting the crushed ore to the direct action of a non-oxidizing blow pipe flame and steam, keeping the ore within a temp. range of 700-925°. Under these conditions free S distills off with very little SO_2 , SO_3 , or H_2S . When conducted in multiple hearth furnaces 100 to 125 lbs. of ore per sq. ft. hearth area may be treated per day, leaving a cinder with less than 1% S. S is extd. from the fumes by washing or it may be pptd. electrically by the Cottrell method. The product is from 98% to 99.5% pure.

H. L. OLIN.

Clarifying water from wet concentration of ore. G. NICOLAI. *Mettall. u. Erz* 3, 135-40, 155-62 (1915).—Filtering is unsatisfactory for this purpose. The best results are obtained by adding alum but economic reasons may make the use of some other inorganic substance advisable. MgCl_2 or H_2SO_4 solns. or other salt solns. are satisfactory. CARLE R. HAYWARD.

A new method for determining the gases in iron. P. GOERRENS AND J. PAQUET. *Ferrum* 12, 57-64, 73-81 (1915).—About 3 g. of the metal are heated in a MgO crucible with 3 g. Sb and 3 g. Sn under a reduced pressure of 0.003 mm. at 1100° until no more gases are evolved. The CO_2 , CO, H and N are then detd. by the usual methods of gas analysis, the entire analysis taking about 3 hrs. In the samples tested by this method there was obtained 0.002 to 0.02% CO_2 , 0.0015 to 0.10% CO, 0.002 to 0.004% H and 0.0000 to 0.0141% N, the values for the last gas being unreliable. In a badly deoxidized elec. steel 10 times as much gas was obtained as in a carefully prepared steel of the same character and it is shown, by means of curves, that the gas content gives a very good means of detg. to what extent the material has been refined. W. T. H.

The importance of annealing steel castings. P. OBERHOFFER. *Stahl u. Eisen* 35, 93-102, 212-6 (1915).—The paper gives tabulated results of mechanical tests on annealed and unannealed specimens together with photomicrographs of structures, all of which show the importance of annealing. The results supplement former papers by O. (cf. C. A. 6, 3083; 7, 3100; 8, 49). CARLE R. HAYWARD.

A comparative study of simple and repeated shock tests and rotary and alternate bending tests. M. NUSBAUMER. *Rev. metal.* 11, I, 1133-90 (1914).—Numerous samples of C-steel and steel alloys were subjected to twisting strains, repeated shock and alternate bending tests with the following results: In C-steels the resistance to these tests is proportional to the content of C, when this is less than 0.25-0.30%. Ni-steels are generally more resistant than C-steels to repeated shock or alternate bending but not to twisting strains. Steels of high Ni content are not superior to mild C-steel in these respects. Ni-Cr steels are more resistant than Ni-steel to repeated shock and twisting. In the Ni-Cr steel series, it is always the very soft steel which shows the max. resistance. Tempering considerably increases the resistance to alternate bending tests, while annealing has the directly opposite effect. Tempering diminishes the resistance to repeated shocks. With C-steels and low content Ni-steels, tempering

followed by annealing raises the resistance to repeated shocks, while with Ni-Cr steels this resistance is diminished. Tempering not followed by annealing increases the resistance to repeated shock in the case of mild C-steel and especially of steels of low Ni content, but diminishes their resistance to alternate bending. Ni-Cr steels by this treatment are more resistant both to repeated shock and alternate bending tests. Whatever the kind of repeated tests a metal is subjected to, it always breaks by progressive fissuration. Numerous photographs, tables and curves are given. L. T. F.

Tungsten projectiles. R. VASSELIN. *Rev. d'artillerie* 83, 343-50; *Rev. metal.* 11, II, 769(1914).—The obvious advantages (d., hardness, tenacity) of W are pointed out. Owing to the fact that the annual production of W is only 2-3000 tons, however, its immediate employment in the manuf. of projectiles is unlikely. L. T. F.

The chemical and mechanical relation of iron, cobalt and carbon. J. O. ARNOLD AND A. A. READ. *Engineering* 99, 362-4(1915); cf. *C. A.* 9, 1295.—Correction of page number. E. J. C.

Gas-fired industrial furnaces 1. Solution control in ferric chloride leaching of sulfide copper ores (FLYNN) 7. Regenerators (STEIN) 21. Burning blast furnace gas (HUSSENER) 21. Furnace for roasting pyrites (BARTH) 1. Method of reducing metals in crystallized form on glass slips (BOWMAN) 2.

HANEMANN, H.: *Einführung in die Metallographie und Wärme-behandlung.* Berlin: Gebr. Borntraeger. 128 ss. 10 M.

U. S., 1,139,558, May 18. R. S. MOORE. **Furnace for heating metal billets, blooms or slabs preparatory to rolling or pressing.**

U. S., 1,139,825, May 18. A. E. VANDERCOOK. **Filtering solutions from ore pulp.** A layer of pulp is formed on the filter and the liquid from the pulp is forced through the filter under pressure of the body of liquid and suction beneath the filter. A large number of fine streams of the pulp are forced directly against the filter to prevent formation of a cake on the filter. Cf. *C. A.* 9, 1455.

U. S., 1,139,923, May 18. E. THAULOW. **Flux for welding aluminium, consisting of borax and a small % of an alkali metal bisulfate or pyrosulfate.**

U. S., 1,140,042, May 18. J. H. KLEPINGER and F. R. CORWIN. **Furnace for roasting ores, with superposed circular concrete hearths with lime rock facings on their upper surfaces.**

U. S., 1,140,125, May 18. G. L. DANFORTH, JR. **Checker-work regenerator for metallurgical furnaces.**

U. S., 1,140,131, May 18. J. V. N. DORR. **Apparatus for continuously separating liquids and solids of ore pulps, etc.** The solids settle and the liquid overflows from a settling tank. A hydrometer suspended below the level of the liquid automatically operates a device for permitting the discharge of settled solids when the density of the liquid has reached a certain point and also operates an elec. alarm. Cf. *C. A.* 9, 782.

U. S., 1,140,310, May 18. W. F. LAMOREAUX and C. W. RENWICK. **Reducing sulfur dioxide in smelter gases to free sulfur by passing the gases through an elec. heated bed of incandescent coke.**

U. S., 1,140,350, May 25. G. F. BEACH. **Hydrocarbon-fired furnace for heating metals.**

U. S., 1,140,550, May 25. G. E. WEISSENBURGER. **Making steel by heating a charge of Fe low in oxidizable constituents such as Si and Mn in a Bessemer converter**

until oxidation of C begins and then discontinuing the application of heat and directing a blast of air against the charge substantially to eliminate the oxidizable constituents.

U. S., 1,140,568, May 25. S. L. BROWN. **Hardening iron** by heating it to a white heat and then immersing it in boiling NaCl for about 5 min. Cu similarly treated and then scoured does not readily tarnish.

U. S., 1,140,700, May 25. C. O. MICHAELSEN. **Rotary ore classifier**. Cf. C. A. 9, 780.

U. S., 1,140,710, May 25. A. F. PLOCK. **Apparatus for sintering ores**. Cf. C. A. 8, 1409.

U. S., 1,140,764, May 25. C. F. PAIGE. **Ore concentrator**.

U. S., 1,140,793, May 25. W. J. BOUDWIN. **Apparatus for classifying and de-watering ore**.

U. S., 1,140,863, May 25. R. F. BACON. **Separating sulfide minerals from gang by flotation**. The flotation soln. is produced by the reaction of SO_2 on H_2S or other sulfide in the soln. in such proportions as to form an acid soln. of colloidal S.

U. S., 1,140,866, May 25. R. F. BACON. **Separating oxidized copper or other ores from gang**. The mixt. of ore and gang is treated with H_2S and H_2O and then SO_2 is introduced to render the soln. faintly acid and convert the H_2S into a colloidal S soln. in which flotation may be effected.

U. S., 1,140,872, May 25. P. J. BROWN. **Hot-blast stove for metallurgical furnaces**.

U. S., 1,140,898, May 25. W. GIBSON, SR. and R. SKEMP. **Galvanizing iron or steel sheets or other articles** by passing through a bath of the molten coating metal, then into a non-oxidizing atm. and applying powdered NH_4Cl or other flux to the molten surfaces of the coating as the articles come from the bath to prevent oxidation and produce more uniform distribution of the coating metal.

Brit., 736, Jan. 10, 1914. LÖTBAND-GES. and J. KREISSIG (NÉE ECKRICH). **Soldering wires**, or the like, end to end, by enclosing the joint in a combustible tissue, such as hemp, cotton, fleece, cellulose, paper, etc., coated with pulverized solder mixed with flux and satd. with a heat-producing agent, such as a hydrocarbon or other chem. compd. or mechanical mixt., which is ignited to effect the soldering. The heat-producing agent may be mixed with the solder.

Brit., 902, Jan. 13, 1914. J. ABT. **A fluxing composition for brazing cast Fe to cast Fe, rod Fe, or cast steel**, consists of a plastic comp. or paste formed by mixing powdered steel or Fe, borax, an oil not containing resin or acid, such as coconut oil, paraffin oil, or vaseline, and ethylated spirits, preferably in the proportion of 60 parts of steel, 20 of borax, and 10 each of oil and spirits. The comp. may be restored to its plastic condition, if it hardens after keeping, by the addition of a small quantity of methylated spirits. In applying the compn., the articles are cleaned by a stiff wire brush and H_2O , and the compn. then applied and the articles clamped together. The joint is surrounded by borax and the articles heated in a furnace or charcoal fire or blue burner. The joint is sprayed with spelter and then covered with curved sheet Fe to retain the heat. Borax is then applied to promote free fusion. The article is removed after cooling.

Brit., 908, Jan. 13, 1914. T. V. HUGHES. **In annealing and coating metals or metal articles**, the heating is effected in an atm. of inert gases satd. with the vapor of the metal or alloy under treatment or of the coating metal or alloy, or both. The inert gas is passed, on its way to the heat-treatment chamber, through heated passages containing scraps of the desired metal mixed or not with refractory or other material, and scraps of the metal may also be placed at or near the inlet to the chamber; or

the articles to be treated may be surrounded by or placed in spaces having partitions made of sheets or netting composed of or coated with the desired metal. The scrap metal may be remelted and granulated from time to time for re-use by pouring the molten metal into a liquid or by pounding or shaking it at the temp. of crystn.

Brit., 922, Jan. 13, 1914. H. KÖPPERS and AKT.-GES. PEINER WALZWERK. The solubility of **phosphate slag** in citric acid is increased by stirring in silicious material before the slag solidifies. Slag from the converter is run into trucks, and about 500-600 kg. of sand are added to 7000 kg. of slag. A crust is allowed to form, and then stirrers are plunged through this crust to incorporate the sand with the slag.

Brit., 933, Jan. 13, 1914. W. A. HILLS. In recovering tin, zinc, or lead from scrap, the coating metal is volatilized, and the Fe is melted in 1 operation in a neutral or reducing atm., an elec. or surface-combustion furnace preferably being employed. The vapors may be condensed before or after oxidation, and preferably a water spray condenser comprizing a vertical wheel rotating in a closed tank is used; or the vapors may be forced into H_2O by means of an injector, or centrifugal machines may be used. If acid or alkali be added to the H_2O , the metals may be recovered in the form of chlorides, sulfates, stannates, zincates, etc. The molten Fe is refined with fluxes in the ordinary way, and any Sn, etc., that enters the slag may be recovered.

Brit., 1,368, Jan. 17, 1914. A. H. HIGGINS and MINERALS SEPARATION, LTD. A process for the selective separation of different constituents of an ore by flotation consists in the sep. treatment of products containing particles of substantially uniform size or containing particles having substantially the same rate of fall in liquid. The factors of differential gaseous attachment and of differential falling power in liquid are thereby utilized, and concentrates relatively high in certain constituents and residues relatively high in others are obtained. The sized or classified products may be treated by the process described in 16,141, 1913, or in the app. described in 21,650, 1913 (C. A. 9, 782). The frothing-agent used is preferably partly sol. in H_2O , such as eucalyptus oil, and is present in very small quantity, more being added during the treatment if required. Acids, alkalies, or sol. salts may be present. Cf. C. A. 8, 1562.

Ger., 279,989, May 12, 1910. ELEKTROSTAHL, G. M. B. H. A process of imparting acid properties to steel, in a basic elec. furnace, consisting in bringing the steel into contact, in the basic elec. furnace, with silicious materials containing no oxides of the heavy metals, as, *e. g.*, mixts. of SiO_2 or Al silicate with C, so that these materials form Si compds. with the steel as a result of the gradual action, in the heat, on the steel bath, such Si compds. dissolving in the steel. SiC may be added, if necessary. Briquet-like material may also be added to the steel in the furnace, *e. g.*, material composed of Fe, C, SiO_2 , or fire brick, or their mixts., together with SiC.

Ger., 280,204, Sept. 14, 1913. ERHARD & SÖHNE. Welding furnace with metal bath heating.

Ger., 280,414, Dec. 2, 1913. K. ALBERT, CHEM. FABRIK and O. SCHLEIMMER. Mfg. cast iron or steel from galvanized Fe scrap, by melting the scrap down in a highly heated Fe bath containing C, whereby all the Zn is eliminated. The product is worked further, in the known manner, to cast Fe or cast steel. The ZnO, most of which is volatilized immediately, and the balance of which is driven off with the flue gases, is recovered by filtration. The Fe obtained from such scrap is free from S and O, as the Zn removes both S and O. When used in connection with the Siemens-Martin furnace, this process necessitates the provision of exhaust channels.

Ger., 281,105, Jan. 10, 1913. N. E. MACCALLUM. Removing or preventing ferric oxide deposits in the regenerators of Martin furnaces. See U. S., 13,782 (C. A. 8, 3178).

Ger., 281,178, Mar. 7, 1913. W. WEBER and H. STÄHLER, FABRIK FÜR DAMPKESSEL UND EISEN-KONSTRUKTIONEN. Device for mechanically handling and working the roast from siderite roasting furnaces. Cf. C. A. 8, 3007.

Ger., 281,292, Sept. 7, 1913. VEREINIGTE SCHMIRGEL- UND MASCHINEN-FABRIKEN AKT.-GES. v. S. OPPENHEIM & Co. and SCHLESINGER & Co. Constructional details of a tilting hearth melting furnace with 2 oil- or gas-firing nozzles directed obliquely down into the furnace, and at an angle to one another.

Ger., 281,293, Mar. 11, 1913. E. SCHULTE. Mfg. phosphor-copper by forcing molten P, with exclusion of air, by hydraulic pressure, into molten Cu in exactly detd. amts. A suitable furnace is specified.

Ger., 281,313, July 28, 1912. THE CLEVELAND WELDING AND MFG. CO. Electric welding device with roller electrodes.

10. ORGANIC CHEMISTRY.

C. A. ROUILLER.

Constitution of the glycerophosphoric acid in lecithin. O. BAILLY. *Compt. rend.* 160, 395-8(1915).—Willstätter and Ludecke (*Ber.* 37, 3754) have shown the presence of β -glycerophosphates in lecithin and Fourneau and Piettre (*C. A.* 7, 803) have succeeded in isolating 2 Ca glycerophosphates from the alcoholysis products of lecithin, without characterizing these compds. On hydrolyzing 100 g. lecithin from egg yolk, B. obtained a mixt. of Ca α - and β -glycerophosphates, which were readily sep'd. and identified by Grimbert and B.'s methods (*C. A.* 9, 1309). Egg lecithin therefore appears to be a mixt. of α -lecithin, $\text{HOC}_2\text{H}_4\text{NMe}_3\cdot\text{O}\cdot\text{P}\cdot\text{O}(\text{OH})\cdot\text{O}\cdot\text{CH}_2\text{CH}(\text{OR})\text{CH}_2\text{OR}$ (R = oleyl, stearyl or other acyl radical), and β -lecithin, $\text{HOC}_2\text{H}_4\text{NMe}_3\cdot\text{O}\cdot\text{P}\cdot\text{O}(\text{OH})\cdot\text{O}\cdot\text{CH}(\text{CH}_2\text{OR})_2$. Also in *J. pharm. chim.* 11, 204-13(1915). L. E. W.

Benzofulvanol and benzofulvene. V. GRIGNARD AND C. COURTOT. *Compt. rend.* 160, 500-4(1915); cf. C. A. 8, 3436.—Mg indene bromide in anhydrous Et_2O was heated and mechanically shaken (cf. C. A. 8, 2) with $(\text{CH}_2\text{O})_3$ for about 5 hrs. in H. The Et_2O soln. was then poured on ice, treated with NH_4Cl and NH_4OH to dissolve Mg salts, washed with H_2O , dried by means of Na_2SO_4 , and evap'd. (at temp. not $>50^\circ$). The residue, fractionated *in vacuo*, gave a 70% yield of α -benzofulvanol,

$\text{CH}:\text{CH}:\text{CH}:\text{CH}:\text{C}:\text{C}:\text{CH}(\text{CH}_2\text{OH})\cdot\text{CH}:\text{CH}(\text{A})$, $b_{10} 134^\circ$, possessing an odor of roses.

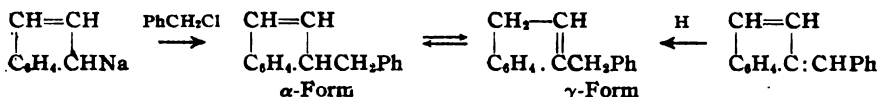
When passed over pure Al, heated to 250° under 15-20 mm., (A) is dehydrated and converted into benzofulvene (B), $\text{CH}:\text{CH}:\text{CH}:\text{CH}:\text{C}:\text{C}:\text{C}:(\text{CH}_3)\cdot\text{CH}:\text{CH}$, greenish

yellow leaflets, m. 37° , extremely unstable and polymerizing readily when kept *in vacuo* over H_2SO_4 or in sealed tubes, and forming the polymer, $(\text{C}_{10}\text{H}_8)_n$, vitreous yellow mass softening appreciably at 180° , but without definite m. p. (B) absorbs O and Br very readily. Other dehydrating agents such as ZnCl_2 , H_2SO_4 and KHSO_4 act upon (A), giving rise to resins. By treating Mg halide derivs. of fluorene and cyclopentadiene with aldehydes and ketones, G. and C. obtained fulvanols and dibenzofulvanol derivs. which yielded colored fulvenes and dibenzofulvenes upon dehydration.

LOUIS E. WISK.

Theory of oscillation of the indene double linkage. C. COURTOT. *Compt. rend.* 160, 523-6(1915); cf. preceding abst.—Thiele and Bühner (*Ann.* 347, 249) found that the reaction between PhCH_2Cl and indene in the presence of alkalis led to the formation of the benzy lindene (A), m. 34° , also obtained by the reducing action of Hg-Al upon

benzylideneindene. To account for the non-formation of 2 isomeric (α and γ) benzylindenes, T. and B. formulated their "indene double linkage oscillation" hypothesis, expressed schematically as follows:



Repeating T. and B.'s work, but carrying out the reaction between PhCH_2Cl and indene, by the use of a Mg indene halide, instead of alkali, C. obtained a liquid benzylidene (*B*), b_{14} 175–77°, readily converted into (*A*) by the action of alcoholic KOH. (*A*) adds 2 Br atoms, the dibromide losing HBr spontaneously with the formation of T.'s benzylideneindene. (*B*), on the other hand, yields a yellow dibromide which loses very little HBr and which forms resins on attempted debromination with $\text{C}_6\text{H}_5\text{N}$. It is evident that (*A*) is the γ -benzylidene and that (*B*) is the less stable α -isomer. The "indene oscillation hypothesis" is therefore untenable. C. cites other examples of indene isomerism. Ph_2CHBr acting upon a Mg indene halide yields α -benzhydrylindene, colorless, m. 161°, readily converted into the γ -isomer, m. 115–6°, also obtained by hydrogenation of diphenylbenzofulvene.

LOUIS E. WISE.

Crystalline calcium-theobromine. LOUIS ROUSSEAU. *Compt. rend.* 160, 363–5 (1915).—Calcium-theobromine, $(\text{C}_7\text{H}_7\text{O}_2\text{N}_4)_2\text{Ca}\cdot 9\text{H}_2\text{O}$ (*A*), radiating clusters of fine needles, was formed by treating 1 mol. $\text{Ca}(\text{OH})_2$ with 2 mols. theobromine in CO_2 -free H_2O . Very dil. acids acting upon (*A*) yield colloidal theobromine. This reaction may account for the intensity of the diuresis caused by (*A*), which is probably converted into colloidal theobromine by the gastric juice.

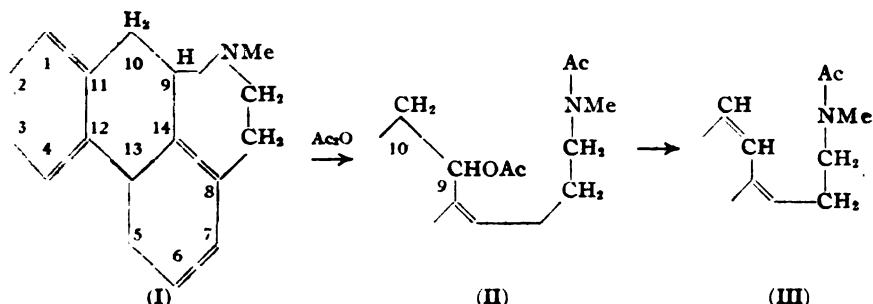
LOUIS E. WISE.

Catalytic hydrogenation of liquids under the influence of common metals at moderate temperatures and pressures. IV. Reduction of aliphatic compounds with ethylenic linkings. ANDRÉ BROCHET AND MAURICE BAUER. *Bull. soc. chim.* 17, 50–5 (1915); cf. *C. A.* 8, 3180.—In the following expts. the compds., usually in appropriate solvents, were mixed with relatively large amts. of active Ni (10–20 g. per 100 g. of compd.) and shaken in a H atm. under an initial pressure of about 15 kg. per sq. cm., at temps. ranging from 13° to 100°, depending on the nature of the substance and solvent used. During the course of the hydrogenation, the pressure frequently fell to 5–8 kg. per sq. cm. and in most expts. a fresh charge of H was required to complete the reduction. By these means $\text{CH}_2\cdot\text{CH}(\text{CH}_3)_2$ in EtOH was completely reduced at room temp. to $\text{Me}(\text{CH}_2)_3\text{Me}$, b_{724} 122–4°. $\text{PhCH}\cdot\text{CHCO}_2\text{H}$ (100 g. in 200 g. $\text{C}_6\text{H}_{11}\text{OH}$) was readily converted into $\text{Ph}(\text{CH}_2)_2\text{CO}_2\text{H}$ at 100° in about 1.25 hrs. This reduction proceeds more slowly when carried out in EtOH at temps. not exceeding 40°. In both cases, however, the solns. are contaminated by Ni salts. This difficulty was obviated by using $\text{PhCH}\cdot\text{CHCO}_2\text{Na}$ in H_2O , the reaction carried out at 13–21° going to completion in about 1 hr. and the alkalinity of the soln. apparently in no way affecting the activity of the Ni. Similarly $\text{PhCH}\cdot\text{CHCO}_2\text{Me}$ in MeOH was reduced to $\text{Ph}(\text{CH}_2)_2\text{CO}_2\text{Me}$, $b.$ 228–30°, and 3,4- $\text{CH}_2\text{O}_2\text{C}_6\text{H}_4\text{CH}\cdot\text{CHCO}_2\text{Na}$ in H_2O formed 3,4- $\text{CH}_2\text{O}_2\text{C}_6\text{H}_4(\text{CH}_2)_2\text{CO}_2\text{H}$ (?), b_{11} 171–2°. At 60–80°, anethole, without use of solvent, is converted into 4-MeOC₆H₄Pr, b_{78} 209–11°, which suffers no further reduction even at 190°. Eugenol, on the other hand, is reduced to dihydroeugenol (*A*), b_{718} 245–7°, which on further reduction at 200° yields octohydroeugenol, 3,4-MeO-(HO)C₆H₃Pr; phenylurethan, microcrystals, m. 272° (cf. Madinaveitia and Blanco, *Soc. espanola fis. chim.* 10, 381 (1913)). Safrole, on reduction, yields only dihydrosafrole, b_{781} 228–30°, even when the temp. is raised to 200°. Isoeugenol, when hydrogenated in EtOH at 15–22°, yields (*A*). V. Reduction under atmospheric pressure of aliphatic

compounds containing the ethylenic linking. With ANDRÉ CABARET. *Ibid* 55-9.—In these expts., H gas was bubbled through mechanically shaken solns. of unsatd. compds. containing suspensions of active Ni. Under these conditions, 1-octene, PhCH:CHCO₂H, its Na salt and Et ester, and 3,4-CH₂O₂C₆H₄CH:CHCO₂Na, may all be slowly but completely reduced to the corresponding satd. compds. The rate of hydrogenation of C₂H₅OH varied greatly in different expts., the catalyst apparently being poisoned during the course of the reaction. C₂H₅NCS suffered no reduction whatsoever, while isosafrole was rapidly and completely reduced to dihydrosafrole and anethole was more slowly converted into 4-MeOC₆H₄Pr. Unsatd. ketones could be converted into the corresponding satd. ketones by this method, whereas the use of H under pressure may cause reduction of the CO group. 30 g. 3,4-CH₂O₂C₆H₄CH:CHAc in 200 cc. EtOH in the presence of 20 g. active Ni were completely hydrogenated in 25 min. at 65-70°.

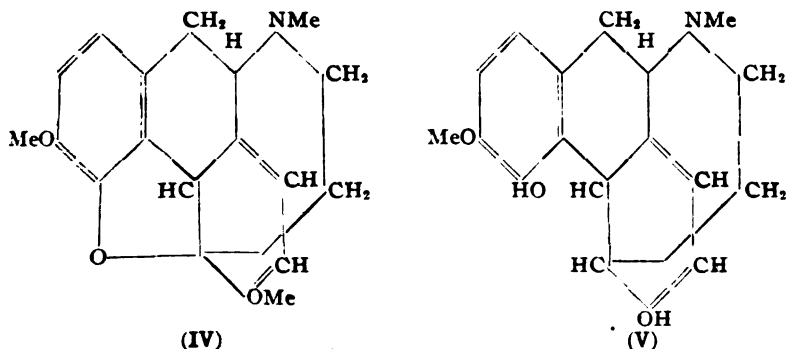
LOUIS E. WISE.

Action of acetic anhydride upon morphine alkaloids. M. TIFFENEAU. *Bull. soc. chim.* 17, 66-77(1915).—T. gives a review of the work of previous investigators in this field. The morphine alkaloids may be grouped into 3 classes according to their behavior towards Ac₂O. Morphothebaine, apocodeine and apomorphine (I) (Pschorr's



formula) and its derivs. all suffer fission between the 9-C atom of the phenanthrene nucleus and the adjacent N atom (with the formation of an amide, type III). Assuming that an unstable, intermediate acetylation product of type (II) is formed, which passes into (III), the fission may be considered a typical tertiary benzylamine reaction, analogous to the reaction: C₆H₄CH₂CH₂NMe.CH₃ + Ac₂O → AcO-

CH₂C₆H₄(CH₂)₂NMeAc (cf. C. A. 8, 1567). A 2nd class of alkaloids to which belong thebaine, codeinone and pseudocodeinone on treatment with Ac₂O undergoes a double rupture ("C and N fission"). As an example: thebaine (IV) forms thebayl acetate



and $\text{AcO}(\text{CH}_2)_2\text{NHMe}$. A 3rd class, which includes morphine, phenyldihydrothebaine (A), thebainone (V) (enol form), and codeine, suffers no rupture under the influence of Ac_2O , but simply yields the corresponding acetates. T. believes that the O bridge in (IV), which is lacking in (A), and (V) renders (IV) very much more sensitive to Ac_2O action. The typical benzylamine reaction to which the apomorphine alkaloids respond may be considered additional evidence in favor of Pschorr and Knorr's constitutional formulas (at least as far as the N-linking is concerned) and serve to reject such hypotheses as those of Gadamer (C. A. 8, 2875) who believes that the N in the morphine alkaloids is more probably linked to the 8-C atom of the phenanthrene nucleus.

LOUIS E. WISE.

Action of magnesium on halogen-substituted aromatic acids. YU. ZAL'KIND AND A. A. SHMIDT. *J. Russ. Phys. Chem. Soc.* 46, 681-7 (1914).—The previous work on this subject (C. A. 8, 3187) concerned compds. in which both the Br and the CO_2H were in the side chain. Extending the investigation to substances having either one or both of these substituents in the ring, the following regularities were established: Substances with both the Br and the CO_2H in the ring, as a rule, do not react with Mg (cf. Meyer and Toegel, *Ann.* 347, 71), and when the reaction is forced by prolonged warming with Mg activated with I the result is not formation of compds. of the Grignard type, but a sapon. of the ester group. The removal of the CO_2H alone to the side chain also has comparatively little effect on the mobility of the Br. But when the Br alone is in the side chain the reaction is greatly facilitated. Even then, however, the *p*-derivs. (e. g., *p*- $\text{CH}_2\text{BrC}_6\text{H}_4\text{CO}_2\text{Et}$) are almost inactive, only the *o*- and the *m*-derivs. reacting with Mg. The reaction in this case is similar to that of the β -halogen-substituted esters previously examd., more than 1 mol. of ester entering into reaction with formation of esters of dibasic acids. Thus in the reaction of *o*- $\text{CH}_2\text{BrC}_6\text{H}_4\text{CO}_2\text{Et}$ (a) with activated Mg 3 mols. of it condense to form the *hydroxy acid*, *o*- $\text{MeC}_6\text{H}_4\text{C}(\text{OH})(\text{CH}_2\text{C}_6\text{H}_4\text{CO}_2\text{H})_2$ (amorphous *silver salt*; *acetate*), and the *m*-ester corresponding to (a) gives the corresponding *m*-acid, amorphous, becomes yellowish 250° , decomps. 280° (*silver salt*; *acetate*), gives upon oxidation *m*- $\text{MeC}_6\text{H}_4\text{COCH}_2\text{C}_6\text{H}_4\text{CO}_2\text{H}$ and *m*- $\text{C}_6\text{H}_4(\text{CH}_2\text{OH})\text{CO}_2\text{H}$. The Me ester corresponding to (a) did not react with Mg.

H. M. GORDIN.

Action of magnesium on the esters of bromosuccinic acid. YU. S. ZAL'KIND. *J. Russ. Phys. Chem. Soc.* 46, 688-92 (1914).—With a view to examg. the action of Grignard's reagent on the halogen-substituted esters of dibasic acids, expts. were made with Me and Et monobromosuccinates. It was found that the Me ester reacts less readily than the Et ester, the former requiring activated Mg, while the latter requires only a small crystal of I. Both esters yielded the corresponding esters of fumaric acid, showing elimination of HBr, together with the 2 isomeric esters of butanetetracarboxylic acid, showing that the reaction partly resembles that of Wurtz-Fittig, 1 mol. of $\text{RCO}_2\text{CH}(\text{MgBr})\text{CH}_2\text{CO}_2\text{R}$ reacting with 1 mol. of $\text{RCO}_2\text{CHBrCH}_2\text{CO}_2\text{R}$ with formation of MgBr_2 . In the case of Et bromosuccinate there also was a condensation of 3 mols. of the ester with formation of the ester of a *pentabasic acid*, $\text{EtO}_3\text{C}-\text{CH}_2\text{CH}(\text{CO}_2\text{Et})\text{C}(\text{OH})(\text{CH}_2\text{CH}_2\text{CO}_2\text{Et})\text{CH}(\text{CH}_2\text{CO}_2\text{Et})\text{CO}_2\text{Et}$, m. 257° ; *silver salt*.

H. M. GORDIN.

Saponification of esters with activated magnesium and the etherate of magnesium iodide. YU. ZAL'KIND. *J. Russ. Phys. Chem. Soc.* 46, 692-7 (1914).—Observation showed that when Mg activated according to Bayer or simply Mg mixed with a little I is used in Grignard's reaction with some esters there is, along with the formation of compds. of the Grignard type, partial sapon., resulting in the production of the acids underlying these esters. In order to exam. the extent of sapon., the yield in acids and its relation to the conditions of the reaction were examd., using BzOEt and the es-

ters of *o*- and *m*- $\text{BrC}_6\text{H}_4\text{CO}_2\text{H}$. The conclusions arrived at are as follows: In no case is the sapon. complete. This may be due either to the existence of a limiting state of equil., or to the reacting mass becoming so thick that proper interpenetration of the interacting substances is impeded. The latter cause would explain why the acid yield is independent of the amt. of MgI_2 etherate used. Mg alone causes no sapon., but when both Mg and I are present sapon. takes place, no matter whether we use the ready-made etherate or activated Mg or simply a mixt. of Mg and powdered I. The extent of sapon. is increased by increasing the amt. of activated Mg, by raising the temp. of the reaction, or by lengthening the time of heating. If only the required amt. of activated Mg is used, there is no resinification, and the reaction is a simple sapon. without the formation of any new substances. With BzOEt , *e. g.*, the reaction is either: $\text{BzOEt} + \text{MgI}_2 = \text{BzOMgI} + \text{EtI}$, or $\text{BzOEt} + \text{BzOMgI} = (\text{BzO})_2\text{Mg} + \text{EtI}$. With an excess of Mg there is considerable resinification, and the reaction is more complicated, the EtI produced interacting with the Mg, giving EtMgI which reacts with more EtI to form MgI_2 and C_2H_{10} . The formation of the latter accounts for the (slight) pressure observed when the reaction is carried out in a sealed tube. H. M. G.

Reaction of dibromomethyl ether with benzene in presence of aluminium bromide. I. L. RABTZEVICh-ZUBKOVSKII. *J. Russ. Phys. Chem. Soc.* 46, 698-704 (1914).—In many respects $(\text{CH}_2\text{Br})_2\text{O}$ (a) behaves like acid chlorides (is decompd. by H_2O , reacts with alcs., etc.). Since the latter interact with C_6H_6 in presence of AlBr_3 to form ketones, (a) was expected to yield under these conditions some or all of the isomeric compds., $\text{C}_6\text{H}_4\text{CH}_2\text{OCH}_3$. Expts. proved, however, that neither in CS_2 nor in C_6H_6

are such compds. produced. In CS_2 nothing but anthracene (b) could be found, while in C_6H_6 the reaction product consisted chiefly of PhCH_3 (c), together with considerable amts. of *p*- and *m*-(PhCH_2) C_6H_4 (d), small amts. of (b) and PhMe (e), some high boiling hydrocarbons (not examd.), and some resinous matter. The formation of (b), (e) and (d) may be accounted for by assuming that the AlBr_3 changes (a) to CH_2Br_2 , part of which reacts with C_6H_6 like CH_2Cl_2 , giving (b) and (e) (Friedel and Crafts, *Ann.* [6] 11, 263), while another part gives with C_6H_6 PhCH_2Br , which interacts with (c) to form (d). The non-formation of the *o*-isomer of (d) may be explained in the same manner as the non-formation of *o*-xylene in the methylation of C_6H_6 (Jacobsen, *Ber.* 18, 338). H. M. GORDIN.

New method of making dibromomethyl ether and methylene bromide and iodide. V. E. TISECHENKO AND I. L. RABTZEVICh-ZUBKOVSKII. *J. Russ. Phys. Chem. Soc.* 46, 705-8 (1914).—The method previously given for prepg. $(\text{CH}_2\text{Br})_2\text{O}$ (a) (*Ibid* 19, 472), while giving a good yield, is not convenient when larger amts. of it are needed, because then the satn. of $(\text{CH}_2\text{O})_2$ (b) with HBr requires several days. A much quicker method consists in mixing (b) with P, Br and H_2O : $2\text{P} + 10\text{Br} + 3\text{H}_2\text{O} + 10\text{CH}_2\text{O} = 2\text{H}_3\text{PO}_4 + 5(\text{CH}_2\text{Br})_2\text{O}$. If all the ingredients are mixed the H_2O will not suffice to properly moisten the mass. It is therefore better to take all the H_2O at once and add to it the P, Br and (b) in small portions at a time. Yield, 60%. When (a) is mixed with AlBr_3 there is an evolution of heat but no reaction at ordinary temp. On quickly heating this mixt. to $150-60^\circ$ a violent reaction takes place, and HBr is evolved in torrents. When heated only to $100-8^\circ$, or very slowly to $175-80^\circ$, the reaction is moderate, and the product upon addition of H_2O yields very pure CH_2Br_2 . Yield, 60%. Similarly with AlI_3 (a) yields CH_2I_2 . H. M. GORDIN.

Oxonium compounds of sulfuric acid with ethers. V. V. CHELINTZEV AND N. A. KOZLOV. *J. Russ. Phys. Chem. Soc.* 46, 708-25 (1914).—It having been shown by several investigators that ethers form definite chem. compds. with H_2SO_4 , C. and K. undertook to prep. these compds. in cryst. form, and to exam. them in respect to their

mol. wt. and heat of formation. The ethers used were Et_2O and $\text{iso-Am}_2\text{O}$, and the results obtained as follows: When 100% H_2SO_4 is mixed with either of these ethers and the mixt. cooled with liquid air, cryst. compds. are produced: $\text{H}_2\text{SO}_4 \cdot \text{Et}_2\text{O}$, m. -66.4° ; $\text{H}_2\text{SO}_4 \cdot 2\text{Et}_2\text{O}$, m. -88° ; $\text{H}_2\text{SO}_4 \cdot (\text{C}_6\text{H}_{11})_2\text{O}$, m. -47° ; $\text{H}_2\text{SO}_4 \cdot 2(\text{C}_6\text{H}_{11})_2\text{O}$, m. -74° . That in this reaction there is no decompn. of ether with formation of alkyl sulfate was proved by titrating the H_2SO_4 , both immediately after mixing the acid and ether in mol. quantities and after letting the mixt. stand for nearly 2 months. To each of the above compds. corresponds a definite thermal effect, the amts. of their heats of formation being: 6.83, 8.57, 6.15, 7.3 large cal., resp. Further addition of either of the ethers of these compds. causes no thermal effect whatever, the compds. merely going into soln. These solns. are homogeneous when both the ethers and the H_2SO_4 used are perfectly pure, otherwise an aq. layer seps. out. The compds. are readily sol. in MeOH , EtOH , AcOH , AcOEt , H_2SO_4 and POCl_3 , but almost insol. in hydrocarbons, EtBr , $\text{C}_2\text{H}_5\text{Br}$, and PhBr , and but slightly sol. in C_6H_6 . It is possible that at least in some of these solns. there is an interaction between solute and solvent with a replacement of the ethers by other mols. For the f. p. detn. of the mol. wts. of these compds. AcOH and POCl_3 were used as solvents. It was found that in both solvents there is a dissociation into the components and formation of complex compds. In the case of AcOH there is reason to assume the formation of $\text{H}_2\text{SO}_4 \cdot \text{AcOH}$ from the mono-etherates and $\text{H}_2\text{SO}_4 \cdot 2\text{AcOH}$ from the di-etherates. The etherates are supposed to be oxonium compds. having the formulas $(\text{R}_2\text{HO})_2\text{SO}_4$ and $\text{R}_2\text{HOSO}_4\text{H}$. Attempts were also made to obtain compds. from H_2SO_4 and methylal, ethylal and anisole. The amts. of H_2SO_4 consumed per mol. of these substances showed that in these cases there must be formation of both oxonium compds. and other complexes. H. M. GORDIN.

Gustavson's vinyltrimethylene and ethylidenetrimethylene. AL. FAVORSKII AND V. BATALIN. *J. Russ. Phys. Chem. Soc.* 46, 726-9(1914); cf. *C. A.* 8, 3443.

H. M. GORDIN.

α -Thiitolene, α, α -iodothiitolene and α, α -thiitolene aldehyde. ANNA VLASTELITZA. *J. Russ. Phys. Chem. Soc.* 46, 790-800(1914).—The following modification of Paal's method for making α -thiitolene (a) (*Ber.* 19, 556) increased the yield to 49%. An intimate mixt. of Na levulinate, dried at 120° , P_2S_5 and sand was distd. and the distillate again mixed with P_2S_5 and sand and again distd. The product is purified by satg. it with KOH and distg. first over KOH and then over Na . By means of $\text{I} + \text{HgO}$ (a) was changed to α, α -iodothiitolene (b) (yield, 73%), yellowish oil of an agreeable odor, $b_{16.7} 94^\circ$, partly decomp. with liberation of I on exposure to light, d_4^{20} 1.8794, d_4^{24} 1.8734, MR 42.03, coeff. of surface tension 4.2535. By means of $\text{Mg} + \text{CH}(\text{OEt})_3$ (b) was converted into α, α -thiitolene aldehyde (c), which reacted with N_2H_4 to form the azine, $\text{C}_{12}\text{H}_{12}\text{S}_2\text{N}_2$, yellow crystals, m. $125.4-6^\circ$. When heated nearly to boiling for 1 hr. with $\text{AcOEt} + \text{NH}_3$ in alc., (c) gave diethyl α, α -dimethyl- γ - α -thiitolenylpyridinedicarboxylate, $\text{C}_6\text{H}_5\text{SCH.C}(\text{CO}_2\text{Et})\text{:CMe.NH.CMe:C}(\text{CO}_2\text{Et})$, white needles,

m. $148-8.4^\circ$. In presence of alk. (c) condenses with AcCH:CHPh to form benzylidenemethylthienylideneacetone, $\text{S.CMe:CH.CH:CCH:CHCOCH:CHPh}$ (yield

55%), yellowish needles with a pretty play of green and red colors, m. $58.5-60.5^\circ$, colors H_2SO_4 or HCl blood-red, but the color disappears upon addition of H_2O with sepn. of dark needles, is changed by HNO_3 and diln. with H_2O to rose-colored crystals. With PhNMe_2 in presence of ZnCl_2 at 100° (c) interacts to form tetramethyldiaminodiphenylthiotonylmethane (leucothiitolene blue-green), $\text{C}_6\text{H}_5\text{SCH}(\text{C}_6\text{H}_4\text{NMe}_2)_2$, white needles, m. $131.4-1.8^\circ$; in alc. it oxidizes on exposure, turning intensely green. Tetramethyldiaminodiphenylthiotonylcarbinol (thiitolene blue-green), $\text{C}_6\text{H}_5\text{SC}(\text{OH})(\text{C}_6\text{H}_4\text{-$

NMe_2 ; (d), was made by acting with $\text{CO}(\text{C}_6\text{H}_4\text{NMe}_2)_2$ on the Mg org. compd. of (b); bright gray, indistinctly cryst. powder, begins to char, without m., at 130° , sol. in Et_2O when fresh, but on standing in the air changes to an insol. modification; dissolves in strong acids, but is reprecipitated by H_2O ; its soln. in strong acids colors silk and wool raspberry-red, changing to blue-green upon addition of H_2O ; it is a fast dye and possesses great covering power. By the action of ZnCl_2 on (d) in HCl the zinc chloride double salt of thiolatene blue-green, $3[\text{C}_6\text{H}_4\text{SC}(\text{C}_6\text{H}_4\text{NMe}_2):\text{C}_6\text{H}_4:\text{NMe}_2.\text{Cl}].2\text{ZnCl}_2.3\text{H}_2\text{O}$, was obtained; brown crystals of a Cu luster, begins to char 150° , has a pretty blue-violet color in alc., colors fabrics blue.

H. M. GORDIN.

Note on the article of Stadnikov and Kuz'mina-Aron: "Action of carbonic anhydride on the etherates of alkyl-magnesium halides." A. E. CHICHIBABIN. *J. Russ. Phys. Chem. Soc.* 46, 800-2 (1914).—The conclusions in favor of Grignard's formula for the etherates of Mg org. compds., drawn by Stadnikov and Kuz'mina-Aron (*C. A.* 7, 983), are, according to C., untenable, their expts. being easily interpreted without regarding the etherates as oxonium compds. Thus the reaction between Ph_3CHOBu and PrMgI and the evolv. of CO_2 may be explained as follows: $\text{Ph}_3\text{CHO-Bu} + \text{PrMgI} = \text{Ph}_3\text{PrCH} + \text{BuOMgI}$. The latter reacts with CO_2 to give a mixed Mg salt of HI and BuOCO_2H : $\text{BuOMgI} + \text{CO}_2 = \text{BuOCO}_2\text{MgI}$. This salt is decomposed by mineral acids with evolv. of CO_2 : $2\text{BuOCO}_2\text{MgI} + 2\text{HCl} = 2\text{CO}_2 + \text{MgI}_2 + \text{MgCl}_2 + 2\text{BuOH}$. The unchanged Ph_3CHOPr which they recovered in the reaction of Ph_3CHOPr with PrMgI most probably contained a considerable amt. of Ph_3CHPr whose presence in the ether they failed to notice because the b. p. of both is the same. In general, G.'s formula cannot be accepted until a satisfactory explanation is given why the etherate obtained from Et_2O and AmMgI and that obtained from EtOAm and EtMgI give different products upon decompn. with H_2O (Chelintzev, *Individual Magnesium-Organic Compounds*, Moscow, 1908, 126). Unless additional hypotheses be made of there being a difference between the 4 valences of the O, the comp. of the etherate ought to be in both cases the same, Et_2AmOMgI , and, therefore, the decompn. products also ought to be the same.

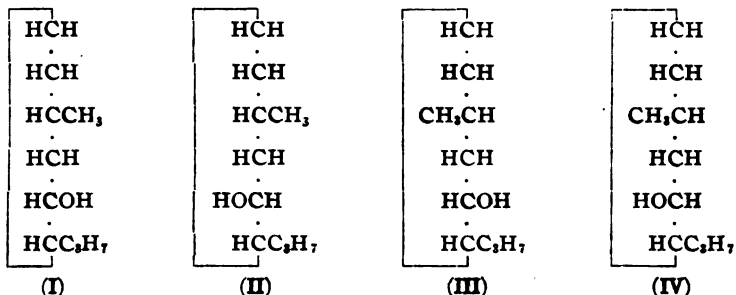
H. M. GORDIN.

Preparation of ethers from aldehyde and ketone acetals and magnesium organic compounds. A. E. CHICHIBABIN AND S. A. ELGAZIN. *J. Russ. Phys. Chem. Soc.* 46, 802-14 (1914); cf. *C. A.* 8, 3443.

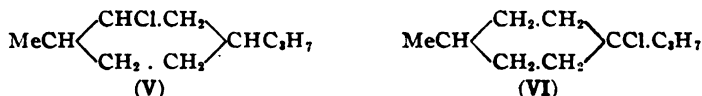
H. M. GORDIN.

Menthol and some of its derivatives. N. I. KURSANOV. *J. Russ. Phys. Chem. Soc.* 46, 815-45 (1914).—When menthol (a) in C_6H_6 is carefully and with const. cooling added to PCl_5 covered with C_6H_6 , crude menthyl chloride (b) results, consisting of a mixt. of isomeric chlorides. Boiling KOH in alc. changes all of these to menthene (c), except the so-called permanent menthyl chloride (d), but the latter thus prep'd. is contaminated with some menthyl Et ether (e), while by heating (b) with PhNH_2 (200:214) to $160-70^\circ$ for 6 hrs., then acidifying with a weak acid, fractionating the product, and repeating these operations 3 times, (d) is obtained pure; liquid of agreeable odor, b_m $111-2^\circ$, b_{10} $109-10^\circ$, d_4^{20} 0.9365, d_4^{20} 0.9424, $[\alpha]_D^{20} -51.23^\circ$, is not decomposed by alc. KOH at 100° , but prolonged heating on a sand bath with PhNH_2 (1:3) changes it, as well as (b), to (c). From the impure (d) obtained from (b) and KOH it was not possible to isolate (e), but its presence therein was proved by boiling this (d) with an excess of Na in Et_2O . The product, consisting of (c), menthane (f) and cryst. dimethyl (g), had, after removing the (c) and the (f), the odor of (e), while (g) obtained from the pure permanent (d) by the same method was free of this odor. In still larger amt. is (e) produced when NaOH is used instead of KOH in the reaction with (b). Attempts to convert (d) into (a) by means of AcOAg or BzOAg were not successful, the reaction yielding nothing but (c). Grignard's reagent, without the addition of I, does not react with (d), but in presence of a small cryst. of I a reaction takes place with evolution

of heat. If after the reactions slacken the mixt is boiled for 3 hrs., and after cooling a current of O passed into it, the product is found to consist of (c), (f), (g) and natural (a) (purified by changing it to the acid menthyl phthalate and sapon.), without a trace of the other isomers of the latter. This shows that (d) is the menthyl chloride corresponding to natural (a). If, instead of (d), (b) is subjected to Grignard's reaction, and the product treated in exactly the same manner, the result is a mixt. containing both the products given under the same conditions by (d) and the liquid isomers of (g) and (a). If the reaction product of Grignard's reagent with either (d) or (b) is not boiled and treated with O as above, but a current of CO₂ is passed into it, menthancarboxylic acid (h) (Zelinskii, *Ber.* 35, 4417) is produced in both cases, but while from (d) only the cryst. modification of (h) is formed, and the latter is unaccompanied by other substances, (b) yields a mixt. of the cryst. and liquid isomers of (h), together with (c), (f) and the cryst. and the liquid isomers of (g). Owing to the presence of 3 asym. C atoms in (a), the latter ought to exist in 4 spatial configurations (I-IV) of which each



gives 2 antipodes and 1 (*l* + *d*) modification. To these 4 (a) correspond 4 (d). The formation of the 2 isomeric (g) from (b) in Grignard's reaction indicates that (b) contains at least 2 of these (d), but it is possible that it also contains some carvomenthyl chloride (V) and the tertiary chloride (VI). Since (VI) is incapable of giving (g) in Wurtz'



reaction (*J. Russ. Phys. Chem. Soc.* 33, 300), and since all the derivs. of (V) boil considerably higher than those of (a) (Bayer, *Ber.* 29, 824), while the liquid (g) boils at the same temp. as the crystals, we must assume that the formation of the 2 modifications of (g) is due to the presence in (b) of 2 of the isomers of (d), 1 giving the cryst., the other the liquid (g). If there be (VI) in (b), it may owe its formation to a splitting off and subsequent addition in another order of HCl. Of the 4 stereoisomeric (d) corresponding to (I-IV), the 2 corresponding to (I) and (III), having the tertiary H of the CH to which the C₂H₅ group is linked further removed from the Cl (*trans*-arrangement), are stable, while the other 2 (d), corresponding to (II) and (IV) in having that H nearer to the Cl (*cis*-arrangement), are unstable. Since only 2 isomeric (h) are produced from (b), it must contain only 2 isomeric (d), 1 stable, the other unstable. The formation of only 2 of the 4 possible chlorides from (a) by PCl₅ is due to the fact that only the groups attached to the C linked to the OH in (a) undergo a spatial rearrangement, giving a stable and an unstable compd., the groups attached to the other 2 asym. C atoms remaining unchanged. Hence, of the 2 chlorides in (b) 1 corresponds to either (II) or (IV), the other to either (I) or (III). Since pure (d), representing the stable modification, is a *trans* compd., natural (a), being obtainable from it, must also be a *trans* compd., either (I) or (III), while the liquid (a) must be a *cis* compd. For a complete

knowledge of the configuration of natural (*a*) we would have to know the spatial positions of the H and the Me at the 3rd asym. C. While this knowledge is lacking, we have reason to assume that in natural *l*-(*a*) the C to which the iso-Pr is linked is *l*-rotatory, while the C attached to the Me is *d*-rotatory. This conclusion is arrived at by a somewhat lengthy consideration of the relation between the rotations of natural (*a*) and *l*-menthone (*i*), in connection with the fact that the latter is converted by H_2SO_4 into isomenthone which is not the antipode of (*i*), its *d*-rotation being greater than the *l*-rotation of (*i*) (Beckmann, *C. A.* 3, 1273). The cryst. and the liquid (*b*) correspond to *trans*- and *cis*-(*a*), resp., while the ethylmenthane previously described (*J. Russ. Phys. Chem. Soc.* 33, 301), having the Et in the same position as the OH in natural (*a*), has a configuration like the latter. Similarly the configuration of the cryst. (*g*) is given by the relation of the latter to natural (*a*). Menthyl phenyl ether, $\text{C}_{11}\text{H}_{19}\text{OPh}$ (*j*), was prepd. as follows: K was heated with double the required amt. of (*a*) till soln. was effected. To the resulting K mentholate a very slight excess of PhI (*k*) and a small amt. of finely divided Cu (*Naturkupfer*, Ullmann and Sponagel, *Ber.* 38, 221) were added, and the mixt. heated to 140° , when a ppt. began to appear and brisk boiling set in, which continued even after the removal of the source of heat. When the boiling ceased the mixt. was heated for 8 hrs. to $150\text{--}60^\circ$ and then fractionated by distn. 40% of (*k*) was recovered as C_6H_6 , part of the mentholate was reduced to (*a*), and another part oxidized to menthone, while the yield of (*j*) was 40%; needles, m. $52\text{--}3^\circ$, b_{11} $150\text{--}1^\circ$, $[\alpha]_D^{20} -128.11^\circ$, easily sol. in org. solvents. If the Cu is omitted the result is a mixt. of C_6H_6 and much resin, but contains no (*j*). Similar results were obtained by using PhBr instead of (*k*), but in this case the reaction is less energetic, and the yield of (*j*) only 20%. In the same way, by replacing K with Na the yield of (*j*) drops to 25%. The relation of (*j*) to natural (*a*) shows it to be a *trans* compd. By the same method, in presence of Cu, PhOEt was obtained from (*k*) + EtOK (yield 35%) and from (*k*) + EtONa (yield, 45%), while in absence of Cu the reactions gave nothing but C_6H_6 , the expected AcH evidently being completely resinified. Heated alone in a sealed tube to 250° for 3 hrs. (*j*) remains unchanged, but when heated with a little HCl to 170° it gives PhOH, the unstable (*d*) (proved by its yielding (*c*) with KOH in alc.) and a mixt. of isomeric menthylphenols, $\text{C}_{10}\text{H}_{19}\text{C}_6\text{H}_4\text{OH}$ (*m*), immobile resin at ordinary temp., vitreous mass. at very low temp., and oily liquid at 100° , b_{11} $179\text{--}86^\circ$, optically inactive, is converted by alkali into almost insol. phenolates that are completely hydrolyzed by H_2O , gives a urethan $\text{C}_{22}\text{H}_{31}\text{O}_2\text{N}$, m. 141° , from the mother liquor of which a small amt. of another cryst. substance, m. 136° , was isolated. The isomerization of (*j*) to (*m*) is not as simple as the isomerization of $\text{PhOCH}_2\text{CH:CH}_2$ to $\text{CH}_2\text{:CHCH}_2\text{C}_6\text{H}_4\text{OH}$ (Calisen, *C. A.* 6, 1016) where no intermediate substances are formed. It is proved by expts. that (*m*) may also be made by the interaction of (*d*) with PhOH, and that this reaction is reversible. Hence the isomerization of (*j*) to (*m*) is due to the action of the (*d*) on the PhOH produced intermediately, the reaction taking place in 2 steps: $\text{C}_{10}\text{H}_{19}\text{OPh} + \text{HCl} = \text{C}_{10}\text{H}_{19}\text{Cl} + \text{PhOH}$, $\text{C}_{10}\text{H}_{19}\text{Cl} + \text{PhOH} \rightleftharpoons \text{C}_{10}\text{H}_{19}\text{C}_6\text{H}_4\text{OH} + \text{HCl}$. Since the HCl is constantly regenerated, its effect is merely catalytic, and a mere trace of it will suffice to isomerize (*j*) to (*m*). Owing to the reversibility of the reaction between (*d*) and PhOH, (*m*) may be produced in as large a yield as 82% by heating them, not in a sealed tube, but in a vessel closed only with a CaCl_2 tube, so that the HCl is driven off as soon as produced. The (*m*) obtained from (*d*) + PhOH is sometimes very slightly *l*-rotatory, and that part of (*d*) which fails to react is found to have changed to its unstable modification, though the latter also reacts with PhOH to give (*m*). The isomerization of (*j*) to (*m*) seems to be but a particular case of a general reaction. Thus PhOEt may be converted by the same method to $\text{EtC}_6\text{H}_4\text{OH}$. The work in this direction is to be continued.

H. M. GORDIN.

Action of ethylmagnesium iodide on α -thienyl ethyl ketone. E. DOMRACHEVA. *J. Russ. Phys. Chem. Soc.* 46, 864-7(1914).— α -Thienyl Et ketone (a) was made by the action of EtCOCl on thiophene in presence of AlCl₃. Yield, 60%. Treated with EtMgI in Et₂O and decompd., with NH₄Cl, (a) gave *diethyl- α -thienylcarbinol*, Et₂-(C₄H₃S)COH (b), thick liquid, solidifying to a glassy mass when cooled with liquid CO₂, b₁₈ 116-70°, d₄^{15.6} 1.0779, MR 48.66. Heated for 1 hr. to 120° with (CO₂H)₂, (b) loses H₂O, changing to *methylethylthienylethylene*, MeCH:CEt(C₄H₃S) (c), liquid of a characteristic odor, b₁₈ 90-1.5°, solidifies to a vitreous mass at -80°, takes up 2 atoms of Br, but the resulting bromide at once begins to lose HBr and resinifies, yields upon oxidation with KMnO₄ a small amt. of α -thiophenecarboxylic acid. The formation of (c) was accompanied by a *dimer* C₁₈H₁₄S₂, thick yellowish liquid of a feeble odor, b₁₈ 213-8°.

H. M. GORDIN.

Reaction of esters with magnesium organic compounds. I. G. L. STADNIKOV. *J. Russ. Phys. Chem. Soc.* 46, 868-87(1914).—The comp. of the complex produced in the 1st stage of interaction of an ester RCO₂R' with a Mg org. iodide R'MgI is according to Chichibabin (*J. Russ. Phys. Chem. Soc.* 37, 180; 38, 327) RR'C(OR')OMgI, while according to Reformatskii it is RCOR". Usually an excess of the Mg org. iodide is used in the reaction, the mixt. is warmed, and then decompd. with H₂O. Under these conditions the above complex reacts with another mol. of the Mg org. iodide, and the final product, usually being a tertiary alc., gives no clue to the comp. of the complex formed in the 1st stage of the reaction, since a compd. of either of the above formulas may thus be made to yield such an alc. If, however, only 1 mol. each of ester and Mg org. compd. be used, or the product, without being warmed, be at once decompd. with H₂O, there ought to be produced, according to these formulas, a ketone and the alc. whose ester was taken in the reaction. Since S.'s expts. prove that in this case the product is the unchanged ester, the above mentioned complex cannot have either of the formulas assigned to it by C. or R. We must rather assume that the complex is an oxonium compd., either RCOO(R')(I)MgR" (Bayer), or RCOO(R')-(R')MgI (Grignard). With B.'s formula it is difficult to explain the frequent formation in this reaction of ketones RCOR", and still more that of iodo-Mg alcoholates R'OMgI, without resorting to several clumsy hypotheses, e. g., the splitting off of the radical R" from the Mg, and of the I from the O, the migration of I from O to Mg, etc. These difficulties are overcome by G.'s formula which plausibly explains the above as well as all other transformations of esters in their interaction with Mg org. halides. Moreover, G.'s formula enables us to foresee several abnormal transformations which have never been observed and which B.'s formula does not even suggest. These transformations of the complex are as follows: RCOO(R')(R')MgI $\rightarrow$ RCOR' + R'OMgI (1), RCOR' + R'OMgI (2), RCOOMgI + R'.R" (3) and RCOOMgI + 0.5R'.R' + 0.5R".R" (4). Of these, (1) is the usual transformation where the ketone reacting with another mol. of the Mg org. compd. would give a tertiary alc. which, when its mol. wt. is high, will yield the corresponding hydrocarbon, while (2), (3) and (4) are abnormal transformations. Hence the proof that these really take place would conclusively prove that G.'s formula is preferable to B.'s. The proof then reduces itself to an exam. of the transformations of the alc. radical R' of the ester used. As the problem is easiest to solve when R' has a high mol. wt. and, therefore, gives readily isolated products, expts. were made with esters containing "heavy" radicals, using the reaction of AcOCHPh₂ with EtMgI, iso-AmMgI, PrMgI, BuMgI and PhMgI, and of BzOCH₂Ph with PhMgBr. The expts. proved that the above abnormal transformations really occur. Thus, to cite 1 of the numerous expts., AcOCHPh₂ + PrMgI gave as final products C₆H₅, C₆H₆, (Ph₂CH)₂, (Ph₂CH)₂O, Ph₂CHOH and MePrCHOH, together with an unidentified substance, b₁₂

146–53° and containing 90% of C. Hence the complex must be assumed to be $\text{AcO}(\text{CHPh}_2)(\text{Pr})\text{MgI}$, and its decompn. to be as follows: $\text{AcO}(\text{CHPh}_2)(\text{Pr})\text{MgI} = \text{AcO-MgI} + 0.5(\text{Ph}_2\text{CH})_2 + 0.5\text{C}_2\text{H}_6 + 0.5\text{C}_3\text{H}_8$, the other substances resulting from secondary transformations. As this is partly normal and partly according to (4), G.'s formula is to be preferred.

H. M. GORDIN.

Abnormal course of Grignard's reaction. G. L. STADNIKOV. *J. Russ. Phys. Chem. Soc.* 46, 887–9 (1914).—According to Grignard (*Ann. chim. phys.* [7] 24, 474), the result of the interaction of HCO_2Et (a) with iso-AmMgBr is not the expected secondary alc., but iso-AmO₂CH (b), while with iso-BuMgBr (a) gives, besides (iso-Bu)₂CHOH, the ester iso-BuO₂CH (c). In order to account for the abnormal formation of (b) and (c), S. assumes that, owing to the slowness of the reaction of (a) with Mg org. compds., there is gradually formed an alcoholate of the Mg halide, and that this alcoholate reacts with (a) to give (b) and (c). Hence if we would start with such a ready made alcoholate, it would react with an ester, converting the latter to the ester of that alc. whose alcoholate we use, provided the 2 alc. radicals are different. If, however, these are identical there would be no reaction at all. This is proved by the following expts.: AcOCHPh_2 (d) + Ph_2CHOMgI (e) did not react with each other, while AcOEt + (e) gave (d), and AcOEt + the iodo-Mg alcoholate of β -methylcyclohexanol gave β -methylcyclohexyl acetate. The expts., embracing also the esters of inorg. acids, are to be continued. It is possible that with these the iodo-Mg alcoholates will react differently than the full alcoholates $(\text{RO})_2\text{Mg}$ (Rabtzovich-Zubkovskii, *C. A.* 6, 1431).

H. M. GORDIN.

The higher valences of oxygen in organic compounds. VI. Basic properties of oxygen in ethers. V. V. CHEKLINTZEV. *J. Russ. Phys. Chem. Soc.* 46, 889–95 (1914).—Calorimetric detns., similar to those previously made with alcs. in their interaction with ROMgI (*C. A.* 8, 1419), were now made with ethers, using PrOMgI and Et_2O , PhOEt , $\alpha\text{-C}_{10}\text{H}_7\text{OEt}$, $\beta\text{-C}_{10}\text{H}_7\text{OEt}$, Ph_2O , PhCH_2OEt , Ph_2CHOEt , Ph_2COEt and $(\text{PhCH}_2)_2\text{O}$. The results, given in numerous tables, may be summarized as follows: While alcs. unite with ROMgI to form compds. of different complexity according to what alcs. are used, the comp. of the ether compds. is much simpler, all of these having the formula $\text{R}_2\text{O}(\text{MgR})\text{I}$. As shown by the thermal effects of the reactions, the tendency of ethers to exhibit higher valences of O is less pronounced than in alcs. Thus the thermal effect for EtOH is 12.78 cal., while for Et_2O it is 5.05 cal. The more negative the radical and the "nearer" it is to the O the less is the thermal effect. Thus the values for Et_2O , PhCH_2OEt and PhOEt are, resp., 5.05, 4.19 and 0 cal. The ethers corresponding to aliphyl alcs. thus occupy an intermediate position between alkyl and aryl ethers. An accumulation of Ph groups causes a gradual drop in the thermal effect. Thus the values for PhCH_2OEt , Ph_2CHOEt and Ph_2COEt are, resp., 4.19, 2.04 and 0 cal. The transfer of a Ph from 1 of the radicals to the other, provided it is not brought "nearer" to the O, also influences the thermal effect, though to a lesser extent. Thus the values for Ph_2CHOEt and $(\text{PhCH}_2)_2\text{O}$ are, resp., 2.04 and 1.57 cal. Comparing the tendency of alcs. and ethers to form complexes with that of H_2O in this respect, it is seen that the replacement of the H in H_2O by radicals gradually diminishes the tension of O in its tendency to assume higher valences. Thus the thermal effects for H_2O , ROH and R_2O represent a descending series. This explains why H_2O displaces alcs. and ethers from their complexes.

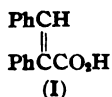
H. M. GORDIN.

Polymerization of styrene. II. HANS STOBBER. *Univ. Leipzig. Ann.* 409, 1–13 (1915); cf. *C. A.* 4, 2120.—The earlier conclusions concerning the course of the polymerization of styrene to metastyrene, obtained by the help of viscosity detns., have been confirmed by the use of refraction detns. Besides the earlier observed "photochem." there is also a "thermal after-effect," that is, styrene preps. which have

been treated with light or heat polymerize more rapidly under the same conditions than those not treated. Old styrene prepn. show a greater tendency to polymerize than freshly distd. samples.

C. J. WEST.

Determination of the configuration of stereoisomeric stilbenes and their carboxylic acids. R. STÖRMER. Univ. Rostock. *Ann.* 409, 13-9(1915); cf following abstr.—The configuration is related to the CO₂H acids. The stable α -acid (I), m. 172, when heated with Ba(OH)₂ in vacuum at 300°, gives considerable amts. of isostilbene besides a little solid stilbene. The formation of the latter is due to secondary rearrangements of the isostilbene. The labile acid, m. 137-8° (II), under the same conditions also gives a mixt. of much stilbene with some isostilbene. This formation of isostilbene is due to a rearrangement of the acid. The configuration of the acids is detd. as follows: The NO₂ deriv. of (I), when reduced and diazotized, gives phenanthrenecarboxylic



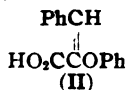
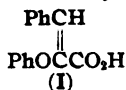
acid, thus establishing the *cis*-position for the 2 Ph groups. The stereoisomeric NO₂ deriv., upon reduction, gives allo- α -phenyl-*o*-aminocinnamic acid, obtained only in the form of salts. The free base at once gives phenylcarbostyryl, while if the Ba salt is diazotized and the soln. boiled, α -phenylcoumarone is formed. These facts establish the *cis*-position of the NO₂ and CO₂H groups in this acid. If the diazo soln. is poured into hot satd. Na hypophosphite soln. containing Cu, a good yield of (II) is obtained, which thus establishes its constitution.

C. J. WEST.

The stereoisomeric α -phenyl-*o*-nitrocinnamic acids and other stilbene derivatives. R. STÖRMER and L. PRIGGE. Univ. Rostock. *Ann.* 409, 20-35(1915); cf. preceding abstr.—The stable (high-melting) O₂NC₆H₄CH: CPhCO₂H (A) is dissolved in Na₂CO₃ in a vessel of uvial glass and treated 7 days with the rays of an uvial lamp; the unchanged stable acid is pptd. with 50% AcOH, the ppt. quickly filtered and the filtrate acidified with concd. HCl. The yield of the low melting acid (B) is 10.7% after 7 days, 13.8% after 14 days and 16% after 21 days. The labile acid gives a 0.47% soln. in C₆H₆ at 18° while the stable acid gives a 0.28% soln. The allo-acid (low-melting) is not changed by boiling an hour with dil. HCl, shaking with cold or warm concd. H₂SO₄, by heating 3 hrs. with 1 mol. I in C₆H₆ or by treatment with sunlight in the presence of Br. After 48 hrs. in the light of a quartz lamp a small amt. of the high-melting acid was obtained. (A) *amide*, pale yellow needles from C₇H₈, m. 173-4°. *Anilide*, citron-yellow needles, m. 136°. (B) *amide*, citron-yellow, m. 166-7°. *Anilide*, yellowish white, m. 148-9°. If the stable NO₂ acid is reduced, the 2 forms of H₂N-C₆H₄CH: CPhCO₂H (C), colorless and yellow, are obtained (Pschorr, *Ber.* 29, 497, 1896). When this is dissolved in C₆H₆ and treated with the rays from an uvial lamp, a good yield of phenylcarbostyryl is obtained. Attempts to replace the diazo group by H failed, the only product being phenanthrenecarboxylic acid. The use of Cu powder in this reaction is not necessary. As a by-product a small amt. of Na₂CO₃-insol. substance is obtained, which is α -phenylcoumarin. This results from a very small amt. of α -phenylcoumaric acid, which is decompd. by boiling H₂O. The compd. C₁₇H₁₄O₂ described by Mayer and Balle (*C. A.* 8, 1738), m. 146-7°, is *phenylmethylcoumarin*, C₁₆H₁₂O₂. This was synthesized by condensing MeC₆H₄(OH)CHO with Ph-CH₂CN and boiling with concd. HCl. The allo-acid (B) upon reduction of an NH₄OH soln. by FeSO₄ and Ba(OH)₂ yields *phenylcarbostyryl*, felt-like needles, m. 227°. The existence of the Ba salt of the aminocinnamic acid follows from the production of a red dye when diazotized and treated with R salt. The Ba salt, when diazotized, poured into cold H₂SO₄, filtered from BaSO₄ and boiled, gives α -phenylcoumarin. If the Ba

salt is diazotized in HCl and allowed to flow slowly into a hot soln. of Na hypophosphate containing a little Cu powder, a good yield of pure *allo-α-phenylcinnamic acid* is formed. *p-Methoxystilbenecarboxylic amide*, porcelain-like leaflets, m. 131.5–2.5°. The stable *p-MeO* acid, treated as above with the rays of the uvioi lamp, gives 20% of the *allo*-form after 8 days, 30 after 21 days; this is sepd. by extg. the HCl ppt. with dil. alc.; hard crystal aggregates, m. 123°. At 15° C_6H_6 forms a 1.945% soln. The reverse change is accomplished by treating the soln. in C_6H_6 , containing I, with the rays of a quartz lamp for 24 hours. *Aniline salt* of the *allo* acid, m. 116°, easily dissociates into its components. *Amide*, fine needles, m. 168–9°. *p-Methoxystilbene* in C_6H_6 is converted into *allo-p-methoxystilbene* by the uvioi lamp, 45.7% being formed in 14 days; an oil, $b_{1.5}$ 143–5°, which is changed into the stable modification when heated at 170° under 15 mm. *o-Nitrostilbene* was prepd. by reducing the diazo sulfate with $C_6H_{11}OH$ and Cu, m. 72–3°. By treatment with the rays of the uvioi lamp, *allo-o-nitrostilbene* is formed, citron-yellow needles, m. 42°. It could not be reconverted into the stable form. Upon reduction with $SnCl_2$ and $AcOH-HCl$, both NO_2 compds. gave the same NH_2 deriv., m. 106°. $FeSO_4$ and NH_4OH gave an oily base. C. J. WEST.

Stereoisomeric α -substituted cinnamic acids. R. STOERMER AND G. VOHT. Univ. Rostock. *Ann.* 409, 36–58(1915); cf. preceding abstr.—*Allo-α-phenylcinnamic acid* (A) is best obtained by treating the Na salt of the stable acid (B) with the rays of the uvioi lamp for 3 weeks or with those of a quartz lamp for 3–4 days. H_2O , C_6H_6 , $EtOH$ or acetone solns. of the free acid may also be used. The yield is about 30%. The stable acid is pptd. with $AcOH$ while the labile form remains in soln. and is pptd. with dil. HCl. (B) *amide*, needles, m. 127°. *Anilide*, m. 141°. (A) *amide*, m. 167–8°. *Anilide*, m. 179°. About 50% of (B) is obtained when (A) in C_6H_6 containing I is treated with the rays of a quartz light for 24 hrs. Both acids possess about the same stability, especially seen in the fact that upon heating either acid a mixt. of both is obtained. If the stable acid is boiled under 20 mm. very little of the labile form is obtained while under the same conditions the labile acid gives a large amt. of the stable. When the acids are distd. with twice their wt. of $Ba(OH)_2$ under 12–13 mm., the stable form yields isostilbene besides some stilbene, while the labile form gave principally stilbene. *Allo-α-phenylcinnamic nitrile* is obtained by the action of the rays of the uvioi lamp upon a C_6H_6 soln. of the stable form for 3 weeks., and sepd. by extrn. with alc. or petroleum ether, b_m 213–4°. At 19° it gives a 17.3% soln., while the solid isomer gives a 2.3% soln. By distn. under ordinary pressure the solid form is obtained. *Allo-α-phenoxy-cinnamic acid*, prepd. by treating a large amt. of the stable acid in alc. with the rays of a quartz lamp for 48 hrs. and extg. with petr. ether, hair-like needles, m. 73°. Petr. ether forms a 0.4% soln. at 16°, while the stable form gives a 0.03% soln. *Amide*, fine needles, m. 107°. *Aniline salt*, m. 98–9°. *Amide of stable form*, compact needles, m. 172°. The configuration of the acids is not known. The stable acid, m. 181°, treated with P_2O_5 , gives an anhydride but not indone, thus indicating the structure (I).

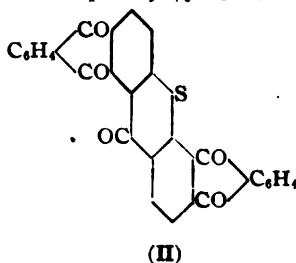
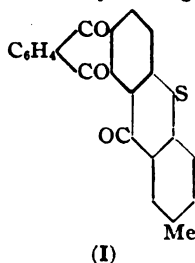


α -Phenoxy-*p*-methoxycinnamic acid, m. 200°, was prepd. by heating 100 g. $PhOCH_2CO_2Na$, 80 g. $MeOC_6H_4CHO$ and 300 g. Ac_2O 6 hrs. at 150°, esterifying and fractionating the mixt. in vacuum. The fraction b. 220–40° and m. 63° is sapond. Treated in 10% Na_2CO_3 for 48 hrs. with the rays of the quartz lamp, 15 g. acid gives 3.5–4.0 g. crude *allo*-acid, needles, m. 120°. *Aniline salt*, m. 113°. *Amide*, long needles, m. 123–4°. *Amide of stable form*, needles, m. 194°. α -Methylcinnamic acid, recrystd. from dil. alc., m. 81–2°. Repeatedly recrystd. from petr. ether, the m. p. drops to 73–4°.

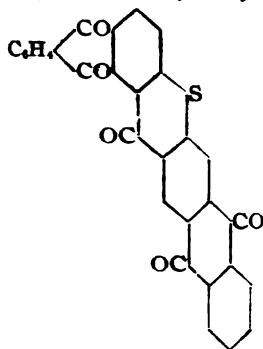
while a mixt. of the two m. about 78° . This accounts for the 3 forms described in the literature. These acids dissolve completely in concd. H_2SO_4 and are pptd. by H_2O . They give a Me ester, b_{16} $137-8^{\circ}$, m. $38-8.5^{\circ}$. The acid does not give a PhNH_2 salt but yields a *phenylhydrazine salt*, voluminous crystals, m. $64-5^{\circ}$. The *allo-acid*, sepd. from the stable form by petr. ether, forms compact monoclinic prisms and hemipyramids, m. $91-2^{\circ}$. Boiled 4-5 hrs. with 20% HCl , it gives the lower melting form. *Aniline salt*, felt-like needles, m. $74-4.5^{\circ}$. *Methyl ester*, oil, b_{16} 122° . *Amide*, fine needles, m. $137-8^{\circ}$. The characteristic reaction of this acid is the formation of α -methylindone, by adding the acid to concd. H_2SO_4 cooled to -2° and after soln. (2 min.) pouring into ice-water, yellow prisms, b_{16} $119-20^{\circ}$, m. $47-7.5^{\circ}$. It is volatile with Et_2O vapors. It is rather unstable and after several days forms an oil. The *phenylhydrazone* is a dark yellow oil. *Semicarbazone*, deep yellow needles, m. $192-3^{\circ}$. *Allo- α -ethylcinnamic acid*, obtained only as an oil, yields an *aniline salt*, m. 81° . This acid gives α -ethylindone, yellow oil, the *semicarbazone* of which forms yellow needles m. 181° .

C. J. WEST.

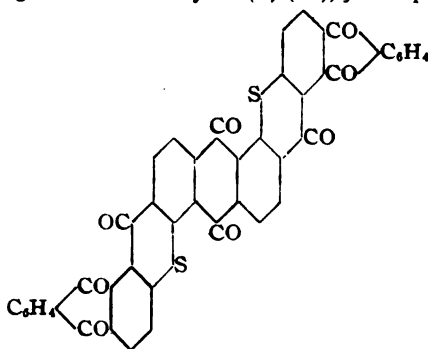
New method for preparing cyclic ketones. II. Preparation of thioethers and thioxanthenes of the anthraquinone series. ALFRED SCHAARSCHMIDT. Berlin. *Ann.* 409, 59-78(1915); cf. C. A. 8, 2358.—1-Cyano-2-anthraquinonyl *p*-tolyl thioether (A), prepd. by boiling 4 g. 1,2- $\text{C}_6\text{H}_4(\text{CO})_2\text{C}_6\text{H}_3(\text{CN})\text{Br}$, 1.8 g. *p*- $\text{HSC}_6\text{H}_4\text{Me}$ and 1 g. K_2CO_3 in 50 g. $\text{C}_6\text{H}_{11}\text{OH}$ for 1 hr., slightly yellow needles from AcOH , m. 251° . Yield, 3 g. Concd. H_2SO_4 gives a violet-red soln. which becomes yellowish red upon heating to $130-40^{\circ}$, due to the formation of the thioxanthone. The alk. $\text{Na}_2\text{S}_2\text{O}_4$ bath is a deep bluish green. 1-Cyano-2,1'-dianthraquinonyl thioether (B), obtained by boiling 5 g. $\text{C}_6\text{H}_4(\text{CO})_2\text{C}_6\text{H}_3\text{SH}$, 6.3 g. 1,2- $\text{C}_6\text{H}_4(\text{CO})_2\text{C}_6\text{H}_3(\text{CN})\text{Br}$ and 3 g. K_2CO_3 in 100 g. $\text{C}_6\text{H}_{11}\text{OH}$ 1 hr., deep yellow needles from PhNO_2 , does not m. 310° . Yield, 7.5 g. The alk. dye bath is brownish red and dyes cotton a pale yellow. The concd. H_2SO_4 soln. is red. "Fenchosol," colorless mobile liquid, d. 0.952, b. $193-6^{\circ}$, miscible with most organic solvents in all proportions, may also be used for this condensation. 1-Cyano-2,2'-dianthraquinonyl thioether (C) is obtained in a yield of 4.7 g. by boiling 3.1 g. 1,2- $\text{C}_6\text{H}_4(\text{CO})_2\text{C}_6\text{H}_3(\text{CN})\text{Br}$, 2.5 g. 2- $\text{C}_6\text{H}_4(\text{CO})_2\text{C}_6\text{H}_3\text{SH}$ and 0.8 g. K_2CO_3 in 100 g. $\text{C}_6\text{H}_{11}\text{OH}$ 1 hr., fine light yellow needles from much PhNO_2 , does not m. 310° . The concd. H_2SO_4 soln. is red, the alk. $\text{Na}_2\text{S}_2\text{O}_4$ bath yellow brown. Di-[1-cyano-2-anthraquinonyl]-1',5'-anthraquinone dithioether (D), prepd. by heating 3.1 g. 1,2- $\text{C}_6\text{H}_4(\text{CO})_2\text{C}_6\text{H}_3(\text{CN})\text{Br}$, 1.4 g. 1,5- $\text{HSC}_6\text{H}_3(\text{CO})_2\text{C}_6\text{H}_3\text{SH}$ and 1 g. K_2CO_3 in 70 g. $\text{C}_6\text{H}_{11}\text{OH}$ 2 hrs., yellowish orange powder from PhNO_2 , in which it is very slightly soluble. The alk. dye bath is green, dyeing cotton a pale yellow. The product is insol. in cold concd. H_2SO_4 . 1-Cyano-2-anthraquinonyl phenyl thioether (E), prepd. by heating 2.1 g. 1,2- $\text{C}_6\text{H}_4(\text{CO})_2\text{C}_6\text{H}_3(\text{CN})\text{Br}$, 1 g. PhSCN and 1 g. K_2CO_3 in 30 g. $\text{C}_6\text{H}_{11}\text{OH}$ until soln. results, glistening yellow needles, m. 207° . The soln. in concd. H_2SO_4 is carmine-red, in $\text{Na}_2\text{S}_2\text{O}_4$ deep bluish green. (B) is also obtained by boiling 1.5 g. 1,2- $\text{C}_6\text{H}_4(\text{CO})_2\text{C}_6\text{H}_3(\text{CN})\text{Br}$, 1.3 g. 1- $\text{C}_6\text{H}_4(\text{CO})_2\text{C}_6\text{H}_3\text{SCN}$ and 0.7 g. K_2CO_3 in 30 g. $\text{C}_6\text{H}_{11}\text{OH}$ for 0.75 hr. Thioxanthone of (A) (I), obtained by heating 1 part (A) with 10 parts 96% H_2SO_4 10 hrs. at 100° ,



yellow plates from AcOH. The concd. H_2SO_4 soln. is red, the alk. dye bath blue olive-green; it dyes cotton a pale green which is oxidized to a very pale yellow by the air. *Thioxanthone of (B) (II)*, obtained by heating 1 part (B) with 10 parts 96% H_2SO_4 0.75 hr. at 190° , brownish orange powder from 100 parts PhNO_2 . The alk. dye bath is bluish green, dyeing cotton a deep bluish green, which is oxidized by the air, more rapidly by dil. NaOCl , to a yellow-orange. *Thioxanthone from (C) (III)*, yellow powder,



(III)



(IV)

giving a red soln. in concd. H_2SO_4 , olive-green in $\text{Na}_2\text{S}_2\text{O}_4$. Cotton is dyed olive and becomes yellow upon oxidation. *Thioxanthone from (D) (IV)*, purified by extn. with dil. NaOH and then with PhNO_2 . The hot $\text{Na}_2\text{S}_2\text{O}_4$ soln. is a black-blue, which dyes cotton the same color and is oxidized to an orange-red by NaOCl . C. J. WEST.

Tetrahydropyridines and their behavior towards aldehydes. A. LIPP AND E. WINMANN. München. *Ann.* 409, 79-147(1915); cf. *Ann.* 294, 141(1897); *Ber.* 38, 2471(1905).—Certain γ - and δ - NH_2 ketones are not stable but split off H_2O , giving the corresponding tetrahydropyridines and pyrrolines. If H or an alkyl residue is attached to the N, neither the free ketone nor the salts are stable, while if an aryl group is present the free ketone is stable in soln. and only upon salt formation do they form condensation products. Certain ring compounds earlier described are, therefore, when in soln., really NH_2 ketones and react as such. *N*-Methyltetrahydropicoline (A) is, in soln., really *N*-methylaminobutyl methyl ketone, $\text{MeHN}(\text{CH}_2)_3\text{Ac}$; of its derivs. the benzoyl compound, the oxime and the semicarbazone have been described. HCHO reacts with an aq. soln. of *N*-methyltetrahydropicoline at room temp. and even at 0° to give *N*-methyl- β -acetopiperidine (B) (cf. Ladenburg, *Ann.* 301, 117(1898)); many of these compds. have been prepd. by L., who, however, assigned other structures to them. (These are given in parentheses following the correct names). Of this the oxime, phenylhydrazones hydrochloride, semicarbazone and its hydrochloride have been described. Upon reduction with Na-Hg in dil. HCl or with Na and EtOH , it yields *N*-methyl- β -piperylmethylalkine (*N*-methylpipecolylalkine), $\text{C}_8\text{H}_{15}\text{NMeCHOH-Me}$, b_{715} 214.5-6.5°. The presence of the $>\text{CHOH}$ group is indicated by oxidation to (B). 12.5 g. AcH in 200 g. H_2O dropped into 28 g. (A) in 400 cc. cold H_2O and allowed to stand 60 hrs. gave 41 g. *N*-methyl- α -methyl- β -acetopiperidine (C) (*N*-methyl- α -pipecolyl- β -methylalkine). Oxime, hone-like prisms, m. $129-31^\circ$. Hydrochloride, prisms, m. $191-3^\circ$ (decompn.). Semicarbazone, tables, m. $168-70^\circ$ (decompn.). Reduced with Na-Hg in H_2O (C) gives *N*-methyl- α -methyl- β -piperylmethylalkine (D), b_{715} 224-26°. Chloroaurate, m. 148° , easily sol. in H_2O at $40-50^\circ$. Mercuric chloride double salt, $\text{C}_8\text{H}_{15}\text{NO} \cdot \text{HCl} \cdot 6\text{HgCl}_2$, short, rectangular prisms, m. $170-2^\circ$, easily sol. in hot H_2O . Heated with 4 parts concd. HCl at $180-90^\circ$ for 3 hrs., (D) splits off H_2O , yielding *N*, α -dimethyl- β -vinylpiperidine (*N*-methyl- α , β -propylene-

piperidine), which is reduced by Zn and HCl to *N*, α -dimethyl- β -ethylpiperidine (*N*-methyl- β -isopropylpiperidine). *N*-Ethyl- Δ^2 -tetrahydro- α -methylpyridine (*N*-ethyl- α -pipecoleine) (*E*), b_{710} 167–70°. *Picrate*, monoclinic prisms, *m.* 126°. In aq. soln. this base exists as the free ketone, *N*-ethylbutyl methyl ketone. *Benzoate*, monoclinic prisms, *m.* 56–7°. *Benzoate oxime*, thick oil. *Oxime*, rhombic tables, *m.* 96–7°. *Semicarbazone hydrochloride*, small prisms, *m.* 166–8°. *N*-Ethyl- β -acetopiperidine (*N*-ethyl- α -pipecoleyl- β -alkine) (*F*), prepd. by dropping 18 g. 40% HCHO into 25 g. (*E*) in 250 g. H₂O. *Oxime*, prisms, *m.* 128–9°. *Semicarbazone*, *m.* 160° (decompn.). *Phenylhydrazine hydrochloride*, yellow, rhombic tables, *m.* 217–8° (decompn.). Upon reduction (*F*) gives *N*-ethyl- β -piperylmethylalkine (*N*-ethyl- α -pipecolyl- β -alkine). *Mercuric chloride salt*, C₈H₁₈NO.HCl.3HgCl₂, rhombic tables, *m.* 121°. (*F*) is easily obtained upon oxidation. Heated with HCl at 180–90°, (*F*) gives *N*-ethyl- β -vinylpiperidine (*N*-ethyl- α , β -ethylenepiperidine). *Chloroplatinate*, *m.* 176° (*L.*, 162°). *Mercuric chloride salt*, *m.* 155° (*L.*, 82°). Upon reduction, *N*, β -diethylpiperidine is formed, b_{710} 177–85°. *Hydrochloride*, prisms, *m.* 186–8°. *N*-Ethyl- α -methyl- β -acetopiperidine (*N*-ethyl- α -pipecoleyl- β -methylalkine) (*G*). *Chloroplatinate*, *m.* 187° (*L.* 167°). *Mercuric chloride salt*, C₁₀H₁₈NO.HCl.6HgCl₂, sinters 140°, *m.* 200° (*L.* gives 3 HgCl₂ and *m.* 116°). *Oxime*, oily. *Chloroplatinate*, yellow powder, *m.* 185° (decompn.). *Semicarbazone*, leaflets and tables, *m.* 184–6°. *Chloroplatinate*, begins to decomp. 150°. Upon reduction (*G*) gives *N*-ethyl- α -methyl- β -piperylmethylalkine (*N*-ethyl- α -pipecolyl- β -methylalkine). α , β -Dimethyl- Δ^2 -tetrahydropyridine (*H*) was obtained by heating a mixt. of 54 g. Br(CH₂)₂N(CO)₂C₆H₄ and 34 g. AcMeCNaCO₂Et in 100 cc. abs. alc. 4 hrs., distg. the phthalimidopropylmethylacetate with steam, and heating 4–5 hrs. with HCl (*d.* 1.10) and then heating the remaining oil with HBr (*d.* 1.49) in a sealed tube at 185–90° for 2 hrs. The aq. soln. of the base treated with BzCl gives 1-benzoylamino-4-methylbutyl methyl ketone, thick oil. *Benzoate oxime*, prisms and tables, *m.* 117–8°. *Oxime*, sirup. Reduced with Zn and HCl (*H*) yields α , β -dimethylpiperidine, b_{710} 138–40°. *Benzoate*, oil. *Hydrochloride* (*I*), fine needles. *Chloroplatinate*, long needles, *m.* 145° (decompn.) *Chloroaurate*, flat, pointed prisms, sinters 105°, *m.* 130–5°. *Mercuric chloride salt*, *m.* 211–2°. *Stannous chloride salt*, flat prisms or tables, *m.* 115–6°. *Picrate*, light yellow prisms, *m.* 147–8°. (*I*), distd. with Zn dust in a stream of H, gives α , β -dimethylpyridine (α , β -lutidine). *Hydrochloride*, very hygroscopic. *Chloroaurate*, feather-like crystals, *m.* 162–4°. *Chloroplatinate*, 6-sided prisms, *m.* 195°. *Mercuric chloride salt*, short, 3-sided prisms, *m.* 191–3°. *Picrate*, short prisms, *m.* 183–4°. On oxidation it yields quinolinic acid. δ -Phthalimido- α -methylvaleric acid, found in the oil after boiling the above acetate with HCl and extd. with Na₂CO₃ soln., white leaflets, *m.* 106–7°. It is not changed by heating with H₂O 2 hrs. at 175°. *Concd.* HBr at 190° decomp. it. *Calcium salt*, with 5 H₂O, leaflets or tables. Other by-products are α -methylhomopiperidinic acid, δ -amino- α -methylvaleric acid and β -methylpiperidone.

C. J. WEST.

Convallarin. I. J. LINDNER. Univ. Czernowitz. *Monatsh.* 36, 257–67(1915).—Contrary to the statements of Walz (*Neues Jahrbuch für Pharm.* 10, 145 (1858)) convallarin could not be obtained cryst.; the difficulty in obtaining a pure product lies not so much in removing the organic impurities as in the marked hygroscopic properties of the compd. Dried 2 weeks over CaCl₂ it analyzed for C₂₈H₄₀O₁₀, and probably is a hydrate with 1 H₂O. Samples dried at 100° indicate a partial decompn. of the hydrate. Upon sapon. with 2, 5 or 10% H₂SO₄ at about 100°, a hexose (glucose?) and convallaretin, C₁₅H₁₈O₄, are formed, hone-like crystals from alc. or Et₂O, darkens 75–80° but does not *m.* 225°. It readily forms a hydrate, C₁₅H₁₈O₄, which loses 1 mol. H₂O over P₂O₅ but not over CaCl₂. No MeO, CO nor double bond is present. It

gives a *diacetyl derivative*, amorphous, which indicates 2 HO groups. Convallaretin reacts with alkali, giving a *compound*, $C_8H_{14}O_8$, which indicates the presence of an ester group, $-CO_2CH_3-$.

C. J. WEST.

Perhalogenation of anthraquinone. ALFRED ECKERT AND KARL STEINER. Univ. Prag. *Monatsh.* 36, 269-80(1915); cf. *C. A.* 9, 1465.—1,2,4,5,6,7,8-*Heptachloroanthraquinone* (A) was prepd. by condensing 30 g. 1,2,4- $Cl_3C_6H_3$ and 15 g. $Cl_4C_6(CO)_2O$ by heating with 15 g. $AlCl_3$ 5 hrs. at 150° , which probably yields a mixt. of 2 isomeric *heptachlorobenzoylbenzoic acids*, yellow needles, m. $226-230^\circ$, and then heating 5 g. of this mixt. with 50 g. fuming H_2SO_4 1 hr. at 200° , extg. the product with hot H_2O and glacial AcOH and recrystg. from PhCl, pale yellow needles, m. 302° . Since this differs from the previously described compd., obtained from $C_6H_4(CO)_2C_6H_4$ and $SbCl_5$, the first compd. must be 1,2,3,5,6,7,8-*heptachloroanthraquinone* (B). Since 1,4,5,8- $Cl_2C_6H_3(CO)_2C_6H_3Cl_2$ (C) is formed as an intermediate product in the action of $SbCl_5$, the further action of $SbCl_5$ must result in a wandering of the Cl atom as well as in further chlorination. The action of 15 parts $SbCl_5$ upon (C) or (A) results in the formation of (B). (A) and (B) can be easily sep'd. as (A) is much more sol. in org. solvents than (B). *Heptabromoanthraquinone*, obtained by the action of 30 g. Br upon 10 g. $C_6H_4(CO)_2C_6H_4$ dissolved in 200 g. fuming H_2SO_4 at 50° , yellow needles from $PhNO_2$, does not m. 400° . If the reaction mixt. is heated 1 hr. on the H_2O bath after standing 4 hrs. in the cold, the product is decompd. into $Br_4C_6(CO_2H)_2$, C_6Br_6 , m. 306° , and *per-bromobenzoylbenzoic acid*, $Br_4C_6COCBr_4CO_2H$, needles from PhCl, m. 278° ; this is decompd. into $Br_4C_6(CO_2H)_2$ and $CHBr_3$ upon heating with 10 parts concd. H_2SO_4 1 hr. at $200-50^\circ$. *Pentabromobenzene*, needles from glacial AcOH or PhCl, m. 293° .

C. J. WEST.

Influence of the solvent upon the splitting off of carbon dioxide from dihydroxybenzoic acids. FRANZ V. HEMMELMAYR. Graz. *Monatsh.* 36, 299-302(1915); cf. *C. A.* 7, 1705.—Temp. does not play as much part as the solvent used. Salts, which only slightly increase the b. p. of H_2O , have a marked effect upon the decompn. Chlorides are more active than sulfates; using the same salt, the effect is nearly proportional to the salt content. Acids are more active than neutral salts, the effect depending upon the elec. dissociation of the acid (HCl acid is strongest, H_3PO_4 the weakest). Bases (except NH_4OH) have no effect. HO acids and phenols have no noticeable effect upon the decompn. H_3BO_3 appears to act as a retarding agent upon the splitting off of CO_2 .

C. J. WEST.

Isomerism of erucic, brassidinic and isoerucic acids. I. L. MASCARELLI. Univ. Cagliari. *Atti accad. Lincei* 23, II, 583-5(1914); *Gazz. chim. ital.* 45, I, 213-9(1915).—Three isomers of the acid $C_{22}H_{42}O_2$ are known; erucic acid (a) occurs as the glyceride in colza oil; brassidinic acid (b) is obtained from the preceding by the action of HNO_3 ; and isoerucic acid (c) is obtained by satg. erucic acid with HI and then splitting off HI with KOH. Fileti and Ponzio (*Gazz. chim. ital.* 1893, II, 382) have shown that in (a) the unsatd. bond occurs between the 13th and 14th C atom from the CO_2H group. This has been verified by treating (a) with Br and eliminating 2 HBr to get behenic acid, and by Yegorow (*C. A.* 7, 1477) through the hypoazotide. The formation of (b) from (a) is like the formation of elaidinic acid from oleic acid and shows that they are *cis* and *trans* forms. The existence of (c) is not provided for by the theory but according to Ponzio (*Gazz. chim. ital.* 1904, II, 50) the unsatd. bond is in the same position as in (a) and (b). M. has decided to study these 3 acids by physico-chem. methods. Sudborough and Gittens (*C. A.* 2, 1420) found the esterification consts. of (a) and (b) to be $K = 22.2$ and 22.5 , resp. Stewart (*C. A.* 1, 1406) found that the light absorption of maleic, fumaric, etc., differs for the geometric isomers but (S. et al., *J. Chem. Soc.* 101, 600(1912)) for (a) and (b) and (c) it is practically equal.

The refractive index is 105.00 for (a) and 105.02 for (b). It has been found that the magnetic rotation of the malenoid type is normal while that of the fumaroid type is high but the method was of no value in this case. The f. p. method is the most promising and is based on the fact that of 2 geometric isomers one makes solid solns. with the corresponding satd. compd. and the other does not. Bruni and Gocni (*Gazz. chim. ital.* 30, I, 55) showed in the case of *cis* and *trans* isomers, with ethylene bonds, that for any pair the *trans* form gives solid solns. in the corresponding satd. compd. but the *cis* does not. Further B. observed that the compds. with a double bond that give a solid soln. with the satd. deriv. have higher m. ps., are less sol. and more stable than the isomer that doesn't give the solid solns. and since fumaric ester belongs to the former group and maleic ester to the latter he concludes it is rational to assign the former to the fumaroid type and the latter to the malenoid type. II. L. MASCARELLI AND B. TOSCHI. *Ibid* 586-90.—The results on the cryoscopic behavior of (a), (b) and (c) are described. Of the 3 acids (a) is cryoscopically normal in behenic acid; (b) and (c) show mol. wts. higher than the theory. Accordingly assuming that the unsatd. bond is in the same position in all, (b) and (c) have a similar configuration. On the basis of B.'s deductions, (a) is the *cis* type and (b) and (c) *trans*. This conclusion is in agreement with the physical properties of the three acids: (b) has a higher m. p. and is more stable than (a). (a) was obtained as white pearly scales, m. 33-4°; (b) white scales, m. 57-60°; (c) cryst. powder, m. 52-3°; behenic acid, white, shining scales, m. 82-3°.

E. J. WITZEMANN.

Some nitrated and halogenated derivatives of pseudocumene. A. HUENDER. Univ. Amsterdam. *Rec. trav. chim.* 34, 1-34(1915).—*Trinitropseudocumene* and the substitution of one of its NO_2 groups with other radicals. 1,3,4- $\text{Me}_3\text{C}_6\text{H}_3$ (a), b. 167°, was nitrated according to Fittig and Laubinger (*Ann.* 151, 257) by adding 10 g. (a) drop by drop to a mixt. of 100 cc. concd. H_2SO_4 + 50 cc. HNO_3 (d. 1.52) with ice cooling. The mixt. poured into crushed ice, filtered, washed, dried and recrystd. from glacial AcOH gave trinitropseudocumene (b), m. 185° (yield $\approx 10\%$). 1 g. (b) in 50 cc. abs. MeOH treated with 0.2 g. Na in MeOH and warmed on the H_2O bath gave methoxydinitropseudocumene (c), colorless crystals, m. 80°. 0.20 g. (b) in 25 cc. abs. EtOH treated with 0.23 g. Na in EtOH , etc., gave, finally, a brown-black ppt. from which the EtO deriv. could not be sep'd. The presence of NaNO_2 was detd. so that NO_2 was substituted with OEt but the product was tarred. Lobry de Bruyn (*Rec. trav. chim.* 11, 112(1892); 13, 126(1894)) showed that NaOEt has stronger reducing properties than NaOMe . Solns. of (b) in AcMe treated with aq. NaOH form NaNO_2 but dinitropseudocumenol which should be formed could not be isolated. The products have not been examd. for acids derived by intramol. oxidation of Me by the NO_2 under the influence of NaOH . 1 g. (b) was heated 3 hrs. in the sealed tube at 120° with 20 cc. MeOH containing 0.140 g. NH_3 and gave on cooling orange-yellow needles of dinitropseudocumidine (d), m. 181°. This deriv. is not identical with that obtained by Auwers (*Ber.* 18, 662). (b) similarly treated with MeNH_2 for 10 hrs. on the H_2O bath gives 6-methylaminodinitropseudocumene (e), yellow crystals, m. 140°. Treated with HNO_3 (d. 1.52), (e) is converted into 6-methylnitramino-3,5-dinitropseudocumene, fine, colorless crystals, m. 113°. Attempts to replace an NO_2 in (b) with S and S_2 as was done by Blanksma (*Rec.* 20, 121(1901)) with $\text{C}_6\text{H}_4(\text{NO}_2)_2$ gave very little sulfide or disulfide because the SNa or SH was oxidized by the NO_2 . 1.26 g. 1,2,4- $\text{Cl}_3\text{C}_6\text{H}_3(\text{NO}_2)_2$ in EtOH + 1.5 g. $\text{Na}_2\text{S} \cdot 9\text{H}_2\text{O}$ in EtOH soln. were filtered and treated with 1.6 g. (b) in EtO I and boiled; 2,3,5-trimethyl-4,6,2',4'-tetranitrodiphenyl sulfide (f), seps. in yellow crystals, m. 215°. The reaction is thus $(\text{NO}_2)_2\text{C}_6\text{H}_3\text{Cl} + \text{Na}_2\text{S} \rightarrow (\text{NO}_2)_2\text{C}_6\text{H}_3\text{SNa} + \text{NaCl}$ and $(\text{NO}_2)_2\text{C}_6\text{H}_3\text{SNa} + (\text{b}) \rightarrow (\text{f}) + \text{NaNO}_2$. *Prepn. of some nitro- and bromonitropseudocumenes.* After having found that one NO_2 in (b).

could be replaced variously, H. undertook to det. the constitution of the derivs. for this purpose because the m. ps. were so nearly identical. It was thought that the bromodinitro derivs. would be more satisfactory. One of these (probably 2,3,5,4,6-Me₃(O₂N)₂C₆Br) was obtained by treating (d) by Sandmeyer's reaction. A 2nd, probably 3,4,6,2,5-Me₃(O₂N)₂C₆Br, was obtained by direct bromination of (a) and subsequent nitration, but in repeating Kelbe and Pathe's expts. (*Ber.* 19, 1546(1886)) it became necessary to amplify the data on the Br and NO₂ derivs. of (a). 20 g. 5-pseudocumidine-HBr diazotized and poured into an HBr soln. of CuBr and distd. with steam gave the 5-bromopseudocumene (g) (15 g.) on adding NaOH. 25 cc. (a) + 0.001 g. Fe + Br₂ gives (g) besides other products. The oil obtained is freed from (g) by cooling to -25° and fractionated; crude 3-bromopseudocumene (h) (containing probably some of the 5- and 6-compd.) b. 226-30°. (b) treated with NH₄SH gives nitropseudocumidinesulfonic acid which at 130° in the sealed tube loses the SO₃H group to give 3-nitro-5-pseudocumidine, m. 136°, which diazotized, etc., gives 3-nitropseudocumene, m. 30°, and reduced with Fe + H₂SO₄ gives 3-aminopseudocumene, and which by Sandmeyer's reaction gives, finally, pure (h) as an oil. In order to obtain 6-bromopseudocumene 5-pseudocumidine was acetylated, then nitrated by boiling with 50% HNO₃ which gave 6-nitro-5-acetpseudocumidide. This sapond. (5 g.) with 20 cc. concd. H₂SO₄ at 120° in an oil bath and distd. from H₂O with steam gave the free base, m. 47°, from which NH₃ was eliminated to give 6-nitropseudocumene, m. 20°, b. 253°. This (10 g.) reduced with 25 g. Fe + H₂SO₄, finally, on the H₂O bath for 1.5 hrs. under a condenser, sepd. on cooling 6-pseudocumidine sulfate; the free base b. 233°. The free base by Sandmeyer's reaction gave 6-bromopseudocumene (i), b. 223°, m. -15°. (i) was more easily obtained thus: 5-pseudocumidine treated with concd. HCl sepd. the hydrochloride to which the calcd. amt. of Br₂ was added; the mixt. was heated 0.5 hr. on the H₂O bath and cooled. The crystals obtained were placed in Na₂CO₃ soln. and the mixt. distd. with steam; 6-bromo-5-pseudocumidine (j), m. 72°, was obtained. (j) was shown to have the Br at 6 by boiling it 0.25 hr. with Ac₂O, and pouring into H₂O, yielding the Ac deriv., m. 204°, which gave with HNO₃ (d. 1.52) 6-bromonitroacetopseudocumidine, m. 235°, which, sapond. with concd. H₂SO₄, gave the free base, m. 150°. (j) diazotized as above gave (i). The best yields were obtained by this method. Of the mono-NO₂ derivs. of (a) the prepn. of the 3- and 6-derivs. has been mentioned. The 5-NO₂ deriv. of (a) was obtained thus: 6.5 g. 5-pseudocumidine + 25 cc. H₂O + 8 cc. HNO₃ (d. 1.4) were cooled and treated with 7 g. NaNO₂ and the cold soln. was poured into a soln. of Cu₂O obtained by heating 50 g. CuSO₄ + 15 g. glucose + 100 cc. H₂O. Afterwards 20 g. NaOH in 60 cc. H₂O were added, cooled rapidly and AcOH added to slight acidity and the mixt. distd. with steam, giving crystals, m. 70°. A small amt. was nitrated further and gave (b), m. 186°. By prepg. the dinitropseudocumenes, H. was able to prove that in (b) the NO₂ group at 6 is the one substituted by NH₂, etc., in the reactions described in the beginning and that (d) is not identical with the deriv. obtained by Auwers. 40 g. 5-pseudocumidine was acetylated with 50 g. AcOH and the Ac deriv. added, 15 g. at a time, to a mixt. of 75 cc. HNO₃ + 75 cc. H₂SO₄, which gave 53 g. dinitroacetopseudocumidine, m. 228°, and which sapond. gave the free base, yellow crystals, m. 180°. 5 g. of the latter were dissolved in 30 cc. concd. H₂SO₄ + 15 cc. H₂O and treated with cooling with 2 g. NaNO₂ in 25 cc. H₂O. The whole was poured into 150 cc. boiling 95% EtOH, heated 10 min. and the EtOH distd. The 3,6-dinitropseudocumene (k) was distd. over with steam; it m. 96° (Nietzki, *Ber.* 27, 1429(1894)). The product (d) obtained by treating (b) with NH₃ was diazotized as described above and gave 3,5-dinitropseudocumene (l), m. 72°. (k) and (l) were reduced with (NH₄)₂S. (k) in EtOH soln. was treated with EtOH-NH₃ and H₂S was passed through the mixt. After boiling

0.5 hr., EtOH-NH₃ was added and H₂S passed through again for some hrs. Finally the EtOH was distd. off and the residue boiled with 5% HCl and filtered. On adding NH₄OH to the filtrate 5-amino-3-nitropseudocumene, m. 136°, identical with the product obtained from (b), was formed. Its constitution was proved (1) by melting it with the same compd. obtained by Mayer's method (*Ber.* 20, 966(1887)); (2) by adding Br in AcOH and obtaining 6-bromo-3-nitro-5-pseudocumidine, m. 150°; and (3) by diazotizing to obtain 3-nitropseudocumene, m. 30°. (k) was reduced in the same way for 12 hrs. and gave 3-nitro-6-aminopseudocumene, of which the constitution was proved by brominating in AcOH, giving 5-bromo-3-nitro-6-aminopseudocumene, m. 165°, and by boiling the diazotized compd. with EtOH to obtain 3-nitropseudocumene, m. 30°. The rule of Nölting, etc. (*Ber.* 35, 630(1902)) that NH₄SH in reacting on poly-NO₂ compds. attacks that NO₂ group first which has the least number of *o*-substituents was verified with (k) and (l). Also Clandish's rule (*J. Chem. Soc.* 87, 1257(1905)) that the more Me groups in the ring the more difficult and slow is the reduction of NO₂ was verified. The 5,6-dinitropseudocumene (m) was only obtained indirectly. 3-Pseudocumidine, b. 235°, was acetylated (Ac deriv., m. 187°) and nitrated in HNO₃ + H₂SO₄ to obtain 5,6-dinitroacetyl pseudocumidide, m. 221°. The Ac was sapond. off by heating with H₂SO₄ 0.5 hr. at 100° and pouring into H₂O; the free base, m. 206°, was diazotized, etc., and gave (n), yellow crystals, m. 90°. Of the dinitropseudocumidines, the 3,6,5-(NO₂)₃NH₂ deriv. (n), m. 181°, is known; the 3,5,6-(NO₂)₃NH₂ isomer (o), m. 180°, was obtained above from (b) with MeOH-NH₃; and the 5,6,3-(NO₂)₃NH₂ deriv., m. 206°, was obtained in the prepn. of (m). When (o) is acetylated with Ac₂O + a drop of H₂SO₄ the Ac deriv. of (o), m. 250°, was obtained; the Ac deriv. of (n), m. 228°. Of 6 possible isomeric mononitropseudocumidines 2 were mentioned above; 3-nitro-5-pseudocumidine, m. 136°, and 6-nitro-5-pseudocumidine, m. 47°. 3-Nitro-5-pseudocumidine, m. 92°, was obtained by reducing 3,6-dinitropseudocumene, and is distinguished by its 5-Br deriv., m. 165°, from the known 6-bromo-3-nitro-5-pseudocumidine, m. 150°. The dinitrobromopseudocumenes were obtained by nitrating the corresponding bromopseudocumene; 3,6-dinitro-5-bromopseudocumene (p), m. 218°; 5,6-dinitro-3-bromopseudocumene (q), m. 180°; 3,5-dinitro-6-bromopseudocumene (r), m. 179°, was obtained from the 6-NH₂ deriv. by Sandmeyer's reaction. The 3,5-dinitro-6-chloropseudocumene (s), colorless crystals, m. 162°, was obtained similarly. Although the NO₂ at 6 in (b) is easily replaced by OMe, NH₂ and NHMe it is more difficult to replace the Cl or Br at 6 by the above groups. In the case of (s) Cl is replaced by NH₂ by heating 3 hrs. in the sealed tube in EtOH-NH₃ at 120°, while (r) only reacts at 170°, which is in accord with the observations of Steger (*Rec. trav. chim.* 18, 9(1899)) and Lufok (*Ibid* 20, 324(1901)), viz., that the order of difficulty of replacement in the *o*- and *p*-position is: NO₂ is easier than Cl and Cl is easier than Br when all are in the same respective position. (p) heated 3 hrs. with 1 mol. NaOMe in MeOH at 120° is unchanged; at 170° tar is formed. (q) similarly treated also gives a negative result. Products of the reaction mixts. of HNO₃-H₂SO₄ on the halogendinitropseudocumenes. As was stated above, 5-bromopseudocumene heated in a mixt. of equal parts of HNO₃ (d. 1.52) + concd. H₂SO₄ gives white needles, m. 150° ((p) m. 216°). To assume that the Br has shifted its position does not help since the m. p. does not coincide with that of (q) or (s). The same product is more easily obtained by heating (p) with HNO₃-H₂SO₄ on the H₂O bath and the mixt. usually solidifies while heating. Poured into H₂O and recrystd. from AcOH, it m. 150°. This product is very different from (p) although it still contains Br. Unlike (p) an NO₂ group is easily replaced by OMe, becomes red and crystallizes with the NaNO₂ formed. The Cl analog of (p) gives a similar deriv., m. 147°. (r) gives a similar compound, colorless plates, m. 185°. On the contrary (b), trinitromesitylene, trinitro-

xylylene and trinitrotoluene are not affected by $\text{H}_2\text{SO}_4\text{-HNO}_3$. Likewise, (g) remains unchanged. The product obtained from (p) was analyzed with difficulty and found to be $\text{C}_8\text{H}_6\text{O}_4\text{N}_2\text{Br} + \text{NO}_2$, i. e., (p) with 1 H replaced by NO_2 which H. calls *the nitrate* (i), for short. (i) boiled with H_2O is not changed; in the sealed tube with H_2O it begins to react at 165° , becomes yellow, and seps. a colorless compd., m. 199° , and a yellow-red tablet. The latter remains unchanged when the treatment is repeated. 2 g. (i) in 15 cc. acetone and 15 cc. H_2O heated to 170° for 2 hrs. gave CO_2 , an acid soln. and the same cryst. compd., $\text{C}_8\text{H}_6\text{O}_4\text{N}_2\text{Br}$ (u), m. 202° . (u) is also obtained on boiling (i) with dil. H_2SO_4 at 145° . (i), m. 150° , becomes dark red 165° and then explodes, giving NO_2 vapors. When (i) is heated with mol. amts. of NaOMe and NaOEt or with MeOH-NH_3 and EtOH-NH_3 , resp., the same compd. (v), $\text{C}_8\text{H}_6\text{O}_4\text{N}_2\text{Br}$, m. 190° , is obtained. The latter reaction takes place at room temp. This compound is quite different from (u), especially in its solubility in H_2O and EtOH . 1 g. (i) in MeOH or $\text{EtOH} + 14$ drops of 33% MeNH_2 heated becomes red and seps. $\text{C}_{10}\text{H}_{12}\text{N}_2\text{O}_4\text{Br}$, colorless, shining needles, m. 185° ; with EtNH_2 , $\text{C}_{11}\text{H}_{14}\text{N}_2\text{O}_4\text{Br}$, crystals, m. 130° , was sepd. The deriv. obtained with MeNH_2 dissolved in HNO_3 liberated N_2 and on diln. sepd. $\text{C}_8\text{H}_6\text{O}_4\text{N}_2\text{Br}$ (= (p) + O), colorless, m. 190° , showing NMe is replaced by O, probably identical with (v). 1.1 g. (i) boiled with 0.900 g. PhNH_2 seps. on cooling $\text{C}_8\text{H}_{14}\text{N}_2\text{O}_4\text{Br}$, golden crystals, m. 168° . From all the above it appears that (i) is (1) a compd. with an NO_2 group in the side chain, thus CH_2NO_2 , (2) an addition product of bromodinitropseudocumene, with HNO_2 , or (3) a nitrate of bromodinitropseudocumene, i. e., contains the group CH_2ONO_2 . Further work must det. which of these hypotheses is correct.

E. J. WITZEMANN.

Catalysis. Decomposition of heptachloropropane, $\text{CCl}_2\text{CCl}_2\text{CCl}_2\text{H}$, by heat and by the aid of catalyzers. J. BÖSEKEN, J. VAN DER SCHEER AND J. G. DE VOOGT. Delft. *Rec. trav. chim.* 34, 78-95 (1915).—Prins (*Thesis*, Delft, 1912) found that heptachloropropane (a) is decompd. by AlCl_3 into CHCl_3 and C_2Cl_4 and the 3 Cl derivs. seem to be in equil., thus: $\text{C}_2\text{HCl}_3 \rightleftharpoons \text{CHCl}_3 + \text{C}_2\text{Cl}_4$. But with AlCl_3 at 80° the vapor pressure, which should reach a limit, increases continually owing to the formation of HCl , so that $\text{C}_2\text{Cl}_3\text{H} \rightarrow \text{C}_2\text{Cl}_4 + \text{HCl}$ must also take place. This paper is a report on further work on these reactions. (a) was drawn by means of a current of CO_2 through a glass tube passing through an electric furnace. The temp. was regulated and detd. with a Pt-Ir couple. The tube was charged with fragments of Cu_2Cl_2 , ZnCl_2 , BaCl_2 , etc. The products passed through a flask fitted with a return-flow condenser and passed from the latter into an ice-cooled receiver and thence through a wash bottle to remove HCl . From the HCl titration the amt. of C_2Cl_4 is calcd. according to the reaction: The comp. of the mixt. of Cl derivs. condensed ($\text{C}_2\text{Cl}_3\text{H}$, C_2Cl_4 , CHCl_3 and C_2Cl_4) was detd. by titrating with NaOEt in the known way. Of all these, (a) decomp. very quickly and quant., thus: $\text{C}_2\text{Cl}_3\text{H} + \text{KOH} \rightarrow \text{KCl} + \text{H}_2\text{O} + \text{C}_2\text{Cl}_4$, but precautions are necessary since $\text{C}_2\text{Cl}_4 + 3\text{KOEt} \rightarrow 3\text{KCl} + \text{C}_2\text{Cl}_3\text{C(OEt)}_2$ more slowly. By detg. the amt. of KOH quickly utilized and stopping the addition when KOH is only slowly neutralized (a) can be quant. detd. as is shown by control analyses. The error in titration is about 1% but the error due to volatility is greater. The HCl formed was detd. (owing to the CO_2 present) by adding Ba(OH)_2 in excess, then H_2SO_4 of a known titer and the excess titrated back after boiling with the acid. 15 expts. with various amts. of (a) at temps. ranging from 240° to 420° in the empty tube showed from 1.3 to 62.3% decompd. to give $\text{C}_2\text{Cl}_4 + \text{HCl}$. The reaction giving $\text{CHCl}_3 + \text{C}_2\text{Cl}_4$ did not occur as was shown by detg. the unchanged (a). There was a small discrepancy in the last expt. The quantity of (a) used and the duration of the expt. have little influence on the reaction. In 11 expts., using ZnCl_2 as a catalyst and ranging from 260° to 410° , 20.8 to 89.7% decompd. to give $\text{C}_2\text{Cl}_4 + \text{HCl}$. The total decompn. was nearly

the same in each case. This shows that ZnCl_2 accelerates this decompn. but does not activate the breaking of the C union to give $\text{CHCl}_3 + \text{C}_2\text{Cl}_4$. Its effect is relatively greater at the lower temps. With BaCl_2 for the same range of temps. a very feeble positive effect was obtained. In the mono-Cl and -Br derivs. the mol. is highly unsatd. after the HCl is sepd. and has enough affinity so that the bibasic chlorides play an important rôle in their catalysis, but with (a) the residue C_2Cl_4 is much less satd. and a chloride with more pronounced affinities must be used. Expts. with Cu_2Cl_2 showed: (1) that the decompn. is much more complete than in the preceding expts.; at 190° the (a) was 37% dissociated; at 250° only 10% remained unchanged and all was decompd. at 400° ; (2) the decompn. goes in 2 directions; (3) although the figures are irregular they show that the decompn. into $\text{C}_2\text{Cl}_4 + \text{CHCl}_3$ is more active than the decompn. into $\text{HCl} + \text{C}_2\text{Cl}_6$, especially at high temps. Attempts to obtain (a) by boiling $\text{CHCl}_3 + \text{C}_2\text{Cl}_4$ with Cu_2Cl_2 failed so that it seems that Cu_2Cl_2 does not become active at a sufficiently low temp., and moreover it is not so sol. as AlCl_3 . AlCl_3 , however, is active at a temp. at which the equil. in $\text{C}_2\text{Cl}_4 + \text{H} \rightleftharpoons \text{CHCl}_3 + \text{C}_2\text{Cl}_6$ is far to the left and the decompn. into $\text{C}_2\text{Cl}_4 + \text{HCl}$ is of secondary importance. The system $\text{C}_2\text{Cl}_4 + \text{H}$, C_2Cl_6 , C_2Cl_4 , CHCl_3 , HCl and AlCl_3 . $\text{C}_2\text{Cl}_4 + \text{CHCl}_3$ at 65° gives a yield of 9% of (a) with AlCl_3 which shows that the equil. is nearly completely on the side of (a). In order to study this complicated system from 65 – 200° , 0.5–1 g. (a) + about 0.1 g. AlCl_3 were sealed in small tubes and heated to the proper temp. in an oil bath. The unchanged (a) was detd., the C_2Cl_4 was detd. approx. in CCl_4 soln. by treating with excess of Br in the light and titrating the excess of Br. C_2Cl_6 is not affected much. The contents of the tubes was dissolved in CCl_4 , this soln. washed with H_2O until neutral, and the washings extd. with CCl_4 to win back dissolved Cl derivs. This soln. is divided in 2 parts and analyzed. 3 expts. at 110° and 120° and 2 at 130° for various time intervals were made. The results show that at 110° the equil. $\text{C}_2\text{HCl}_7 \rightleftharpoons \text{C}_2\text{Cl}_4 + \text{CHCl}_3$ is considerably to the right, in the 50-hr. expt. (63.4%), while 34.4% goes to $\text{C}_2\text{Cl}_6 + \text{HCl}$. The velocity of this latter reaction increases until at 130° 90.5% goes this way and only 9.1 to $\text{C}_2\text{Cl}_4 + \text{CHCl}_3$. The decompn. into $\text{C}_2\text{Cl}_6 + \text{HCl}$ is probably not reversible. On satg. C_2Cl_6 with HCl and heating at 110° with AlCl_3 not a trace of (a) was formed. Equimol. amts. of C_2Cl_4 and CHCl_3 were heated with AlCl_3 from 70° to 108° . When there is no excess of CHCl_3 the synthesis is very slow even at 65° ; an increase in temp. accelerates it very markedly but at the same time the decompn. into $\text{C}_2\text{Cl}_6 + \text{HCl}$ appears, so that at 108° less (a) is formed than at 100° . So that to prep. (a) a temp. as low as possible and an excess of CHCl_3 are necessary. AlCl_3 is appropriate for the catalytic synthesis of (a) because all the compds. CHCl_3 , C_2Cl_6 and C_2Cl_4 are activated at the temp. at which the equil. $\text{C}_2\text{Cl}_4 + \text{CHCl}_3 \rightleftharpoons \text{C}_2\text{Cl}_7\text{H}$ is on the side of $\text{C}_2\text{Cl}_7\text{H}$. The decompn. and synthesis of (a) with AlCl_3 shows: (1) that the equil. $\text{C}_2\text{Cl}_4 + \text{CHCl}_3 \rightleftharpoons \text{C}_2\text{Cl}_7\text{H}$ is displaced toward the left at 110° ; (2) that the decompn. into $\text{C}_2\text{Cl}_6 + \text{HCl}$ at 110° is not a reversible reaction; (3) that the 1st reaction is more active than the 2nd at 65° , while the equil. itself is probably considerably to the right; that the equil. in (1) is not able to be realized because of the reaction in (2).

E. J. WITZEMANN.

The influence of some glycols on the electrical conductivity of boric acid. J. BÖSEKEN, *et al.* Delft. *Rec. trav. chim.* 34, 96–113 (1915).—Since the 1st communication on this subject (*C. A.* 6, 623) a series of glycols have been examd. α -Monochlorohydrin (a), b. 135 – 40° , was neutralized with Na_2CO_3 , and fractionated again. The N aq. soln. showed a sp. cond. of 29.1×10^{-4} which quickly rose to 31.7×10^{-4} . Freshly prepd. (a) dissolved in 1 and 0.5 mol. concns. in 0.5 mol. solns. of H_3BO_3 (cond. 26.8×10^{-4}) showed a very small difference in cond. as compared with the calcd. value, showing that no compd. with a higher cond. is formed between (a) and H_3BO_3 .

Divinylglycol (b) (Griner, *Ann. chim. phys.* [6] 26, 369(1892)), b. 138–44°, used in fresh solns. like (a) and H_2BO_3 showed a feeble positive influence on the calcd. cond. of the mixt. The solns. of (b) become acid on standing. Pinacol in 0.25 mol. soln. at 25° has a cond. of 8.1×10^{-8} , but in 0.25 mol. solns. of H_2BO_3 it showed little tendency to form a complex. 1,3-Propanediol (Nef, *Ann.* 335, 206, 306(1904)), b. 214°, was redistd. from BaO ; the cond. of a *N* soln. is 2×10^{-8} , which mixed with 0.5 mol. H_2BO_3 shows a slight depression, which excludes the formation of a complex. 1,4-Butanediol (Bouveault, Blanc, *Bull. soc. chim.* [3] 31, 1210(1904)), b₇₆ 235°, shows no tendency to form a complex acid with a higher cond. According to the Baeyer strain theory the 2 OH's are close enough together so that they might be expected to have some effect. α -Monophenyl glyceryl ether (c), $PhOCH_2CH(OH)CH_2OH$, obtained from phenylglycide (Lindemann, *Ber.* 24, 2245(1891)) by boiling it with twice its wt. of 2 *N* H_2SO_4 and extg. with Et_2O , etc., b₄₀ 213°, m. 67°. With H_2BO_3 no complex with a larger cond. is formed. B. finds confusion in the literature on the products formed by the action of $PhONa$ on $ClCH_2CH_2CH_2O$ by which (d) and $(PhOCH_2)_2CHOH$ (e) are formed.

Some physical consts. and the action of Br on these derivs. were studied. Of (d) the mol. wt. in $PhOH$ is 148.8 (calcd. 150), $d_4^{21.2}$ 1.1109, n_D^{21} 1.53072, mol. refraction 41.598 (calcd. 41.246). Of (e) the mol. wt. in $PhOH$ is 214 (calcd. 244), m. 81°, d_4^{24} 1.179, av. mol. refraction in $EtOH$ or $MeOH$, 69.45 (calcd. 69.077). Of (c) the m. p. is 69°, d_{40} 1.225, mol. refraction 44.61. In order further to det. their individuality their behavior toward Br was studied. $PhOH$ in either H_2O or CCl_4 soln. treated with Br 15 min. or 5 hrs. absorbed 3 atoms of Br per mol. $PhOH$. (d) similarly treated in CCl_4 soln. for 15 min. absorbed ≈ 1 atom of Br; (c) in H_2O or CCl_4 for 15 min. absorbed ≈ 2 atoms Br; (e) in CCl_4 for 15 min. or 5 hrs. absorbed ≈ 2 atoms Br. The results show clearly that (d) and (e) are markedly different. It is interesting to note that the substitution of glycide for OH cuts down the rapid substitution in the Ph group from 3 to 1. In (e) it is almost certain that 1 Br enters each nucleus, but in (c) 2 Br atoms react, showing that the free OH's influence this substitution favorably. *Bisbromophenyl glyceryl ether* (probably p - $BrC_6H_4OCH_2CH_2CHOH$) was obtained as white leaves, m. 81.5°, is stable in 20% $NaOEt$ soln., is attacked and tarred by $AlCl_3$. The *dibromophenyl glyceryl ether*, probably o,p - $Br_2C_6H_3OCH_2CH(OH)CH_2OH$, is obtained as white crystals, m. 90.5°. None of the glycols examd. increases the cond. of H_2BO_3 solns.; glycerol shows a weak positive effect; Magnanini has shown that erythritol, mannitol and dulcitol show a marked positive effect. B.'s earlier expts. showed that pyrocatechol and pyrogallol have a marked positive effect but that resorcinol, quinol and phloroglucinol have no or a negative effect on the cond. So that it is clear that: (1) OH groups repel each other; (2) polyatomic alcs. form compds. with a high cond. when 2 OH groups are in a favorable position; (3) the position will be favorable when the OH groups are in the same plane and on the same side of the 2 C atoms to which they are bound and thus rings like $O.C.C.OBOH$ and $O.C.C.C.O.-$

BOH are formed. In the simple glycols the OH groups repel each other and get as far apart as possible and thus the complex is not formed, but as the OH's are multiplied they can not place themselves so unfavorably and so complexes are formed. 1,3-Propanediol does not react with H_2BO_3 but the homologous pentaerythritol does because it has more OH's. $CNO_2(CH_2OH)_4$ (Henry, *Rec. trav. chim.* 21, 210), m. 155–60°, showed an excess cond. of 122.2×10^{-8} in 0.5 mol. soln. when mixed with 0.5 mol. H_2BO_3 . The excess cond. for 0.5 mol. pentaerythritol is 221.9×10^{-8} ; for glycerol 8.3×10^{-8} . Sorbitol (obtained by reducing glucose, Fischer, *Ber.* 23, 2133(1890)) shows a very marked effect on the cond.; it is much stronger than that of pyrogallol. The max. cond. observed on mixing 0.5 mol. solns. of sorbitol and H_2BO_3 was $1303 \times$

10^{-8} (calcd. 48.3×10^{-8}), i. e., an excess cond. of 1254.7×10^{-8} , due to the formation of an acid complex.

E. J. WITZEMANN.

The coloring of certain picrylmethylamine derivatives by alkalis. A. P. N. FRANCHIMONT AND H. J. BACKER. *Verslag Akad. Wetenschappen* 23, 641-6(1914).—The results of the measurements described in a former paper (C. A. 8, 1271) on the absorption spectra of picrylmethylnitroamines and their alkaline solns. have an important bearing on the theory of Hantzsch that their coloring may be ascribed to the action of the NO_2 - and NH_2 -groups on each other and that the coloring is thus detd. by the NO_2 -groups of the C_6H_2 nucleus which react with the base, while the NO_2 -groups bound to N play only a subsidiary rôle. In order to test this theory more completely, observations were made on the absorption spectra of various derivs. of picrylmethylamine of the form Picr.NMeX, in which X = Ac, CO_2Me , CO_2Et , Ph or NO. The spectra for these compds. and their alk. solns. are shown graphically and confirm completely the above theory.

L. H. ADAMS.

α -Sulfofropionic acid and its separation into optically active isomers. A. P. N. FRANCHIMONT AND H. J. BACKER. *Verslag Akad. Wetenschappen* 23, 647-52(1914).—To obtain the *d*-form of α -sulfofropionic acid an aq. soln. of its acid strychnine salt was allowed to cryst., and the product converted into the neutral Ba salt by treatment with the theoretical amt. of $\text{Ba}(\text{OH})_2$. The Ba was then removed by addition of the theoretical amt. of H_2SO_4 to a soln. of the Ba salt, and the α -form obtained finally by recrystn. over P_2O_5 . It contains 1 mol. H_2O of crystn. and is very hygroscopic, m. $81-2^\circ$, $[\alpha]_D^{20}$ 32° , $[\text{M}]_D^{20}$ 49.2° ; acid K salt, α 23.8° , M 45.7° ; acid Ba salt, α 18.0° , M 79.8° ; acid strychnine salt, α -14.6° , M -71.4° ; neutral Ba salt, α -4.96° , M -14.4° . The *l*-form was prepd. in a similar way from the mother liquors from which the acid strychnine salt of the *d*-form had been sepd. It also contains 1 mol. H_2O of crystn.: its m. p. was not detd.; α -29.8° , M -45.8° ; acid strychnine salt, α -27.7° , M -135° ; neutral NH_4 salt, α 7.9° , M 14.8° . The racemic acid (1 mol. H_2O of crystn.), m. 100.5° .

L. H. ADAMS.

Chondroitin-sulfuric acid. IV. P. A. LEVENE AND F. B. LAForge. Rockefeller Inst. *J. Biol. Chem.* 20, 433-44(1915); cf. C. A. 8, 2704.—Chondrosamine, the hexosamine obtained by hydrolyzing chondroitine- H_2SO_4 , contains a normal C chain, as it is oxidized by Br to tetrahydroxyaminocaproic acid, which on reduction yields a monohydroxyaminocaproic acid, identical with that obtained from glucosaminic acid under the same conditions. On oxidation of desaminochondrosamine with HNO_3 , a di- CO_2H acid, chondrosic acid, is formed which analyzes for an anhydrotetrahydroxyadipic acid and is isomeric with isosaccharic acid. An O bridge is present between the α - and α_1 -C atoms. The osazone of chondrosamine is identical with that obtained from allose or altrose and chondrosamine apparently has the structure *l*- α -allosamine. No evidence has yet been obtained as to the arrangement of the groups on the α -C atom in the original sugar. Chitaric and chitonic acids are probably epimers, one having the configuration of glucose and the other of mannose. *Chondrosaminic acid*, from chondrosamine-HCl by the action of excess of Br, short, prismatic needles grouped in rosettes; does not melt but darkens above 190° ; $[\alpha]_D^{25.6}$ -16.15° , after 48 hrs., -29.23° . *Chondrosic acid* was obtained by boiling the Ca salt previously described (C. A. 8, 2704) with $(\text{CO}_2\text{H})_2$; large parallelopipeds, m. $179-81^\circ$; $[\alpha]_D^{28}$ -16.56° . *Chondrosaminic acid*, after deamination with AgNO_3 , on oxidation with HNO_3 yielded inactive *epichondrosic acid*, m. $201-2^\circ$. A very small amt. of hexosaminic acid was obtained by the action of 80% HCN on ribosimine, m. 198° (decompn.), $[\alpha]_D^{28}$ -22.26° , after 48 hrs., -9.4° . The acid K salt of epi-isosaccharic acid was prepd. by the oxidation of deaminized glucosaminic acid and from it the Pb salt was obtained, which on decompn. with H_2SO_4 gave free *epi-isosaccharic acid*, large plates, very sol. in

the usual reagents except cold amyl alc. and Et_2O . It contains 1 mol. H_2O which can be removed by heating *in vacuo* at 78° ; the dry substance m. 160° , $[\alpha]_D^{25}$ 39.7° .

A. P. LOTHROP.

The mutarotation of phenylosazones of pentoses and hexoses. P. A. LEVENE AND F. B. LAForge. Rockefeller Inst. *J. Biol. Chem.* 20, 429-31 (1915).—In working with rare sugars the identification of osazones is of much importance. In Neuberg's $\text{C}_6\text{H}_5\text{N}$ -EtOH soln. the initial rotation of an osazone is affected slightly by the presence of impurities but the direction of the mutarotation and the equil. rotation remain const. The m. ps. of the osazones, at a rate of heating of 4-5 sec. per 1° , have been revised and are as follows: *l*-arabinose, 166° ; *d*-xylose, 164° ; altrose, 178° ; gulose, 168° ; galactose, 201° ; glucose, 208° . Optical rotations: *d*-xylosazone, $[\alpha]_D$ -0.10° , after 24 hrs., -0.43° ; *l*-arabinoxazone, 0.55° , after 18 hrs., 0.30° ; *d*-altrosazone, -0.40° , after 24 hrs., -0.29° ; *d*-gulosazone, 0.07° , after 24 hrs., 0.50° ; *d*-galactosazone, 0.80° , after 24 hrs., 0.34° ; *d*-glucosazone, -0.62° , after 24 hrs., -0.35° . A. P. LOTHROP.

The elimination of bromine from dibromoanisylideneacetophenone. I. F. J. WILSON AND A. A. BOON. *Pharm. J.* 94, 486-7 (1915).—The compd. $\text{MeOC}_6\text{H}_4\text{CHBr}\cdot\text{CHBrBz}$, m. $139-40^\circ$, loses HBr by treatment with abs. MeOH or EtOH, forming either $\text{MeOC}_6\text{H}_4\text{CHBr}\cdot\text{CH(OR)Bz}$ or $\text{MeOC}_6\text{H}_4\text{CH(OR)CHBrBz}$ ($\text{R} = \text{Me}$ or Et). MeO compd., m. 102° , EtO compd., m. $74-5^\circ$. II. Cf. *J. Am. Chem. Soc.* 22, 667-71 (1900).—Removal of HBr from the dibromide with formation of $\text{MeOC}_6\text{H}_4\text{CBr}\cdot\text{CHBz}$ or $\text{MeOC}_6\text{H}_4\text{CH}\cdot\text{CBrBz}$, m. $93-4^\circ$, can be effected by the action of either (a) $\text{C}_2\text{H}_5\text{OH}$, (b) *iso*- $\text{C}_4\text{H}_9\text{OH}$, (c) PhCH_2OH or (d) AcOH. A mixt. of 20 g. Br_2 compd. with excess of pure reagent was heated on the H_2O bath for 1-3 hrs. and the products were fractionated. $\text{C}_2\text{H}_5\text{Br}$ and $\text{C}_4\text{H}_9\text{Br}$ were among the by-products of (a) and (b), resp. III. Elimination of both Br atoms from the dibromide was effected, with formation of $\text{MeOC}_6\text{H}_4\text{CH}\cdot\text{CHBz}$, m. $75-6^\circ$, by boiling on the H_2O bath with excess of (e) Me_2CHOH , (f) Me_2COH , (g) Me_2CO , (h) benzoin. With (g), heating lasted 1 hr., with (e), (f), and (h) 7-8 hrs. Of by-products, only Me_2CHBr and Me_2CBr were indicated in (e) and (f), resp. Much resin formed in (II) and (III). S. W.

Oxypinenes. J. EMILE BLOMÉN. *Am. J. Pharm.* 87, 199-210 (1915).—A review of the literature with the following summary: (1) When pinene or turpentine is oxidized by the air, O_3 is absorbed from the air, either as such, or O_2 is, partly at least, transformed into O_3 . (2) When pinene is directly oxidized by O_3 , one or more ozonides of pinene will result. (3) When either of the above ozonides of pinene comes into contact with moisture a decompn. takes place, resulting in the formation of H_2O_2 and the intermediary O compds. of pinene (oxypinenes). (4) On prolonged standing or by heat intermol. or auto-oxidation will take place, resulting in the higher oxidation products of pinene—pinonic acid, etc.

W. G. GAESSLER.

The alkaloids in tobacco extract. EUGEN NOGA. *Fach. Mitt. Tabakregie* 1914, Nos. 1 and 2; *Chem. Zentr.* 1915, I, 434.—Turkish tobacco was digested with H_2O and the liquor evapd. *in vacuo*. By shaking out with C_6H_6 there was obtained from 25 kg. ext. of 40° Bé. a small amt. of alkaloid not volatile in steam. This was fractionated into 4 parts: (1) *Nicotoline*, $\text{C}_8\text{H}_{11}\text{N}$, a colorless, mobile liquid of strong, characteristic odor, similar to that of $\text{C}_8\text{H}_9\text{N}$, b. 208° , d_4^{21} 0.9545, n_D^{20} 1.5105; it gives the common alkaloid reactions. With HCl, H_2SO_4 , picric acid, HgCl_2 and PtCl_4 , it forms well crystd. salts of definite m. p. (2) *Nicotine*, b. 267° (Pictet and Rotschy). (3) *Isonicotine*, $\text{C}_8\text{H}_{11}\text{N}$, a colorless, thick, oily liquid, of rather strong and very persistent odor, b. 293° , becoming dark, d_4^{20} 1.0984, n_D^{20} 1.5749; it is optically inactive, easily sol. in org. solvents, difficultly in H_2O and petr. ether. It forms well crystd. salts with HCl, H_2SO_4 , picric acid, HgCl_2 , PtCl_4 , AuCl_3 and with MeI. It is oxidized to nicotinic acid,

gives the pine splint reaction and immediately decolorizes KMnO_4 in the cold. These

properties indicate the formula $\begin{array}{c} \text{CH}:\text{CH}:\text{C}=\text{C}:\text{CH}:\text{CH}_2 \\ || \quad | \quad | \quad | \\ \text{CH}:\text{N}=\text{CH} \quad \text{NMe}-\text{CH}_2 \end{array}$. (4) Nicotelline, $\text{C}_{10}\text{H}_8\text{N}_2$,

m. 148° , b. above 300° (Pictet).

E. H.

The isomeric octa-acetates of lactose. C. S. HUDSON AND J. M. JOHNSON. *J. Am. Chem. Soc.* 37, 1270-5 (1915).—To 400 cc. of Ac_2O and 25 g. NaOAc heated nearly to boiling 100 g. com. milk sugar is slowly added (after the reaction has started, it continues without external heating); when all the sugar has dissolved the soln. is boiled 10 min. and poured into much cold H_2O , the viscous ppt. stirred, allowed to settle, the H_2O poured off and fresh portions added from time to time; after standing under H_2O overnight, the solid mass is filtered, dried, exhausted with warm Et_2O by decantation and the residue recrystd. from 95% alc. until the sp. rotation is const.; yield, 55%. Under the microscope, each minute crystal can be seen to melt distinctly about 90° , but the melt is so viscous that the drops do not coalesce, and as the temp. rises to 100° , air bubbles appear and give a whitish appearance which does not disappear till about 104° as the liquid becomes more fluid. $[\alpha]_D^{20}$ for this lactose β -octa-acetate ($c = \text{g. per } 100 \text{ cc. soln.}$): CHCl_3 , -4.70° , -3.45° for c 10.3644, 19.4414, resp.; C_6H_6 , -25.78° , -23.52° for c 5.72, 10.49; glacial and 50% AcOH , no perceptible rotation for c 10. When 50 g. of this acetate and 5 g. ZnCl_2 in 250 cc. Ac_2O are heated 30 min. on the H_2O bath, cooled, poured into much H_2O , allowed to stand overnight, filtered, ground, dried in the air, crystd. from Et_2O and then repeatedly from 95% alc., there is obtained a 56% yield of an isomeric lactose α -octa-acetate, felted needles, m. 152° ; $[\alpha]_D^{20}$ 53.62°, 54.77° for c 7.8560, 20.3340 in CHCl_3 ; 23.89°, 28.6° for c 4.7518, 10.66 in C_6H_6 ; 60.72°, 59.93° for c 6.0932, 9.8868 in glacial AcOH ; 61.40° for c 4.9356 in 50% AcOH . Solns. of 2.5 g. of either isomer in 50 cc. glacial AcOH containing ZnCl_2 kept 5 months at 20° attain equil. when about 86% of the α -form is present; 5 g. of either isomer and 0.5 g. ZnCl_2 in 50 cc. Ac_2O kept 30 min. at 100° , reach equil. with 81% of the α -form present. With HBr in Ac_2O - AcOH , both yield the same hepta-acetyl-bromolactose, m. $139-41^\circ$, $[\alpha]_D^{20}$ 104-5° in CHCl_3 (Fischer, *C. A.* 4, 3234). The α -form gives an av. mol. wt. of 692 in freezing C_6H_6 , the β -form 611. The more strongly d -rotatory form is called α , like the more strongly d -rotatory lactose. The algebraic difference of the mol. rotations of the 2 forms agrees closely with that of the 2 glucose penta-acetates in CHCl_3 and 50% and glacial AcOH but not so closely in C_6H_6 (cf. preceding abstr.).

CHAS. A. ROUILLER.

The isomeric alpha- and beta-octa-acetates of maltose and of cellose. C. S. HUDSON AND J. M. JOHNSON. *J. Am. Chem. Soc.* 37, 1276-80 (1915); cf. preceding abstr.—The previously known β -maltose octa-acetate m. $159-60^\circ$ (cor.): $[\alpha]_D^{20}$ 62.59°, 62.91° for c 5.09, 10.61 in CHCl_3 ; 74.83°, 74.52° for c 5.20, 10.26 in C_6H_6 ; 54.80° 57.40° for c 5.45, 10.43 in 99.5% AcOH . From 100 g. heated 11 min. on the H_2O bath in 250 cc. Ac_2O with 5 g. ZnCl_2 is obtained the α -maltose octa-acetate, m. 125° (cor.): $[\alpha]_D^{20}$ 122.77°, 121.94° for c 5.01, 9.94 in CHCl_3 ; 124.05°, 123.11° for c 5.00, 9.93 in C_6H_6 ; 124.25°, 124.50° for c 3.95, 10.12 in 99.5% AcOH ; 121.24°, 120.25° for c 5.06, 10.07 in MeOH . α -Cellose octa-acetate, prepd. in the usual way from filter paper with Ac_2O and a little concd. H_2SO_4 and recrystd. from 95% alc. until the rotation is const., shows $[\alpha]_D^{20}$ 41.95°, 40.87° for c 9.85, 5.85 in CHCl_3 , and m. 229.5° (cor.). When this is hydrolyzed with alc. KOH and 75 g. of the resulting cryst. cellose is acetylated with Ac_2O and NaOAc , there is obtained 111 g. octa-acetate with $[\alpha]_D^{20}$ -7.5° in CHCl_3 ; after 16 crystns. from alc., alc.- CHCl_3 and CHCl_3 - Et_2O , this gives 19 g. m. 202° (cor.), $[\alpha]_D^{20}$ -14.48° , -14.74° for c 10.88, 5.10 in CHCl_3 ; 2.96 g. of this, heated 15 min. on the H_2O bath in 50 cc. Ac_2O with a trace of ZnCl_2 , gives 1.9 g.

of the α -compd., $m. 221-3^\circ$, $[\alpha] 40.5^\circ$. The rotary power of the transformed soln. (44.9°) shows that the equil. is far towards the side of the α -form. The formation of the α -acetate with Ac_2O and H_2SO_4 from cellulose, also, does not show whether cellulose is a condensation product of α - or β -cellulose. The algebraic differences of the mol. rotations in $CHCl_3$ of the acetates of the α - and β -forms of glucose, lactose, maltose and cellose all agree closely, showing that the differences in structure in the 4 acetylated sugars do not appreciably affect the rotatory power of the end asym. C atom; this may be somewhat due to the fact that the 3 bioses are derivs. of glucose and have much of their structure in common with glucose. CHAS. A. ROUILLER.

The isomeric penta-acetates of mannose. C. S. HUDSON AND J. K. DALE. *J. Am. Chem. Soc.* 37, 1280-2 (1915).— β -Mannose penta-acetate, $m. 117-8^\circ$ (cor.), $[\alpha]_D^{20} -25.3^\circ$, -25.1° for c 8.4292, 18.136 in $CHCl_3$, is obtained in 45-50% yield from 10 g. mannose slowly added to 4 g. $ZnCl_2$ in 40 g. Ac_2O kept at 0° with occasional shaking for 24 hrs. With 30 cc. Ac_2O containing 1 g. $ZnCl_2$ on the H_2O bath for 30 min., 20 g. yields 7 g. of the isomeric α -penta-acetate, $m. 64^\circ$ (cor.), $[\alpha]_D^{20} 54.9^\circ$ for c 3.6788 in $CHCl_3$. The difference in the mol. rotations of the 2 forms (31,300) is considerably smaller than the corresponding value for the glucose penta-acetates (38,100), which suggests that the change from the glucose to the mannose chain may somewhat affect the rotation of the end asym. C atom. CHAS. A. ROUILLER.

Crystalline d -fructose penta-acetate. C. S. HUDSON AND D. H. BRAUNS. *J. Am. Chem. Soc.* 37, 1283-5 (1915).—To 240 cc. Ac_2O and 10 cc. concd. H_2SO_4 kept in ice and salt and vigorously stirred is slowly added 40 g. d -fructose; when the sugar has dissolved (about 1 hr.), the mixt. is shaken with 500 cc. ice H_2O , neutralized with $NaHCO_3$, filtered and washed with $CHCl_3$ and the filtrate also extd. with $CHCl_3$; the $CHCl_3$ solns. are dried with $CaCl_2$ and concd. *in vacuo* to 30-50 cc., spread in a thin layer in a flat dish and a strong current of air passed over them till the odor of the $CHCl_3$ disappears and that of Ac_2O becomes noticeable; the residue, kept *in vacuo* near KOH and occasionally stirred, crysts. to a solid mass which, when stirred in a mortar with Et_2O and filtered, yields 16 g. of pure penta-acetate, sepg. from Et_2O on slow evapn. in large crystals. $m. 108-9^\circ$, from C_6H_6 in crystals with 1 mol. of solvent, $m. 90^\circ$; $[\alpha]_D^{20} -120.9^\circ$ and 105.5° for c 5.000 in $CHCl_3$ and c 2.000 in C_6H_6 , resp. CHAS. A. ROUILLER.

The volatile oils of the genus *Solidago*. EMERSON R. MILLER AND JEMISON M. MOSELEY. *J. Am. Chem. Soc.* 37, 1285-94 (1915).—Steam distn. of fresh *Solidago rugosa* Mill., in full bloom, collected near Auburn, Ala., gave about 0.4% of a light yellow oil, $d_4^{25} 0.8620$, $[\alpha]_D -12.8^\circ$, $n_D^{25} 1.4813$, sapon. no. 4.22, sapon. no. after acetylation 10.97, corresponding to 1.47% ester calcd. as borneol acetate and 1.67% free alc. calcd. as borneol. Fractionation after sapon. gave chiefly a fraction having all the properties of α -pinene, together with fractions which were undoubtedly limonene and β -pinene. Similarly, *S. odora* Ait. generally gave about 1% of oil with a rotation of $10-20^\circ$ in a 100 mm. tube; the mixt. of oils from several distns. was slightly yellow, with an odor somewhat like that of anise and with a suggestion of saffrole and a warm and sweetish taste, $d_4^{25} 0.9310$, $[\alpha]_D 13.72^\circ$, $n_D^{25} 1.5065$, sapon. no. 7.9, acid no. 0.63, % of MeO 15.9. The oil (0.65% yield) obtained from plants which had been transplanted and cultivated in an open field and harvested about Sept. 12, showed $d_4^{25} 0.9450$, $[\alpha]_D 9.33^\circ$, $n_D^{24} 1.5140$, sapon. no. 8.9, after acetylation 19.4; 1 cc. with 2 drops of 90% alc., gave a turbid mixt.; 1 vol. with 0.4 vol. of 90% alc. a clear mixt.; 1 vol. with 15 vols. of alc. a turbid mixt. With 1 drop of concd. HNO_3 is obtained a bright green color soon changing to reddish brown and, with excess of acid, to bright red. With concd. H_2SO_4 is produced a brownish purple soon changing to rose on the edges; with concd. HCl a dull red color; with glacial $AcOH$ no color; with concd. HCO_2H a

purple color soon changing to reddish brown; with concd. aq. KOH no change; with boiling 0.5 *N* alc. KOH a very dark color. Shaking with excess of 5% KOH produces no change in vol., showing the absence of more than traces of phenols no aldehydes could be detected with Schiff's reagent, NaHSO₃ or NH₄OH; no anethole sepd. in a freezing mixt. after several hrs. The Zeisel method showed 15.9% MeO (that it was not EtO or a mixt. of MeO and EtO was shown by passing the alkyl halide formed into PhNMe₂; PhNMe₂I, m. 212-3°, was obtained). After sapon. the oil yielded fractions with the following b. p., d_{25}^{25} and $[\alpha]_D$, resp.: (1) 165-80°, 0.8440, 68.56°; (2) 180-210°, 0.9830, 48.34°; (3) 210-2°, 0.9640, 0.25°; (4) 212-25°, 0.9680, 0.20°; (5) 225-40°, —, —. (1) gave a nitrosyl chloride, m. 103°, but the m. ps. of the nitropiperidine and -benzylamine made the presence of pinene doubtful; no phellandrene could be identified in (1) and (2) through the nitrosite; that (3) contained methylchavicol was shown by its oxidation by KMnO₄ in dil. AcOH to homoanisic acid, but that it also contained other substances was shown by the fact that an MeO detn. gave only 16.98%, that it showed an ester no. of 9.12 and, after acetylation, of 46.85. No camphor could be detected in (2) or (3) through the oxime. (3) heated 50 hrs. with 0.5 part C₆H₄(CO)₂O, cooled, poured off from the C₆H₄(CO)₂O, dissolved in Et₂O, extd. several times with 5% soda, treated with NaOH and distd., gave a small amt. of a solid sepg. from petr. ether in hexagonal plates m. 203-4°, and giving a phenylurethan m. 138-9°, showing that borneol is a constituent of the oil. Together with the urethan were obtained a few larger crystals, m. 149-50°, indicating the presence of a 2nd alc. in the oil. Fractionation of the oil obtained from cultivated plants gave fractions with the following b. ps., $n_D^{20.5}$ and $[\alpha]_D$, resp.: (1) 170-6°, 1.4735, 62.6°; (2) 176-80°, 1.4769, 71.0°; (3) 180-95°, 1.4880, 57.4°; (4) 195-210°, 1.5118, 15.4°; (5) 210-2°, 1.5210, 0.7°; (6) 212-22°, 1.5221, 0.1°; (7) 222-36°, 1.5260, -0.2°. (1) gave the nitrosyl chloride, m. 103°. (2)-(6) gave a purple color with HCO₂H, the intensity diminishing with rising b. p. and (7) producing no color; with HNO₃ (4) gave a green color. (1) must contain at least 1 terpene, either sabinene or sylvestrene rather than α -pinene. While the physical consts. of (2) indicate the presence of limonene, nothing in the odor suggests it. Acidification with H₂SO₄ of the alk. liquid resulting from sapon., subsequent fractional steam distn., neutralization with NaOH, concn. and treatment with AgNO₃ gave dark Ag salts (possibly owing to the presence of HCO₂H), containing 33.67, 39.8, 69.45 and 73.9% Ag, resp. The residue remaining after the steam distn., when heated with BaCO₃ and H₂O, filtered and treated with AgNO₃, yielded a light yellowish ppt. with 25.22% Ag.

CHAS. A. ROULLER.

Condensation of vanillin and piperonal with certain aromatic amines. ALVIN S. WHEELER. *J. Am. Chem. Soc.* 37, 1362-4 (1915).—W. discusses certain points in which his observations (*C. A.* 7, 3506) are at variance with those of Manchot and Furlong (*C. A.* 4, 459).

CHAS. A. ROULLER.

The color of some cyclic ketonic acids and their esters. HANS STOBBER. Leipzig. *Ber.* 48, 441-6 (1915).—The difference in color between the Bordeaux-red allochryso-ketonic acid (a) and its light yellow Et ester was formerly explained (*C. A.* 1, 2705) as being due to difference in constitution on the basis of Hantzsch's theory (*Ber.* 39, 3080 (1906)). The absorption of (a) and of the similar compds., 9-ketofluorene-4-carboxylic acid (b), phenylindonacetic acid (c) and ketofluorene (d), as well as of the Et esters of (a) and (b) and the Me ester of (c), has since been detd. by the Hartley and Baly method. The absorption of the esters is almost identical with that of the corresponding acids, so that ester and acid are analogously constituted. The compds. (a)-(d) all show selective absorption, at the higher concns., in the region of the long wave lengths. The very flat bands of (b) and (d) cover the region λ 415-345 μ . The band of (c) in 0.01 *N* soln. 10 mm. thick reaches to λ 465 μ , that of 0.01 *N* (a) to λ 526 μ when

6-8 mm. thick and to about λ 555 μ m when 10 mm. thick. Besides these typical bands, (a), (c) and (d) show a pronounced band at about λ 285 μ m, (b) a greatly flattened band. Finally, in the extreme ultraviolet there is again selective absorption. The acids, therefore, show the same 3 typical characteristics as the ketone (d) and are true ketonic acids, and not, as previously assumed for (a), HO lactones. C. A. R.

Molecular compounds of inorganic halides. VI. Action of titanium tetrachloride on organic compounds containing oxygen. ARTHUR ROSENHEIM, with RICHARD SCHNABEL AND ROBERT BILECKI. Berlin. *Ber.* 48, 447-52(1915); cf. Hauser and Levite, *C. A.* 9, 1180.—When 3 mols. *o*-HOC₆H₄CO₂H in abs. Et₂O is boiled with TiCl₄ there are obtained purple-red crystals (a) (cf. *Ber.* 38, 2781(1905)), easily losing HCl in the air and m. 115° (decompn.) when heated rapidly. They have the comp. TiCl(OC₆H₄CO₂H)₃.HCl; the 3 org. acid residues are bound to the Ti by a primary and a secondary valence and form a complex in whose 2nd sphere (using the Werner nomenclature) are the Cl anion, bound by a primary valence, and the added HCl mol.; i. e., the compd. is entirely analogous to those formed by the action of SiCl₄, TiCl₄ and BCl₃ on 1,3-diketones (Dilthey, *Ann.* 344, 300(1906)). With TiBr₄ instead of TiCl₄ is obtained the Br compd. TiBr₃ and 2-3 mols. *o*-HOC₆H₄CO₂Me give the compound [Ti(OC₆H₄CO₂Me)₃]₂TiCl₄, unstable, ruby-red crystals. When (a) is heated in dry air at 65-70°, it loses about 0.5 of its Cl; probably the mol. of HCl is split off; if the temp. is raised to 140-50°, best in CO₂, the total loss in wt. is 39%, and Ti(OC₆H₄CO₂)₃ (Levi, *Ann. chim. phys.* [6] 25, 433) remains; this compd. is more easily obtained from TiCl₄ and 2 mols. HOC₆H₄CO₂H boiled in C₆H₆ at least 6 hrs. Treated with C₆H₅N in abs. alc. it gives a pyridinium salt, OTi(OC₆H₄CO₂C₆H₅N)₃, light yellow microscopic prisms. On the other hand (a) under the same conditions gives a salt in orange-red, microscopic needles of the comp. O.C₆H₄.CO.OTi(OC₆H₄CO₂C₆H₅N)₃, probably identical

with Hauser and Levite's OTi₂(OC₆H₄CO₂H)₄(C₆H₅N)₄. *m*- and *p*-HOC₆H₄CO₂H give with TiCl₄ no characteristic compds. corresponding to (a). Of the cresotinic acids, only those having the OH in the *o*-position to the CO₂H react like *o*-HOC₆H₄CO₂H, 4,2-Me(HO)C₆H₃CO₂H giving the compound Ti(OC₆H₃MeCO₂H)₃.Cl.HCl, purple-red crystals with cantharides luster, which when heated yields the compound Ti(OC₆H₃MeCO₂)₃, brick-red powder sol. in alc. with yellow color, while with C₆H₅N in alc. is obtained the salt O.C₆H₃Me.CO.OTi(OC₆H₃MeCO₂C₆H₅N)₃, red-yellow crystals.

CHAS. A. ROULLIER.

Catalytic reduction of organic halogen compounds. W. BORSCHKE AND G. HEIM-BÜRGER. Univ. Göttingen. *Ber.* 48, 452-8(1915).—The following observations show that under certain conditions organically combined halogen can again be replaced by H in catalytic reductions; what conditions favor this resubstitution and how it proceeds, whether by the dissociation of the halogen compd. into halogen and a free radical and subsequent addition of the H activated by the Pd, or through an organo-metallic compd. RPdX which with H forms a hydrocarbon, HX and Pd, cannot yet be detd. *ω*-Chlorovinyl-3,4-methylenedioxybenzene, CH₂O₂C₆H₃CH:CHCl, obtained in 11 g. yield from 19.2 g. β -piperonylacrylic acid and 6.9 g. K₂CO₃ in 69 cc. H₂O at 0° treated with 200 cc. of 5% KOCl and then with a slow current of CO₂, needles from alc., m. 29-30°; 9.1 g. of this in 40 cc. of 90% alc., treated with 0.05 g. Pd colloid in a few drops of H₂O and shaken with H at 17°, absorbed practically 4 atoms H without any diminution in velocity after 2 atoms had been absorbed, and gave 5.3 g. of CH₂O₂C₆H₃H₂Et. *p*-Methoxy-*ω*-chlorosytrene, obtained in 57% yield from MeOC₆H₄CH:CHCO₂H, leaflets from alc. or Et₂O, m. 34°, smells of anise; with Pd and H in 90% alc. it gives 85% of MeOC₆H₄H₂Et in 1.5 hrs.; in acetone the reduction is complete only after 5 hrs. but the product is the same. From 18 g. PhCH:CHBr shaken with H and Pd until absorption of the H

ceased was obtained 6.4 g. PhEt; when 6.1 g. were shaken until only approx. 2 atoms of H had been absorbed, 1.1 g. PhEt was obtained; the rest of the product boiled higher and contained halogen. To det. whether these reductions proceeded according to the scheme $RCH_2CH_2X \rightarrow RCH:CH_2 \rightarrow REt$, 12.6 g. $PhCH_2Cl$ in an equal part of alc. was shaken with H and Pd; this gave 7 g. PhMe. Under the same conditions, $PhCHCl_2$, after several days, gives some PhMe, an inseparable mixt. of $PhCH_2Cl$ and BzH, and a little $(PhCHCl)_2$. $PhCCl_3$ is slowly but almost completely reduced to $(PhCCl_2)_2$ (12 g. from 19.5 g. $PhCCl_3$). CHAS. A. ROUILLER.

1-Naphthol 5-mercaptan. H. RENNERT. Marburg. Ber. 48, 549-70(1915); cf. Zincke and Ruppertsberg, C. A. 9, 1058.—**Sodium 1-carbethoxynaphthol-5-sulfonate**, needles from H_2O , is obtained when 100 g. com. 1,5- $C_{10}H_6(OH)SO_3Na$ in 1 l. H_2O is shaken with 20 cc. each of $N Pb(OAc)_2$ and $N Na_2S$, filtered and treated with 20 g. NaOH and 40-5 g. $ClCO_2Et$; with PCl_5 it gives 90% of the *sulfonyl chloride*, $EtO_2COC_{10}H_6SO_2Cl$, needles from benzene, m. 79° , easily hydrolyzed back to the acid by alkalis but very stable towards HCl; boiled a short time with $PhNH_2$ in AcOH it gives the *sulfanilide*, leaflets from alc., m. 129° . From 50 g. of the chloride slowly added to 50 g. Zn dust in 200 cc. alc., then gradually treated with 100 cc. concd. HCl and heated a short time on the H_2O bath, is obtained 50-60% of the *mercaptan*, cryst. crusts from alc., m. $41-2^\circ$, very stable in the air but quickly oxidizing in alk. soln.; *acetate*, $EtO_2COC_{10}H_6SAc$, silky needles from dil. alc., m. 86° . With concd. $FeCl_3$ the mercaptan in warm alc. gives the *disulfide*, leaflets from benzene, m. 87° , while with alc., soda and Me_2SO_4 is obtained the *methyl sulfide*, needles from MeOH, m. 79° , which with Cl in AcOH or $CHCl_3$ gives only tarry products; when treated in 5 parts AcOH with a slight excess of Br, however, it yields a *bromo perbromide*, probably 4,1,5- $C_{10}H_6Br(OCO_2Et)SMeBr_2$, red-brown needles, m. 103° (decompn.), quickly changes and is converted by warm H_2O into the *sulfoxide*, $C_{10}H_{11}O_2SBr$, needles from benzene, m. $119-20^\circ$. **1-Carbethoxynaphthol methyl 5-sulfone**, from the sulfide in AcOH and excess of H_2O_2 on the H_2O bath, needles from C_6H_6 -benzene, m. $94-5^\circ$. **Benzyl 5-sulfide**, from the mercaptan, soda and $PhCH_2Cl$ in cold alc., leaflets from alc., m. $136-7^\circ$; with Cl in AcOH it gives the above $EtO_2COC_{10}H_6SO_2Cl$, while in $CHCl_3$ is obtained the compd. (a) below. **Sulfone**, from the sulfide and H_2O_2 in AcOH, needles from alc., m. 130° . **1-Naphthol 5-mercaptan**, from the EtO_2C deriv. boiled a short time with dil. NaOH in the presence of a little Na_2S , needles from C_6H_6 -benzene, m. $131-2^\circ$, quickly oxidizes in alk. soln.; *diacetate*, needles from alc., m. $149-50^\circ$. **Disulfide**, from the EtO_2C deriv. by hydrolysis in alc. soln., needles from AcOH, m. 212° , sol. without change in alkalis; *diacetate*, leaflets from AcOH, m. 154° . **Methyl sulfide**, from the EtO_2C deriv. and alc. alkali, leaflets from dil. alc., needles from C_6H_6 -benzene, m. $154-5^\circ$; Cl in $CHCl_3$ gives brown amorphous products and in AcOH brown tarry substances; *acetate*, needles from alc., m. $77-8^\circ$; *methyl ether*, $MeOC_{10}H_6SMe$, from the $HOC_{10}H_6SH$ or $EtO_2COC_{10}H_6SH$, NaOH and Me_2SO_4 , silvery leaflets from AcOH, m. 134° . **Sulfone**, $HOC_{10}H_6SO_2Me$, from the EtO_2C compd. and alc. NaOH, needles from H_2O , m. 163° . **Benzyl sulfide**, silky needles from C_6H_6 -benzene, m. 130° ; *acetate*, leaflets from AcOH, m. 157° . **Sulfone**, needles from AcOH, m. 234° , nitrated by HNO_3 (d. 1.4) and apparently converted into a keto chloride by Cl in $CHCl_3$; *acetate*, needles from alc., m. 118° . **1-Naphthol-5-sulfonic acid**, obtained in 80% yield from 10 g. of the $EtO_2COC_{10}H_6SO_2Cl$ and 5.5 g. $NaHCO_3$ slowly added to 10 g. crystd. Na_2SO_3 in 50 g. H_2O gradually heated to $50-60^\circ$, crystals from Et_2O -benzene, decomps. above 120° ; with HBr it apparently gives chiefly the disulfide; Me ether, from the Ag salt and MeI, is identical with the above Me sulfone; *dimethyl ether*, obtained with alk. Me_2SO_4 , silky needles from dil. MeOH, m. 98° . Both the $EtO_2COC_{10}H_6SCH_2Ph$ and $EtO_2COC_{10}H_6SH$ with Cl in $CHCl_3$ give a *compound (a)*, probably 2,4,5,6,8,1- $C_{10}H_2Cl_6OCO_2Et$, needles from ben-

zine, m. 129–30°, does not liberate I in AcOH from KI and is not changed by SnCl_2 or PhNH_2 ; alkalis hydrolyze the EtO_2CO group and eliminate Cl, probably with substitution of HO for it; the EtO_2CO group could not be split off with concd. or alc. HCl. The product of the alk. hydrolysis, needles from benzene, m. 172°, has a Cl content (38.17%) corresponding to the formula $\text{C}_{10}\text{H}_7\text{O}_2\text{Cl}$. $\alpha\text{-C}_{10}\text{H}_7\text{OCO}_2\text{Et}$ with Cl in CHCl_3 also yields a compound, $\text{C}_{12}\text{H}_9\text{O}_2\text{Cl}$, leaflets, m. 126–7°, which with alkali loses the EtO_2CO group and Cl; the product in AcOH with HNO_3 and CrO_3 gives a dark yellow quinone yielding an anilide, dark red needles, m. 209°. CHAS. A. ROULLER.

Thioamides. AUGUST ALBERT. Munich. Ber. 48, 470–3(1915).—If the HO group of $\alpha\text{-HO}$ nitriles is protected by acetylation or benzylation, the nitriles add H_2S smoothly to form thioamides, $\text{RCH}(\text{OAc})\text{CSNH}_2$ (R being either aliphatic or aromatic). In the presence of alc. $(\text{NH}_4)_2\text{S}$ the addition takes place in the cold, but if there are present groups sensitive to $(\text{NH}_4)_2\text{S}$, such as NO_2 groups, it is better to use AcSH or AcSNH_2 . $\alpha\text{-Acetoxyisobutyric thioamide}$, obtained in 2.6 g. yield from 4 g. $\text{Me}_2\text{C}(\text{OAc})\text{CN}$ in 12 cc. C_6H_6 and 4 cc. alc. satd. at 0° with NH_3 treated to satn. with H_2S , shaken some hrs. while thoroughly cooled and allowed to stand overnight in a cool place, leaves, m. 123°; there is also formed a faintly yellow oil giving a strong test with Ph_2CCl_2 . $3,4\text{-Methylenedioxyacetylmandelonitrile}$, obtained in 85% yield from 20 g. KCN and 30 g. piperonal in 40 cc. H_2O slowly treated with 30 cc. cold concd. HCl and subsequent heating of the resulting oil in 4 parts Ac_2O and 7 g. NaOAc for 1 hr. on the H_2O bath, prismatic tables from alc., m. 71°; thioamide, prepd. as above in 87% yield, needles from alc., m. 145°. *Acetylmandelic thioamide*, m. 105°. *o-Nitroacetylmandelic thioamide*, from 2 g. of the nitrile in 20 cc. C_6H_6 boiled 2 hrs. with 1.5 cc. AcSH , broad tables from alc., m. 145°; the compd. is better obtained (nearly 100% yield) when 2 g. of the nitrile in 20 cc. C_6H_6 and 3.5 cc. alc. satd. with NH_3 at 0° is treated 3 min. with H_2S , then with 3.5 cc. of AcSH , and allowed to stand in a cool place for 24 hrs. *o-Nitrobenzoylmandelic thioamide*, long, rectangular tables from AcOH, m. 173° (decompn.). CHAS. A. ROULLER.

Indigoid dyes containing sulfur. I. Thioindole derivatives. A synthesis of indirubin. AUGUST ALBERT. Munich. Ber. 48, 474–83(1915); cf. preceding abstr. —When 20 g. $\text{o-O}_2\text{NC}_6\text{H}_4\text{CH}(\text{OBz})\text{CN}$ in 200 cc. cold C_6H_6 and 40 cc. alc. satd. at 0° with NH_3 is treated 1.5–2.0 hrs. with H_2S and kept, tightly closed, overnight in a cool place, quickly filtered, washed with ligroin, dried on clay and freed from S with slightly warm CS_2 , there is obtained 17 g. of *o-hydroxylaminobenzoylmandelic thioamide* (a), seps. from 2 parts alc. + 1 part H_2O in exceedingly fine, long tables with 1 EtOH + 0.5 H_2O , decomp. 159–64°, depending on the manner of heating; it dissolves in 1 mol. warm NaOH and on cooling a colorless Na salt seps.; this on gentle warming with alc. regenerates (a). (a) gently warmed in excess of aq. alkalis becomes red, then intensely blue-violet, the colors persisting for quite a long time in the cold but disappearing on heating higher. Shaken 2 hrs. with dil. HCl, (a) loses NH_3 and forms *N-hydroxy-2-thio-3-benzoyloxindole* (b), $\text{C}_6\text{H}_4\text{CH}(\text{OBz})\text{CS.NOH}$, needles with 1 MeOH , sinters

39°, m. completely 87° to a green liquid, foams 166°, turning violet; free from alc. of crystn., it m. 97–8°; 1 g. treated with 3 cc. H_2O and 2 cc. Ac_2O gives the acetate, 6-sided tables from MeOH or AcOH , m. 106–8° (decompn.). With excess of aq. alkalis, (b) shows the same color reactions as (a); 5 g. in 50 cc. cold H_2O and 40 cc. of N NaOH deposits after 1–2 hrs. 1.5–1.8 g. of fine, hair-like, blue needles, for the most part sol. in cold H_2O with blue color; the insol. part (0.2–0.3 g.) consists of approx. equal amts. of indigo and a dye (probably indirubin) easily sol. in alc. with red color. From the blue aq. soln., solid NaOH or HCl, but CO_2 best, ppts. a cryst. blue-violet dye, quite sol. in ordinary solvents with the same color (high-boiling solvents are not well adapted

to its purification as it decomps. above 140° , sol. in dil. NaOH with blue color and salt formation but decompd. on warming; the vat obtained with hydrosulfite and NaOH dyes wool, cotton less easily, in gray-violet shades; with alk. NH_4OH is obtained an oxime sol. with wine-red color; above 160° , the dye decomps. explosively with evolution of SO_2 and formation of a new compd. insol. in alkalies. The m. p. varies very widely with the manner of heating; when heated slowly it does not m. 200° ; if placed in a bath at 155° , it decomps. 170° , while if the bath is heated to 158° , the dye decomps. 158° . A. believes it is *2-indole-3-N-hydroxythioindolindigo* (c), $\text{NH}_2\text{C}_6\text{H}_4\text{CO}_2\text{C}:\text{C}:\text{CS.N(OH).C}_6\text{H}_4$. He explains the fact that it contains only 1 HO

group, instead of 2 as would be expected from its formation from (b), as being due to the exchange, after the elimination of the Bz group, of the OH on the N for the H on the C opposite: $\text{C}_6\text{H}_4\text{CH(OH).CS.NOH} \rightarrow \text{C}_6\text{H}_4\text{C(OH).CS.NH} \rightarrow$

$\text{C}_6\text{H}_4\text{CO.CS.NH}$ (d); (d) then condenses with 1 mol. hydroxythioindole to form

(c), and also to some extent with itself to form indigo. With BzCl and aq. NaOH, (c) gives 90% of the *N-benzoate*, long, dark blue needles from boiling CS_2 , decomps. $155\text{--}61^{\circ}$, depending on the method of heating, deflagrates with formation of a white sublimate on heating in a test tube, insol. in alkalies. 5 g. (b) warmed 2 hrs. on the H_2O bath with 15 g. Na_2S in 150 cc. H_2O and 100 cc. of satd. NaHCO_3 gives 1.5 g. of indirubin; the mother liquors on oxidation in the air deposit a small amt. of a blue dye insol. in alkalies and containing S.

CHAS. A. ROUVILLER.

An oxidation product of orcinol. F. HENRICH, W. SCHMIDT AND F. ROSSTREUTSCHER. Univ. Erlangen. Ber. 48, 483-9(1915).—When 200 g. orcinol rubbed up with a little H_2O is dissolved in 100 g. KOH in 200 cc. H_2O , filtered, dild. to 3.5 l. and allowed to stand 14 days exposed to the air in a large dish, it gradually becomes more and more brown; it is then acidified, filtered after 1 day and the ppt. dried; it forms a brown-red cryst. mass with 0.04% ash and seps. from dil. alc. or glacial AcOH, when not heated too long, in ruby-red crystals (a), m. $178\text{--}81^{\circ}$ (decompn.), having the comp. $\text{C}_{14}\text{H}_{12}\text{O}_8\cdot\text{H}_2\text{O}$, losing its H_2O after 2-3 hrs. at 145° ; it now decomps. 195° and is easily sol. in cold soda; it can be purified by heating on the H_2O bath in a little H_2O with BaCO_3 for some time, filtering hot, cooling and adding dil. HCl. Distd. with Zn dust in H, it gives a brown oily mass which, when washed in Et_2O with NaOH and H_2O , yields a heavy, brown, non-crystallizable oil. Boiled 0.5 hr. with Ac_2O , it gives a triacetate, $\text{C}_{20}\text{H}_{18}\text{O}_8$, crystals from C_6H_6 -ligroin (1:4), m. 127° , hardly attacked by cold alkalies, dissolving with brown-red color on heating (at once in alc. KOH), sol. in AcOH with yellow color which quickly disappears on boiling with Zn dust. (a) suspended in 20 parts H_2O and satd. with SO_2 , filtered and extd. repeatedly with Et_2O , gives a pentahydroxyditolyl, $(\text{HO})_5\text{C}_6\text{HMeC}_6\text{H}_2\text{Me(OH)}_5$, needles from H_2O containing SO_2 , m. 254° , reduces Fehling and $\text{NH}_4\text{-Cu}$ solns., oxidized back to (a) by $\text{K}_2\text{Cr}_2\text{O}_7$ in dil. H_2SO_4 , slowly in alk. soln. by air and, quickly, by H_2O_2 . Penta-acetate, crystals from C_6H_6 -ligroin (1:1), m. 155° , mol. wt. in freezing CHCl_3 471-97, attacked by alkalies only on warming. (a) is probably a hydrate of a hydroxyquinone, $(\text{HO})_5\text{C}_6\text{H}_2\text{MeC}_6\text{-HMe(OH)(O)}_2$.

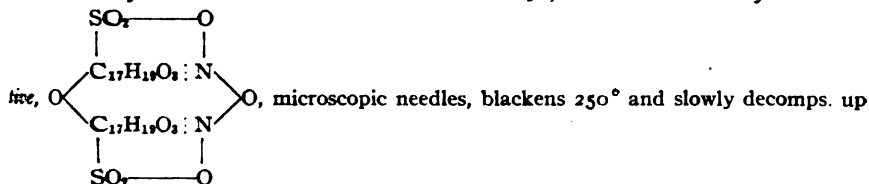
CHAS. A. ROUVILLER.

Molecular weights of the monochloroacetic and α,β -dibromopropionic acids showing double melting points. B. TOLLENS. Univ. Göttingen. Ber. 48, 489-96 (1915).—The following are the av. mol. wts. found for the 2 acids: in freezing H_2O , 90, 221; C_6H_6 , 175, 400; $(\text{CH}_2\text{Br})_2$, 209, 375; in boiling Et_2O , 89, 197; acetone, 96, 215; C_6H_6 , 167, 278. In boiling H_2O , $\text{CH}_3\text{CICO}_2\text{H}$, which is not greatly decompd., gave 68.6-82.1; $\text{CH}_2\text{BrCHBrCO}_2\text{H}$, which is decompd. to a large extent, gave 82.1-96.1. In agreement with Tanatar, Tollens finds, therefore, that the stable and labile forms

of the 2 acids have the monomol. formula in H_2O , Et_2O and acetone and that no transformation effected by heat is necessary, since the f. p. measurements in H_2O and the b. p. detns. in Et_2O and acetone were made at temps. below 63° , the transformation temp. of the stable into the labile forms; the crystn. peculiarities apparently have no connection with the mol. magnitudes.

CHAS. A. ROUILLER.

Morphine. MARTIN FREUND, with H. HERMINGHAUS. Univ. Frankfurt. *Ber.* 48, 497-502(1915); cf. *C. A.* 5, 3810.—The amino oxide $C_{17}H_{19}O_4N$ is obtained in 38 g. yield from 40 g. morphine digested on the H_2O bath with 40 cc. of 30% H_2O_2 , stirred up with abs. alc. and filtered, 8-10 g. of the product not sepg. until the filtrate is concd. *in vacuo*, 18 g. slowly added to 90 cc. cold Ac_2O and 9 cc. concd. H_2SO_4 , boiled a short time, gradually treated with 300 cc. alc., warmed till a cryst. deposit begins to form, cooled, filtered and the filtrate repeatedly evapd. and treated with fresh portions of alc. till no deposit is any longer formed, gives 23 g. of the compd. $C_{24}H_{40}O_{11}N_2S_2$ (a), pptd. from NH_3 by dil. H_2SO_4 in needles, gradually blackens about 280° , reduces Fehling soln.; boiled a long time with alkali, acidified and filtered, it gives $BaSO_4$ with $BaCl_2$; in dil. HNO_3 it dissolves with yellowish red color and soon deposits fine, yellow needles, becoming colorless when pressed out on clay and turning deep red and decomp. on the addition of alkali; on a Pt foil they deflagrate. Warmed with aq. SO_2 until dissolved, cooled and evapd., (a) gives the compd. $C_{17}H_{21}O_7NS$, prisms, m. above 300° . From 5 g. (a) heated 5 min. at 110° with 20 cc. H_2SO_4 (d. 1.84), poured hot into 40 cc. H_2O , rubbed to crystn. and treated with 60 cc. more of H_2O , is obtained the *anhydro deriva-*



to the b. p. of H_2SO_4 ; rubbed with dil. HNO_3 , it gives unstable yellow needles becoming colorless on clay; with aq. SO_2 on the H_2O bath it gives a compound, $HO_3SC_{17}H_{18}O_3 : N$, yellowish green needles, decomp. on boiling with H_2O and even on soln. in NH_3 and pptn. with dil. H_2SO_4 ; it is best crystd. from a mixt. of dil. $AcOH$ and SO_2 and blackens 275° .

CHAS. A. ROUILLER.

3,6-Diaminoselenopyrnone (3,6-diaminoxanthoselenonium). P. EHRLICH AND HUGO BAUER. Georg-Speyer-Haus, Frankfurt a/M. *Ber.* 48, 502-7(1915); cf. *C. A.* 8, 2885.—From 10 g. $(p-H_2NC_6H_4)_2CH_2$ in 500 cc. concd. H_2SO_4 nitrated below 0° with 42 cc. of 100% HNO_3 and 150 cc. concd. H_2SO_4 and subsequently diluted with 6-7 l. H_2O is obtained 158 g. of the *o,o'*-dinitro compd. as sulfate, from which NH_3 liberates the base in a pure state; the H_2SO_4 mother liquors yield 33.5 g. more of less pure base. From 58 g. of this in 290 cc. hot $AcOH$ and 15 g. $NaOAc$ gradually treated with 47 cc. Ac_2O is obtained quant. the di-Ac deriv., 74.5 g. of which, suspended in 1200 cc. alc., treated with 300 g. $SnCl_2$ and 300 cc. HCl (d. 1.19) at 40° , kept several hrs. in the ice chest, filtered, washed with alc., suspended in 1 l. H_2O , decompd. with H_2S , repeatedly extd. with boiling H_2O and pptd. with NH_3 , gives on an av. 40 g. of $[2,4-H_2N(AcNH)-C_6H_4]_2CH_2$; when 15.6 g. of this, suspended in 120 cc. H_2O , are treated with 37 cc. of HCl (d. 1.12), then with ice and 20 cc. of 5 N $NaNO_2$, stirred until the red bisdiazotized compd. has sepd., treated with $NaOAc$ soln. until the reaction to Congo disappears and mixed with 15 g. $KCNSe$ in a little H_2O , stirred for 1 hr. and allowed to stand several hrs., there is obtained 18 g. of a product which is boiled with alc. until nothing more dissolves; there remains a small amt. of a dark brown residue. The 1st alc. ext. on evapn. leaves a dark evil-smelling tar; the subsequent exts. on concn. deposited

amorphous, yellow to brown, sandy ppts. of varying comp., containing considerably less Se than calcd. for the expected intermediate product, $[\text{NCSe}(\text{AcNH})\text{C}_6\text{H}_5]_2\text{CH}_2$; 5 g. of this, heated 1 hr. on the H_2O bath with 25 cc. of concd. H_2SO_4 , then treated with 250 cc. H_2O , filtered, warmed a short time with HCl (d. 1.12), filtered and dild. with

H_2O , gave 2.1 g. of 3,6-diaminoselenopyrnone chloride (a), $\text{CH} \begin{array}{c} \diagup \text{C}_6\text{H}_4(\text{NH}_2) \diagdown \\ \diagdown \text{C}_6\text{H}_4(\text{NH}_2) \diagup \end{array} \text{SeCl}$,

needles with green metallic luster from alc., quite difficultly sol. in H_2O and alc. with red color and no fluorescence, in concd. H_2SO_4 with blood-red color persisting on addition of a little H_2O while more H_2O ppts. out most of the dye. NaNO_2 in HCl gives an almost colorless diazo compd. coupling red with resorcinol or R salt. NaOH ppts. the base in blue-red flocks sol. in Et_2O without color as the carbinol compd. and reforming the dye when shaken with acids, including AcOH ; $(\text{NH}_4)_2\text{CO}_3$ ppts. red flocks of the carbonate, sol. on warming with red color. As compared with the S compd. (b), (a) dyes silk with a much more bluish tinge (somewhat like "Cerise") and tannated cotton a bluish red similar to safranin; the cotton dye is fast to washing but neither the cotton nor silk dye is fast to light. In trypanosomiasis, (a) and (b) produce only transitory healing effects. The toxic dose for a 20 g. mouse is about 1/2500 g. of (b) and 1/3000 g. of (a). Both dyes produce pronounced edema in mice. C. A. R.

Resorcinolarsonic acid and some of its derivatives and reduction products. HUGO BAUER. *Ber.* 48, 509-24(1915); cf. *Farb. v. M. L. & B., C. A.* 8, 2459.—*Resorcinolarsonic acid* (2,4-dihydroxyphenylarsonic acid), obtained in 145 g. yield from 110 g. $m\text{-C}_6\text{H}_4(\text{OH})_2$ heated on the H_2O bath with 171 g. com. H_2AsO_4 (75° Bé.) for 2 days, rubbed up with AcOH and washed repeatedly with AcOH , crystals from the aq. soln. containing AcOH slowly evapd. in a desiccator, m. 191°, gives a dark red color with FeCl_3 , does not reduce $\text{NH}_3\text{-AgNO}_3$ even on heating; the crystals are triclinic pinacoidal, $a:b:c = 0.8088:1:0.4349$, α 84° 21' 15", β 104° 40' 30", γ 79° 31' 30", prisms (a) 100, b (010), m (110) with the end surfaces g (011), c (001), with perfect cleavage along b (010). From 46.8 g. of the acid in 50 cc. concd. H_2SO_4 treated below 0° with 14 cc. each of HNO_3 (d. 1.4) and concd. H_2SO_4 and allowed to stand overnight, is obtained 41.7 g. of the 5-nitro acid, faintly yellow needles with 2 H_2O , which it loses at 110°, becoming colorless and then m. 223° (decompn.), gives a red color with FeCl_3 . If 30 cc. each of HNO_3 and H_2SO_4 are used for the nitration at 20° and the temp. is slowly raised to and kept several hrs. at 60°, there is obtained 50 g. of the 3,5-dinitro acid, yellow crystals from H_2O , rubbing to an almost white powder, m. 206° (decompn.), gives a dark orange color with FeCl_3 . With 4 mols. Br in AcOH , the mono- NO_2 acid gives 3,5,2,4- $\text{Br}_2(\text{HO})_2\text{C}_6\text{HNO}_2$, while the di- NO_2 acid with 2 mols. Br in alc., subsequently dild. with an equal vol. of H_2O , freed of the slight excess of Br with bisulfite and of the alc. by warming on the H_2O bath, yields 2,4-dinitro-6-bromoresorcinol, 2,4,3,5- $(\text{HO})_2(\text{O}_2\text{N})_2\text{C}_6\text{HBr}$, yellow prisms from AcOH , m. 89-90°. 2,4-Dihydroxy-5-aminophenylarsonic acid, obtained quant. from 32.5 g. of the NO_2 acid in 300 cc. H_2O and 100 cc. of 10 N NaOH treated with 70 g. $\text{Na}_2\text{S}_2\text{O}_4$, filtered, cooled and neutralized with 62 cc. AcOH , pptd. by NaOAc from dil. HCl in needles with 1 H_2O , darkens 150°, decomps. at higher temps., quickly turned blue in alk. soln. by the air with formation of an indophenol dye, reduces cold $\text{NH}_3\text{-AgNO}_3$, gives with nitrites a yellow diazo soln. coupling blue-red with $m\text{-C}_6\text{H}_4(\text{OH})_2$; in NaOH with Ac_2O it gives an acetyl derivative, quite sol. in H_2O , easily in concd. HCl . 2,4,2',4'-Tetrahydroxy-5,5'-diaminoarsenobenzene (best prepd. from the NH_2 acid, as described below for the di- Ac deriv.), is obtained as the hydrochloride, dark yellow substance, easily sol. in H_2O , by gently warming 6.5 g. of the NO_2 acid in 20 cc. alc. and 25 cc. HCl (d. 1.19) with 25 g. SnCl_2 , adding 20 cc. AcOH , filtering and adding dropwise to 30 cc. ice-cold HCl (d. 1.19), 20 cc.

AcOH and 1 cc. HI (d. 1.7), adding 40 cc. more AcOH and filtering in a CO_2 atm.; NaOH at first ppts. the free base and, when in excess, redissolves it, the alk. soln. being quickly turned blue by the air. *Diacetyl derivative*, from 3 g. of the NHAc acid dissolved in 30 cc. H_3PO_2 (d. 1.136), filtered, treated with 1 cc. HI (d. 1.7) and stirred, yellow powder, easily sol. in NaOH. *2,4,2',4'-Tetrahydroxy-3,5,3',5'-tetraaminoarsenobenzene*, obtained as the *tetrahydrochloride* in 9.1 g. yield from 13 g. of the di- NO_2 acid in 35 cc. H_2O and 80 cc. HCl (d. 1.19) treated at $35-40^\circ$ with 80 g. SnCl_2 , then with 2 g. KI in a little H_2O and poured into 500 cc. of ice-cold HCl (d. 1.19), dull yellow powder, sol. in H_2O with dark yellow, in dil. HCl with light yellow color; NaOH, soda and NaHCO_3 ppt. the free base and, in excess, redissolve it with brown color; the alk. soln. turns blue in the air; in HCl with nitrites is formed a dark ppt., then a light yellow diazo soln. coupling dark red with $m\text{-C}_6\text{H}_4(\text{OH})_2$; in AcOH is formed a dark green ppt. at once turning deep brown, which does not give the diazo compd. on further treatment with HNO_3 and dissolves in NaOH; it is probably a dye of the Bismarck brown type; the same splitting off of the AsO_2H_2 residue and formation of a brown-red dye is effected in soda soln. with diazo-*p*-nitroaniline. *Acetyl derivative*, from the HCl salt in dil. HCl and excess of Ac_2O shaken vigorously with NaOH, brown horny mass, easily powdered, sol. in soda and NaHCO_3 . The HCl salt boiled a few min. in H_2O gives $1,3,2,4\text{-C}_6\text{H}_2(\text{OH})_2(\text{NH}_2)_2\cdot 2\text{HCl}$ which, with nitrites in HCl, gives a dark yellow diazo soln. coupling blue-red with $m\text{-C}_6\text{H}_4(\text{OH})_2$; in AcOH is obtained a dark green ppt. at once changing to a dark brown dye sol. in alkalies, while in soda with diazo-*p*-nitroaniline is formed a brown-red dye; the 2 dyes are probably identical with those obtained from the As:As compd. *2-Methoxy-4-hydroxyphenylarsonic acid*, obtained in 63 g. yield from 100 g. $\text{MeOC}_6\text{H}_4\text{OH}$ and 160 g. H_2AsO_4 (75° Bé.) after 50 hrs. on the H_2O bath, m. 209° , reduced by H_3PO_2 and KI to *2,2'-dimethoxy-4,4'-dihydroxyarsenobenzene*, yellow powder, sol. in NaOH, insol. in soda. From 15 g. of the acid with 30 cc. each of AcOH and HNO_3 (d. 1.4) after 2 days is obtained 8 g. of the *5-nitro-acid*, light yellow scales from H_2O , m. 237° ; 15.5 g. in 150 cc. H_2O and 50 cc. of 10 *N* NaOH with 35 g. $\text{Na}_2\text{S}_2\text{O}_4$ gives 14 g. of the *5-amino acid*, pptd. from dil. HCl by NaOAc in needles with 2 H_2O , darkens about 120° , decomp. at higher temps., gives a yellowish diazo soln. coupling red with $m\text{-C}_6\text{H}_4(\text{OH})_2$ and with $\text{NH}_2\text{-AgNO}_3$ in the cold forms a red-brown soln. depositing Ag on warming. *2,2'-Dimethoxy-4,4'-dihydroxy-5,5'-diaminoarsenobenzene*, obtained as the *hypophosphite*, friable yellow powder, from the NH_2 acid, H_3PO_2 and KI and addition of the resulting soln. to acetone; free base, resinous yellow ppt., sol. in excess of alkali, the soln. turning red when poured upon paper. If the reduction mixt. is poured into concd. HCl instead of acetone, the *hydrochloride* is formed; this, boiled a few min. in H_2O , gives an *aminoresorcinol methyl ether hydrochloride*, needles, decomp. about 220° , which by exclusion must be the $2,4\text{-(HO(MeO))C}_6\text{H}_2\text{NH}_2\cdot\text{HCl}$; NaOH or soda produces a yellow color, quickly followed by the deposition of red flocks (probably an oxidation product), insol. in excess of alkalies and in Et_2O ; FeCl_3 gives a red color; the diazo soln. is yellow and couples intensely red with $m\text{-C}_6\text{H}_4(\text{OH})_2$; $\text{NH}_2\text{-AgNO}_3$ is immediately reduced. *2,4-Dimethoxyphenylarsonic acid*, obtained in 23.3 g. yield from 28 g. $m\text{-C}_6\text{H}_4(\text{OMe})_2$ and 50 g. H_2AsO_4 after 8 days on the H_2O bath, silky needles from H_2O , m. $242-3^\circ$; what is apparently an impure form of the same product is obtained in small amt. from $2,4\text{-(HO)}_2\text{C}_6\text{H}_2\text{-AsO}_2\text{H}_2$ heated 1 day on the H_2O bath with a large excess of alk. Me_2SO_4 . The above compds. show considerable toxicity without, however, a corresponding curative action.

CHAS. A. ROULLER.

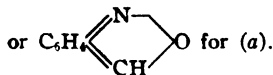
The problem of the valence of sulfur. H. LECHER. Acad. Sci. Munich. *Ber.* 48, 524-36(1915).—Aromatic disulfides being the analogs of hexa-arylethanes which are characterized by their power to dissociate into free radicals, owing to the weakening of the 4th valence of the C_6H_5 C atoms by the proximity of the aryl groups, it became

of interest to det. whether the 2nd S valence in the sulfides is similarly weakened. The colorless Ph_2S_2 (a) dissolves in all indifferent solvents with faintly yellow color; the fused (a), m. $60-2^\circ$, is also yellow and can easily be undercooled to room temp. without disappearance of the color, the colorless form crystg. from the melt. On warming, the solns. or melt become more deeply yellow and resume their original color on cooling. That this is not due to a dissociation equil., $(a) \rightleftharpoons 2\text{PhS}$, is indicated by the fact that Beer's law holds in C_6H_6 at room temp. and in xylene near the b. p. (cf. Piccard, *C. A.* 5, 3444). $(p\text{-Me}_2\text{NC}_6\text{H}_4\text{S})_2$ (b), which is yellow even in the solid state, behaves just like (a) in solns. and when fused, and the solid, also, becomes darker when heated to about 100° , resuming its original color on cooling and becoming still lighter at -50° . L. believes that parallel with the gradual increase of color on heating there is a gradual shifting of the valence distribution, the S-S union gradually becoming weaker, so that the compounds should break down at this point when heated. As a matter of fact, (a) is not attacked by Na powder in Et_2O after 2 days' shaking; 2 g. (a) shaken 10 days in ligroin with an alloy of 0.35 g. Na and 1.6 g. K gave 1.7 g. unchanged (a) and a little K_2S and PhSK ; with Na in boiling ligroin (about 80°) in a N atm. there was no action in 1 hr.; while in boiling xylene with the calcd. amt. of Na after 1.5 hrs. the (a) was almost completely converted into PhSNa , the film of the latter depositing on the Na probably preventing complete interaction. Similarly, (b) boiled 2 hrs. with 5 times the calcd. amt. of Na in xylene gives $\text{Me}_2\text{NC}_6\text{H}_4\text{SH}$ almost quant.; of 3 g. (b) boiled 5 hrs. in xylene with an alloy of 40.3 g. Hg and 10 g. Pb, about 0.5 g. is converted into the mercaptan; with Hg alone, there is no reaction. Neither (a) nor (b) reacts with O in boiling xylene. From 6.6 g. (b) and 12.2 g. $\text{C}_2\text{Ph}_3\text{Et}_2\text{O}$ boiled 3 hrs. in PhMe under CO_2 are obtained 2.6 g. unchanged (b) and 9.9 g. 4-dimethylaminophenyl triphenylmethyl sulfide (c), while 20 min. boiling of 10.6 g. (b) with a filtered soln. of Ph_3C prepd. by shaking 19.9 g. Ph_3CCl in 130 cc. xylene with 50 g. Hg for 22 hrs. gave 4.6 g. unchanged (b) and 15.6 g. (c). (c) seps. from alc. in leaflets, sinters about 145° , m. $146-8^\circ$, perfectly stable in the solid state, insol. in dil. HCl or HNO_3 ; HCl in Et_2O ppts. from org. solvents the cryst. *hydrochloride*, insol. in dil. HCl ; boiling AcOH decomps. (c) with yellow color; boiling PhMe produces no color, boiling xylene a faint yellow color which does not disappear on cooling; the soln. does not show the spectrum of Ph_3C , while the dark yellow soln. in boiling C_{10}H_8 does show the Ph_3C spectrum which, however, disappears on shaking but reappears on heating again; the process cannot be repeated often as dark decompn. products make their appearance. In concd. H_2SO_4 (c) dissolves with red color and evolution of SO_2 and after several hrs. ice ppts. Ph_3COH ; after removal of this with Et_2O , addition of NaOH and extn. with Et_2O , (b) is obtained. PhSCPh_3 prepd. by shaking PhSNa with Ph_3CCl in Et_2O for 18 hrs. is identical with the product obtained from PhSH and Ph_3CCl in C_6H_6 (v. Meyer, *C. A.* 5, 1595); it m. $105-6^\circ$, is not decompd. by boiling AcOH , gives no yellow color in boiling xylene, sol. in concd. H_2SO_4 with red color disappearing on addition of H_2O , becomes yellow in boiling BzOEt or C_{10}H_8 with appearance of the spectrum of Ph_3C which disappears on shaking with air and reappears on warming.

CHAS. A. ROUILLER.

Anthranil. XX. Anthranil and methylantranil. EUG. BAMBERGER. Zurich. *Ber.* 48, 537-82(1915); cf. *C. A.* 4, 2281; 5, 3269.—The present work further confirms the homology of anthranil (a) and the Me deriv. *Iz*-methylbenz- β,γ -isoxazole (b)

and thus gives additional evidence of the correctness of the formula $\text{C}_6\text{H}_7\text{N}_2\text{O}$



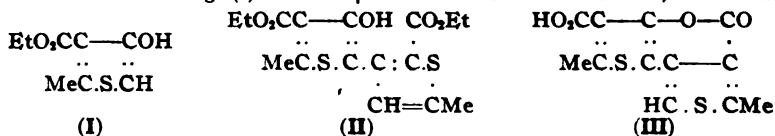
react in the same way towards HNO_3 , but while the product from (a), $o\text{-OHCC}_6\text{H}_4\text{N}(\text{NO})\text{OH}$, was isolated in cryst. form, that from (b), $o\text{-AcC}_6\text{H}_4\text{N}(\text{NO})\text{OH}$, could be identified only by the color reactions of its solns., apparently because the mixt. of NaNO_2 and HCl used partly converted (b) into the *N*-dichloride (together with much of the diazonium salt, $\text{AcC}_6\text{H}_4\text{N}_2\text{Cl}$). In the hope of avoiding this, H_2SO_4 was substituted for HCl but without the desired result, probably because the product sought is too quickly reduced to the diazonium salt. The product obtained is *o*-acetophenyl-nitroamine (c), $\text{AcC}_6\text{H}_4\text{NHNNO}_2$. After many trials under various conditions, the following was found to be the best method for obtaining it: 2 g. (b) turbinéd 3–4 min. with 40 g. of 14.4% H_2SO_4 is treated in the course of 40 min. at 20 sec. intervals ($1\frac{1}{3}$ cc. drops) with 1.33 g. NaNO_2 in 2.3 cc. H_2O , the ice-cold soln. being continuously stirred and a rapid current of air being drawn over its surface by means of a pump; the turbinéd is continued about 5 min. longer, the NaNO_2 burette rinsed twice with 0.5–1.0 cc. H_2O and the crystals of pure (c) washed with ice H_2O and a little cold Et_2O ; instead of filtering, the soln., kept at 0° and turbinéd until no more free HNO_2 can be detected with starch-KI, may be satd. with $(\text{NH}_4)_2\text{SO}_4$, extd. 3 times with 40 cc. of cold Et_2O , the ext. washed with 0.5 cc. portions of ice H_2O until free from diazonium salt (i. e., until the washings no longer couple with α -naphtholate); after 5 portions of (b) have thus quickly been worked up, the Et_2O and aq. layers are combined, the latter again extd. 4 times with 10 cc. portions of Et_2O ; the H_2O soln. (d) is set away in the ice chest; the Et_2O soln. is extd. 4 times with 25 cc. portions of NH_3 (d. 0.914) (for the Et_2O soln. (e), see below); the NH_3 soln. is extd. 3 times with 3–4 cc. portions of Et_2O (which are combined with (e)), and concd. to 0.2 its vol., the solid on the edges dissolved with a few drops of NH_3 and the cold filtered soln. treated dropwise with 2 *N* H_2SO_4 (only a few drops being added beyond the point where the ppt. no longer completely redissolves); the faintly straw-yellow crystals of (c) (0.15 g.) are washed with ice H_2O until free from H_2SO_4 ; the main portion of (c) (2.35 g.) is pptd. from the filtrate in the same manner; the mother liquors satd. with NaCl and extd. with Et_2O yield a further small amt. The Et_2O soln. (e) above again extd. with 50 cc. NH_3 and fractionally pptd. with H_2SO_4 , as above gives 0.02 and 0.07 g. more of (c) and the filtrates yield 0.04 g. more to Et_2O . The Et_2O soln. remaining after the extn. with NH_3 is freed with NaOH from small amts. of faintly acid substances (pptd. by acids (0.02 g.) in $\text{Fe}(\text{OH})_3$ -like flocks), and after washing with H_2O and a little AcOH and drying with Na_2SO_4 leaves 2.95 g. of a dark red-brown oil yielding on steam distn. 1.98 g. of (b) containing a little AcPh . The H_2O soln. (d) above, slowly poured into 8.3 g. β -naphthol and 34 g. NaOH in 400 g. cold H_2O , gives 8.2 g. of $\text{AcC}_6\text{H}_4\text{N}_2\text{C}_{10}\text{H}_7\text{OH}$, m. $198.5\text{--}9.0^\circ$ (*Ber.* 36, 1621 (1903)); the filtrate from this is satd. with NaOH and extd. 5 times with 40 cc. portions of Et_2O , the Et_2O removed, the residue (0.3 g.) taken up in 2 *N* H_2SO_4 , filtered, made alk. and distd.; the distillate on evapn. in the air deposits a base in needles losing their luster in a few days in the air, easily sol. in dil. H_2SO_4 . AcPh was also often isolated from the H_2O soln. (d). In a prepn. of (c) in which 2 g. (b) in 40 g. of 31.2% H_2SO_4 at -3° was treated in 5 min. with 1.5 g. NaNO_2 in 3 g. H_2O , the Et_2O soln., freed from diazonium salts and acids as above and dried with Na_2SO_4 , deposited in 24 hrs. flat, dark brown-red needles, sol. in concd. H_2SO_4 with brown-red color and m. about 240° after crystn. from AcOH ; concn. of the Et_2O filtrate from these needles yielded 0.12 g. of chocolate-brown crystals sepg. from AcOH in brick-red needles, sol. in fuming H_2SO_4 with brown-red color, m. $217\text{--}8^\circ$. Possibly 1 of these products is *o*-azoacetophenone. Under certain conditions, (b), NaNO_2 and H_2SO_4 also yield a small amt. of a cryst. light red acid, sol. in NaOH and NH_3 with a dark blue color soon changing through gray-blue and violet-blue, violet-red to violet and pptd. unchanged in light red flocks from the fresh soln. by acids. (c) seps. from H_2O in silky needles or prisms (if it is attempted to recrystallize large amts. from H_2O , it partly resinifies), softens 102° ,

m. $103-4^{\circ}$, acid to litmus, Me orange and Congo but not to tropeolin, easily sol. in alkalis, NH_3 and soda, stable when protected from the light, difficultly volatile with only partial decompn. with steam, gives only a faintly brownish color with boiling NH_3 - AgNO_3 containing a little NaOH , does not react after 20 hrs. with $\alpha\text{-C}_{10}\text{H}_7\text{NH}_2$ in AcOH but with a little Zn gives an intense red-violet color in a few sec.; warmed with dil. H_2SO_4 it becomes yellow and when poured into α -naphtholate the soln. becomes intensely red; if the H_2SO_4 soln. is boiled, it smells intensely of $o\text{-HOC}_6\text{H}_4\text{Ac}$; the same phenomena are obtained with NaNO_2 and H_2SO_4 , AcOH or HPO_3 or with AcOH and Zn dust. *Silver salt*, from a neutral soln. of (c) in NH_3 and AgNO_3 , voluminous ppt., deflagrates violently on a Pt foil, melts and blackens when cautiously heated on porcelain, seps. from boiling H_2O in needles. *Copper salt*, light brown-yellow silky needles. *Lead salt*, silky needles. *Barium salt*. *Phenylhydrazone*, bronze to deep golden yellow, sometimes light tombac-brown leaflets or flat tables from alc., m. 132.5° , sol. without color in NaOH , NH_3 and soda and repptd. by acids in S-yellow cryst. flocks, sol. in concd. H_2SO_4 with deep indigo-blue, in fuming HCl with blue-green color at once changing to deep blue, then in a few min. to dirty green-brown and soon to brown-red; diln. of the brown-red soln. produces no ppt. *p-Nitrophenylhydrazone*, brownish yellow or dark golden yellow needles with violet surface luster from a very slowly evapd. alc. soln., m. 173° (foaming), sol. in 2 N NaOH and 12% NH_3 with dark blood-red color; cold soda dissolves it only slightly with orange color, completely, with deep red color, on heating or addition of NH_3 or NaOH ; on cooling, a *sodium salt* seps. in light brownish Cu-red flat needles with bronze luster, sol. in H_2O and repptd. by 2 N soda; its light yellow aq. soln. is turned deep red by NaOH . The light red is probably a mono-, the deep red a di-Na salt. Conc'd. H_2SO_4 dissolves the hydrazone with yellow to brown color. When 0.5 g. (c) is introduced in the course of 25 min. into 20 cc. of 62% H_2SO_4 at -15° to -10° with const. stirring, the solid particles mashed with a rubber-tipped rod during the next 35 min., the temp. brought down from -3° to -12° in the next hr., the mashing of the solid particles being continued until the soln. is clear, and the latter is poured upon 120 g. of ice and H_2O , dark yellow cryst. flocks are deposited which, when washed with H_2O until free from diazonium salts, then with dil. NH_4 , NaOH and finally H_2O , and steam distd., yield a yellow distillate; this, when allowed to evap. spontaneously and exhausted with Et_2O , gives 3-nitro-2-aminoacetophenone (f), golden yellow needles from alc., m. $92.5-3.0^{\circ}$, easily sol. in concd. H_2SO_4 or HCl with yellow color and repptd. in great part by H_2O ; the yellow acid solns. are decolorized by 1% NaNO_2 with formation of diazonium salts coupling violet-red with α -naphtholate; aq. solns. dye silk in a neutral bath a light yellow color discharged by boiling H_2O containing AcOH ; when boiled with Zn dust and H_2SO_4 , filtered and treated with FeCl_3 , the soln. soon becomes dark orange-red to blood-red and, if sufficiently conc'd., the oxidation product seps. after a time in dark red-brown flocks; heating of the soln. produces a faint quinone odor. The aq. filtrate from the original deposit of (f) is repeatedly extd. with Et_2O , the ext. washed with ice H_2O , NH_3 and dil. NaOH , the Et_2O evapd. and the residue distd. with steam; the non-volatile portion is filtered hot and on concn. deposits a few mg. of 5-nitro-2-aminoacetophenone (g), silky, straw-yellow needles from H_2O , begins to sinter 146° , m. $150-1^{\circ}$, sol. in H_2O with golden yellow color, pptd. to a large extent by H_2O from concd. H_2SO_4 or HCl in light yellow cryst. flocks which dissolve in 1% NaNO_2 without color, the resulting soln. coupling intensely blue with α -naphtholate; boiled to decolorization with Zn dust and H_2SO_4 , the cooled soln., which doubtless contains $2,5\text{-(H}_2\text{N)}_2\text{C}_6\text{H}_3\text{Ac}$, gives with very dil. FeCl_3 a deep blue color turning to green on warming and evolving the odor of quinone. The NH_3 washings of the above Et_2O exts. give traces of a dark brown powder insol. in NH_3 and alkalis, and a little of an acid sol. in NH_3 with brown-red color and repptd. by acids in amorphous flocks. A few mg. of an amorphous brown acid are also obtained from the NaOH wash-

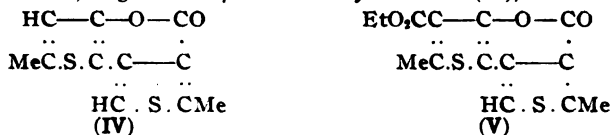
ings. The aq. filtrate from the original deposit of (f), when made alk. with NaOH and extd. with Et_2O , gives a little $o\text{-H}_2\text{NC}_6\text{H}_4\text{Ac}$. Semicarbazone of (f), golden yellow prisms or needles from AcOH, m. 223° , beginning to redden 100° and turning scarlet $115\text{--}20^\circ$; from alc. it seps. in dark orange-red needles on slow cooling, as a scarlet cryst. powder on rapid cooling, from H_2O in silky, orange-red needles or wartlets, often mixed with yellow needles; the yellow also changes into the red form in contact with H_2O or dil. alc., NaOH, soda and NH_3 , the red into the yellow form on moistening with AcOH or HCO_2H ; dil. H_2SO_4 does not change the color of the red form but on warming it dissolves with regeneration of (f). Concd. H_2SO_4 dissolves the semicarbazone without color, H_2O pptg. yellow cryst. flocks or light red needles. When 0.08 g. of (c) in 10 cc. AcOH and 240 cc. H_2O at 0° is treated dropwise with very dil. CaOCl_2 until there is a distinct odor of Cl, light lemon-yellow voluminous cryst. flocks suddenly sep.; these are washed with ice H_2O , then with *N* soda till the washings are alk. to litmus, and again with H_2O ; the resulting golden yellow crystals do not smell of CaOCl_2 , are turned blue in a few sec. by neutral KI-starch; when treated with dil. HCl, especially on warming, they evolve vapors which likewise turn KI-starch paper blue; an aq. suspension boiled 1–1.5 min. yields a clear soln. which no longer reacts with KI-starch when cooled; the alc. soln. with concd. aq. $p\text{-C}_6\text{H}_4(\text{NH}_2.\text{HCl})$, gives a green color in 10–20 sec., then turning to olive-green and finally reddish brown in a few min.; alc. PhNMe_2 produces no color. The crystals are *acetophenylchloronitroamine* $\text{AcC}_6\text{H}_4\text{NCINO}_2$. The aq. soln. boiled until it no longer reacts with KI-starch, then steam distd. and the distillate extd. with Et_2O , yields 4(?)*-chloro-6-aceto-2-nitroaniline*, light orange-yellow, silky, felted needles from alc., m. $142\text{--}3^\circ$, forming yellow solns., pptd. by H_2O from concd. HCl in cryst. flocks, yields a colorless diazonium soln. coupling bluish red with α -naphtholate; reduced with Zn dust and boiling dil. HCl and then treated with FeCl_3 , it deposits dark red-brown flocks. The residue from the steam distn. on cooling deposits a very small amt. of crystals sepg. from H_2O in faintly yellowish silky needles, probably *6-aceto-2(?) -chloro-4-nitroaniline*, whose diazonium soln. couples blue with α -naphtholate; reduction with Zn dust and dil. H_2SO_4 and subsequent treatment with FeCl_3 produces a blue color, changing on heating to green and then dirty brown-red with evolution of a quinone odor. Among the numerous by-products accompanying $o\text{-OHCC}_6\text{H}_4\text{N}(\text{NO})\text{OH}$ (h) in the reaction between (a), NaNO_2 and 23% HCl, the acid which gradually seps. from the wash waters of (h) has been shown to be identical with the acid "M" which accompanies the $o\text{-OHCC}_6\text{H}_4\text{NO}$ formed in the decompn. of the crude (g), and is *o-aldehydophenylnitroamine* (i); it seps. in silky needles, m. $69\text{--}70^\circ$ (total yield of crude product, 0.3 g. from 3 g. (a)), sol. in NaOH, NH_3 and soda; its aq. soln. is acid to litmus, neither colors FeCl_3 nor reduces Fehling soln., forms a white *silver salt* in neutral soln., is volatile with only partial decompn. with steam, forms a yellow *p-nitrophenylhydrazone* sol. in alkalies with intense bluish red color and repptd. by acids in yellow cryst. flocks, only partially sol. in 2 *N* soda with orange-red color changing to dark red on heating; on cooling, golden yellow microscopic needles sep.; concd. H_2SO_4 dissolves the hydrazone with deep red color. *Phenylhydrazone*, S-yellow cryst. flocks sol. in H_2SO_4 with indigo-blue color, changing to yellow with deposition of brown flocks on addition of H_2O ; alkalies dissolve the hydrazone without color, acids repptg. it. Boiled 15–20 sec. with AgNO_3 , NH_3 and a few drops of NaOH, (i) produces a black color; with a little Zn dust in AcOH containing $\alpha\text{-C}_{10}\text{H}_7\text{NH}_2$ is soon formed a deep violet; with HPO_3 or AcOH and NaNO_2 is obtained a soln. which on short warming produces with α -naphtholate the color characteristic of diazotized $o\text{-H}_2\text{NC}_6\text{H}_4\text{CHO}$; on distn. of the soln. is obtained $o\text{-HOC}_6\text{H}_4\text{CHO}$; Zn dust and AcOH effect the same reduction. Boiling with 2 *N* H_2SO_4 rearranges (i) into *aldehydo-o-nitroaniline*, $6,2\text{-OHC}(\text{O}_2\text{N})\text{C}_6\text{H}_4\text{NH}_2$, golden yellow needles, volatile with steam, whose diazonium soln. couples intensely violet (quickly becoming red-brown) with

α -naphtholate, and into the *p*-nitro compound, non-volatile with steam, whose diazonium soln. couples dark blue (changing to yellow-brown) with α -naphtholate. With CaOCl_2 in AcOH (g) gives the *chloroimide*, entirely analogous in its properties to the compd. from (c). Another by-product in the action of NaNO_2 and 23% HCl on (a) is obtained when the alc. filtrate of the crude K salt of (h) is pptd. with Et_2O , filtered and the mother liquors are concd. *in vacuo*. The reddish brown residue, washed with alc. and rubbed with dil. NaOH , gives an acid pptd. in amorphous dirty brown flocks while the part insol. in NaOH (0.28 g. from 16.3 g. (a)) seps. from H_2O in silky, felted needles, insol. in acids or alkalis, m. $108-9^\circ$; *p*-nitrophenylhydrazone, light orange to golden yellow, sol. in alc. NaOH with deep violet-red color. The action of HNO_2 on anthranils may be explained as consisting in the opening of the isoxazole ring with formation of the group $\text{OXCC}_6\text{H}_4\text{N} < (\text{X} = \text{H}, \text{Me})$ which then adds HNO_2 in 2 ways, to form $\text{OXCC}_6\text{H}_4\text{N}(\text{NO})\text{OH}$ and $\text{OXCC}_6\text{H}_4\text{NHNHO}_2$. CHAS. A. ROULLER.

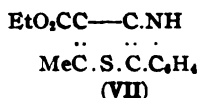
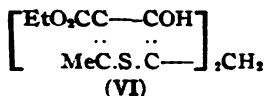
Synthesis of hydroxythiophene derivatives from aminocrotonic ester. ERICH BENARY AND A. BARAVIAN. Univ. Berlin. *Ber.* 48, 593-604 (1915); cf. *C. A.* 4, 312.—When 100 g. $\text{NH}_2\text{CMe}:\text{C}(\text{COCH}_2\text{Cl})\text{CO}_2\text{Et}$ in 350 cc. alc. is treated with 300 cc. of 33% KSH , the resulting mercaptan at once loses NH_3 and condenses to *ethyl 5-thiololene-3-hydroxy-4-carboxylate* (I), needles from alc., m. $64.5-6.0^\circ$ (yield, 75 g.), gives a dark blue color with alc. FeCl_3 , sol. in concd. H_2SO_4 with intense yellow-green fluorescence, tastes bitter. The *methyl ester*, leaflets from MeOH , m. $64-5^\circ$, is obtained in the same way from *methyl α -chloroacetyl- β -aminocrotonate*, 4-sided, granular prisms from MeOH . From 16 g. (I) shaken 24 hrs. with 220 cc. of *N* NaOH , satd. with CO_2



and acidified with dil. HCl is obtained 12.7 g. of the free acid, yellowish granules from H_2O , m. 135° , gives with FeCl_3 a dark blue color gradually changing to brown. *Silver salt*, gray ppt. If (I) is allowed to stand 24 hrs. in 20 parts of fuming HCl it is converted into *diethyl 2,3'-bis-5,5'-thiololene-3-hydroxy-4,4'-dicarboxylate* (II), needles from alc., m. $102-3^\circ$, gives a green color with alc. FeCl_3 , sol. in concd. H_2SO_4 with intense blue-green fluorescence, hydrolyzed by boiling 1 hr. with alc. KOH to the free acid, granules from alc.- H_2O , decomp. $274-6^\circ$, gives a blue-green color with alc. FeCl_3 and an intense yellow-green fluorescence with H_2SO_4 . *Dipotassium salt*. The acid, heated some time with fuming HCl , goes over into the *lactone* (III), brownish needles from alc.- H_2O , decomp. $273-5^\circ$, gives no color with FeCl_3 , sol. in H_2SO_4 with intense yellow-green fluorescence, regenerates the acid on boiling with alc. KOH ; distd. dry with excess of lime, it gives the *4'-monocarboxylic lactone* (IV), needles from alc., m.



119.5° . *Ethyl 2,3'-bis-5,5'-thiololene-3-hydroxy-4-carboxylate-4'-carboxylic lactone* (V), from (I) heated on the H_2O bath with 4 parts PBr_3 , needles from alc., m. 158° , gives no color with FeCl_3 , sol. in H_2SO_4 with intense fluorescence, also obtained from (III) in hot alc. with HCl gas. *Diethyl 2,2'-methylenebis-5,5'-thiololene-3,3'-dihydroxy-4,4'-dicarboxylate* (VI), from 2 g. (I) in 40 cc. alc. with 2.5 cc. HCHO and 2-3 cc. fuming HCl , needles, m. 115° , gives a green color with alc. FeCl_3 , insol. in dil. NaOH , hydrolyzed by boiling alc. KOH to the free acid, needles from alc.- H_2O , m. 201° , gives a green



color with alc. FeCl_3 , does not lose H_2O with hot concd. HCl or H_2SO_4 . *2,2'-Benzal ester*, needles, m. $121-2^\circ$, gives a blue-green color with alc. FeCl_3 ; free acid, m. $161-2^\circ$. *Ethyl 3-phenylhydrazino-4-carboxylate*, from (I) and PhNHNH_2 on the H_2O bath, needles from alc., m. 109° , converted by warm dil. AcOH into the *3-indole ester* (VII), light yellow prisms from alc., m. $171-2^\circ$, gives a blue-green color with FeCl_3 in concd. H_2SO_4 ; free acid, needles from alc.- H_2O , decomp. $275-6^\circ$, gives on distn. with lime *3-indole 5-thiitolene*, needles from alc., m. $154-5^\circ$, quickly changes in the air, sol. in H_2SO_4 with red color, slightly reddens a pine splinter moistened with HCl , gives with NaNO_2 in AcOH the *N-nitroso derivative*, yellow needles from alc., m. $84-5^\circ$. *Ethyl 3-amino-5-thiitolene-4-carboxylate*, in 50% yield from (I) heated to boiling in 1 g. portions with 10 parts AcONH_4 , leaves from alc.- H_2O , m. 47° ; *chloroplatinate*, yellow needles, m. $188-9^\circ$. Attempts to diazotize the NH_2 ester in HCl gave a red-brown ppt. of approx. the comp. $\text{C}_{18}\text{H}_{20}\text{O}_8\text{N}_6\text{S}_2$; with PhN_2Cl in HCl there is obtained a dark red product which m. $145-6^\circ$. When the crude NH_2 ester prepd. as above is treated with dil. HCl there remains undissolved *diethyl 3,3'-iminobis-5,5'-thiitolene-4,4'-dicarboxylate*, green needles from alc., m. $105-6^\circ$, fluoresces strongly in alc.; free acid, needles from alc., decomp. $262-3^\circ$; *dipotassium salt*, needles. *3-Acetamino-5-thiitolene-4-carboxylic acid*, from the NH_2 ester hydrolyzed with alc. KOH and acidified with AcOH , difficultly sol. ppt.

CHAS. A. ROULLER.

Action of oxalyl chloride with derivatives of hydrazine. T. FOLPMERS. Univ. Leyden. *Rec. trav. chim.* 34, 34-77(1915).—F. studied the action of $(\text{COCl})_2$ on derivs. of NH_2NH_2 and the effect of the substituents on the course of the reaction. The literature on the action of acid halides on NH_2NH_2 derivs. is reviewed and it is shown (what has been noted by other chemists) that the nature of the substituents exercises a great influence in detg. the point at which the acid chlorides will attack. When the substituent is Me (i. e., MeNHNH_2) the Me end is more active than the other; but if Ph or any acyl group enters the NH_2NH_2 mol. the free NH_2 is more reactive. The difference between the effect of Ph and acyl appears in the secondary sym. mixed derivs. (like AcNHNHPh) where it is the NH having Ph that reacts. In MeNHNHPh the NH with Me reacts. The hydrazines containing acyl react in their tautomeric form as hydrazides. The method used has a large effect on the result. The nature of the solvent, the presence of H_2O or alk., excess of the NH_2NH_2 deriv. or not, whether the hydrochloride or the free base is used, is especially important with the sec. sym. mixed hydrazines. F. verified the above generalizations and extended them. **Primary derivs. of hydrazines with $(\text{COCl})_2$.** MeNHNH_2 (a) was obtained by treating benzalazine with Me_2SO_4 (Thiele, C. A. 5, 457), then with H_2O , the BzH was extd. with C_6H_6 , the aq. soln. was concd., and crystd. from EtOH . The base, b. $86.5-87^\circ$, was liberated from the sulfate by distg. with KOH . 4 mols. of MeNHNH_2 in dry C_6H_6 + 1 mol. $(\text{COCl})_2$ in dry Et_2O gradually gave a flocculent ppt. and then a viscous mass (b) which crystd. on standing in ice; recrystd. from EtOH it m. 228° . $(\text{CONHNHMe})_2$ was prepd. by von Bruning's method (*Ann.* 253, 13 (1889)), m. 228° (v. B. gave $221-1.5^\circ$) and m. unchanged when mixed with (b). In order further to identify (b) it was treated with HNO_3 gas in H_2SO_4 soln. to obtain the di-NO deriv., m. 153° (decompn.) (not 147° as stated by v. B.). The EtOH mother liquor from (b) treated with much Et_2O seps. crystals of $\text{PhCH:N}(\text{NMeCOCONMeN}):\text{CHPh}$, m. 210° , identical with that obtained by Backer (C. A. 6, 3264), and is probably produced by the action of $(\text{CONMeNH}_2)_2$ on BzH . The latter compd. is the unknown oxalyl- α -methylhydrazide and (b) is the known β -deriv. The α -deriv. is the

principal product, thus showing that $(\text{COCl})_2$ acts mainly on the methylated NH_2 group in (a). The condensation with BzH proceeds better with HCl than with HOAc . 4.32 g. PhNHNH_2 in dry Et_2O were treated slowly with 1.3 g. $(\text{COCl})_2$ in dry C_6H_6 , warmed an instant and filtered. The ppt. was washed with cold H_2O to remove $\text{PhNHNH}_2\cdot\text{HCl}$ and the (CONHNHPh) , remaining, recrystd. from EtOH , m. 277° (softens at 260°). In this case only the NH_2 was substituted by $(\text{COCl})_2$. 2 mols. acetylhydrazide (Curtius, Hofman, *J. prakt. Chem.* [2] 53, 524) + 1 mol. $(\text{COCl})_2$ in dry C_6H_6 on the H_2O bath for 4 hrs. sepd. *oxalylbis- β -acetylhydrazide*, $(\text{AcNHNHCO})_2$, silvery plates from hot H_2O , m. 283° ; the aq. soln. is acid, with $\text{NH}_3\text{-Ag}_2\text{O}$ it gives a pale yellow deriv. which is sol. in excess of NH_3 . In AcNHNH_2 only the NH_2 is substituted with $(\text{COCl})_2$. 2 mols. BzNHNH_2 (Curtius, Struve, *J. prakt. Chem.* [2] 50, 295) + 1 mol. $(\text{COCl})_2$ in dry C_6H_6 liberated HCl at once and sepd. a powder, *oxalylbis- β -benzalhydrazide*, $(\text{BzNHNHCO})_2$, microscopic needles from 95% EtOH , m. 278° ; it also crysts. as a hydrate with 2 H_2O . Neither form reduces $\text{NH}_3\text{-Ag}_2\text{O}$ or Fehling soln. In BzNHNH_2 only the NH_2 is substituted with $(\text{COCl})_2$. *Sym. secondary derivatives of NH_2NH_2 with $(\text{COCl})_2$* . $(\text{BzNH})_2$, obtained from $\text{NH}_2\text{NH}_2\cdot\text{H}_2\text{SO}_4$ + BzCl , was methylated with Me_2SO_4 in a faintly alk. soln. and gave *dimethylbibenzoylhydrazide*, softens 84° , m. 87° ; it was hydrolyzed by heating with strong HCl and concd. on a H_2O bath until it became sticky, the BzOH was partly volatilized, the residue was taken up in a little H_2O and more BzOH crystd. out; the *dimethylhydrazine hydrochloride* (c) was removed with Et_2O , beautiful white plates. 1 mol. (c) + 1 mol. $(\text{COCl})_2$ heated in C_6H_6 for 6 hrs. evolved HCl . The product was filtered off and treated with EtOH to remove unchanged (c); it was insol. in all org. solvents except PhNH_2 and gave on analysis figures corresponding to (c) + $(\text{COCl})_2$ — 2 HCl ; its mol. wt. could not be detd., it does not m. up to 365° , and is perhaps a homolog of hydrazioxazyl (Curtius, CO.NMe.NMe.CO

J. prakt. Chem. [2] 52, 223(1895)), in which case it would be CO.NMe.NMe.CO . Dibenzyldiazide (d) heated with 1 mol. $(\text{COCl})_2$ in C_6H_6 for 5 hrs. gave a combustible gas containing CO (purple color with AuCl_3) and CO_2 . Unchanged (d) was filtered off and the concd. soln. on cooling gave, finally, when crystd. from C_6H_6 , a compd. (e), $(\text{C}_6\text{H}_5\text{O}_2\text{N})_n$, softens 145° , m. $168\text{--}70^\circ$, of which the constitution was not detd. The C_6H_6 mother liquor residue when extd. with Et_2O gave a small amt. of a compd. $\text{C}_{14}\text{H}_{10}\text{N}_2\text{O}$ (f), white plates, m. $139\text{--}40^\circ$, which proved to be diphenylfurodiazole (Pinner, *Ber.* 27, 100(1894)). When repeated by boiling in C_6H_6 10 days (e) was not obtained but a large amt. of (f) was formed. It was thus shown that $(\text{COCl})_2$ acts as a dehydrating agent with (d). *Unsym. secondary derivs. of NH_2NH_2 with $(\text{COCl})_2$* . NH_2NMe_2 obtained by reducing dimethylnitrosoamine with Zn in AcOH , was converted into its hydrochloride and boiled with 0.5 mol. $(\text{COCl})_2$ in C_6H_6 until no more HCl was evolved, filtered, washed with EtOH , dissolved in H_2O , treated with KOH and extd. with Et_2O ; it gave *oxalylbis- β -dimethylhydrazide*, $(\text{Me}_2\text{NHNCO})_2$, m. 233° , which was identical with the same deriv. obtained in another way. MePhNNH_2 in EtOH soln. treated with HCl gas sepd. $\text{MePhNNH}_2\cdot\text{HCl}$ which, dried over NaOH , was heated with $(\text{COCl})_2$; *oxalylbis- β -methylphenylhydrazide*, $(\text{MePhNNHCO})_2$, m. $196\text{--}7^\circ$, seps.; with weak alks. it gives a yellow soln.; with HNO_3 , $\text{K}_2\text{Cr}_2\text{O}_7$ or FeCl_3 in concd. H_2SO_4 it gives a red coloration. $\text{Ph}_2\text{NNH}_2\cdot\text{HCl}$ similarly treated with $(\text{COCl})_2$, etc., gives *oxalyl- β -diphenylhydrazide*, $(\text{Ph}_2\text{NNHCO})_2$, m. $335\text{--}6^\circ$; insol. in solvents except PhNO_2 of which 150 cc. dissolve 3.4 g. *Mixed tertiary derivs. of NH_2NH_2 with $(\text{COCl})_2$* . 1 mol. *oxalylbis- β -dimethylhydrazide* (g) + 1 mol. $(\text{COCl})_2$ heated in C_6H_6 7 hrs. liberated HCl and changed from a white to a yellow powder. Recrystd. from H_2O unchanged (g) was sepd. and some CO_2 evolved. The yellow product $(\text{C}_6\text{H}_{11}\text{ON})_n$ was not decompd. in EtOH ; m. or decompn. p. $238\text{--}40^\circ$, mol. wt. 228. This product was shown not to

be tetraketopiperazine (Bornwater) similarly formed. With H_2O it gives $\text{CO} + \text{CO}_2 + \text{C}_6\text{H}_8\text{O}_4\text{N}_2$. Since 1,3,4-toluylenediamine (*h*) was valuable in detg. the CO.CO group in croconic leuconic acids *F.* boiled 1 mol. of the yellow compd. with 2 mols. of (*h*) in abs. EtOH. White needles, m. $335-45^\circ$ (decompn.), of 2,3-dihydroxy-6-toluquin-oxaline sepd. (Meyer, *Ber.* 30, 769(1897)). In another expt. which was heated 2 days there was a strong odor of Me_2NNH_2 which was identified. Oxalylbis- β -dimethylhydrazide was boiled with (*g*) in EtOH for 1.5 days but it was recovered unchanged. The constitution of the yellow compd. (*i*) is discussed below. Oxalylbis- β -methylphenylhydrazide (*j*) heated with $(\text{COCl})_2$ in C_6H_6 several days becomes red and seps. a violet substance. The red substance on repeated crystn. loses its red color and the rest was identified as (*j*). The red product is not decompd. by boiling C_6H_6 and is slightly sol.; the violet substance is insol. The violet compd. is sol. in acetone from which it crystals in KMnO_4 -colored crystals, but not enough was obtained for identification. The red product, $(\text{C}_6\text{H}_8\text{O}_4\text{N}_2)_n$, was purified by repeated crystn. from C_6H_6 , doubly refractive, rhombic crystals, m. $229-30^\circ$, decompg. to a red liquid, mol. wt. in acetone 420; $\text{C}_{18}\text{H}_{16}\text{O}_4\text{N}_4$ requires 352. The red product (*k*) becomes yellow when heated in aq. KOH and gives a white ppt. of (*j*) on adding AcOH; the mother liquors give CaC_2O_4 with $\text{Ca}(\text{OAc})_2$. The EtOH soln. of (*k*) decolorizes in 1 day and gives back (*j*); if HCl is added $\text{CO} + \text{CO}_2$ are evolved. By treating (*k*) with (*h*) as above the same 2,3-dihydroxy-6-toluquinoxaline was obtained; (*j*) was isolated from the mother liquor. 2 mols. (*k*) boiled with 1 of (*k*) in EtOH do not react. 0.306 g. (*k*) boiled with 1 cc. MePhNHNH_2 was decolorized at once and gave probably (*j*). The absorption spectrum of (*k*) shows a 2 cm. band at 512μ and a 1 cm. band at 494μ and the violet is completely absorbed. Oxalylbis- β -diphenylhydrazide does not react with $(\text{COCl})_2$ even at 120° or on the addition of CuCl or $\text{C}_6\text{H}_5\text{N}$. The action of ethyl hydrazoneacetate hydrochloride on $(\text{COCl})_2$ in C_6H_6 was studied. The reaction product $(\text{C}_6\text{H}_8\text{O}_4\text{N})_n$ was dissolved in CHCl_3 but was not obtained well crystd.; the mol. wt. could not be detd., and its constitution was not detd. MePhNHNH_2 reacting with $\text{ClCH}_2\text{CO}_2\text{Cl}$ in C_6H_6 gave HCl gas and a soln. from which the C_6H_6 was evapd. and the residue, *chloroacetmethylphenylhydrazide*, crystd. from Et_2O , as colorless needles, m. 75° . This was condensed in KOH-EtOH with the amides of $\text{ClCH}_2\text{CO}_2\text{H}$ or $\text{BrCH}_2\text{CO}_2\text{H}$; KCl was pptd. and *bismethylphenylaminodiacypiperazine* was sepd. with petr. ether after evapg. off the EtOH; cryst. plates, m. $244-5^\circ$. The results are summarized in part as follows: When there is one substituent in the NH_2NH_2 mol. the 2 halves can already be distinguished: that which contains the substituent and that which does not. *F.* examd. mono-derivs. containing Me, Ph, Ac and Bz. The principal reaction in the case of MeNHNH_2 with $(\text{COCl})_2$ is the formation of the β -Me deriv.; the α -Me deriv., $(\text{H}_2\text{NMeNCO})_2$, was isolated only as the BzH deriv. The mixed α,β -Me deriv., $\text{MeN}(\text{NH}_2)\text{COCONHNHMe}$, could not be isolated but it might be demonstrated by working on a larger scale. PhNHNH_2 gives only the β -Ph deriv. BzNHNH_2 or AcNHNH_2 both give the β -derivs. (95-6%) but the reaction was done on the H_2O bath. It seems that MeNH is a little more reactive than the NH_2 and the PhNH much less so. With BzNH and AcNH the NH_2 acts like an amide. The results with the sym. disubstituted derivs. are not simple. BzNHNHBz probably reacts as the tautomer $[\text{PhC}(\text{OH})\text{:N}]_2$ since it gives PhC:N:N:CPh.O . Other sym. di-derivs. were not studied

because of lack of time. With the unsym. disubstituted NH_2NH_2 derivs. one N lacked H and so only the β -derivs. could be formed. The 3 mixed tertiary derivs. of hydrazine obtained above were subjected to the action of $(\text{COCl})_2$ in C_6H_6 . Oxalylbis- β -dimethylhydrazide thus treated gave a yellow compd. (cf. (*i*) above), $\text{C}_8\text{H}_{12}\text{O}_4\text{N}_4$,

which may be a tetraketopiperazine, $\text{Me}_2\text{NN} \begin{array}{c} \diagup \text{CO.CO} \diagdown \\ \diagdown \text{CO.CO} \diagup \end{array} \text{NNMe}_2$. The decompn.

of (2) with boiling H_2O is not characteristic of known tetraketopiperazines; the decompn. is quant. and gives the parent hydrazide + CO + CO_2 , thus showing that the oxalyl group was eliminated. Likewise this 2nd oxalyl group reacts with 1,3,4-toluylenediamine to give 2,3-dihydroxy-6-toluquinoxaline and a mol. of the parent hydrazide which is not attacked by the diamine, which indicates that the 2nd oxalyl group is bound differently than the 1st. Although oxalylbis- β -dimethylhydrazide (I) does not react with the diamine the yellow compd. gives Me_2NNH_2 with excess of the diamine, so that (I) at the moment of its liberation does react and must accordingly have a different structure at this moment, i. e., a tautomer. Now the ordinary form of (I) could give the tetraketopiperazine, the $Me_2NN:C(OH)CONHNMe_2$ form may give $Me_2NN:C.CONNMe_2$ and the 3rd $Me_2NN:C(OH)C(OH):N.NMe_2$ may give



$Me_2NN:C\text{---}C:NMe_2$. The latter formula best explains the properties of



the yellow compd. (2) and is called dimeric *oxalic anhydride monodimethylsazone*. In treating oxalylbis- β -methylphenylhydrazide with $(COCl)_2$ a small amt. of a red compd. thought to be $MePhNN:C\text{---}C:NMePh$, i. e., dimeric *oxalic an-*



hydride monomethylphenylosazone, was obtained. If the two above hydrazides react as the tautomers it is clear that the $MePh$ deriv. gives the tautomeric form less easily than the di- Me_2 deriv. and that the di- Ph deriv. does not give the tautomer at all since it does not react.

E. J. WITZEMANN.

II. BIOLOGICAL CHEMISTRY.

WILLIAM J. GIES, EDGAR G. MILLER, JR., PAUL E. HOWE.

A. GENERAL.

FRANK P. UNDERHILL.

The coagulation of albumin by electrolytes. W. D. BANCROFT. *J. Phys. Chem.* 19, 349-59(1915); see *C. A.* 9, 1339. E. J. C.

Some combinations of the type of chondroitin-sulfuric acid. FEDERICO ALZONA. Strassburg. *Arch. farm. sper.* 19, 221-34(1915); cf. *C. A.* 8, 3561.—Substances of the chondroitin-sulfuric acid type are widely distributed in the animal organism, and may be demonstrated in the skeletal muscles, the epithelial tissues and the secretions. They occur for the most part in combination with protein. The current view that a single chondroitin-sulfuric acid is present in the various organs but is combined in different ways, is no longer tenable. The comp. of prepn. obtained from the intestinal mucosa and from the prostate is widely different. Chondroitin-sulfuric acid probably contains a nitrogenous carbohydrate. A. W. DOX.

Experiments on diastase. TH. BOKORNY. *Allgem. Brau.-Hopfen-Ztg.* 55, 431-2 (1915).—Diastase (very difficultly sol. in water and of neutral reaction to litmus paper) was placed in contact with 1.0 N NH_4OH . It was observed that a quantity of NH_3 , corresponding approx. to about 10% of the diastase taken, disappeared. This added NH_3 could not be liberated by boiling alone; to liberate it $NaOH$ had to be added; this proves that the NH_3 is chemically combined. For comparison the NH_3 -absorbing capacity of blood protein, starch, peptone, muscle protein, egg albumen and casein was detd. and found to be 3.70, 1.36, 0.00, 2.55, 4.25 and 3.91%, resp. This behavior towards NH_3 suggests to B. the protein nature of diastase. It is dis-

tinguished from the albumins by the behavior to H_2SO_4 (normal soln.), of which none was absorbed. The protein nature of diastase was further disclosed by a digestion expt. with pepsin-HCl. The diastase was nearly completely dissolved and the soln. gave a bulky ppt. with phosphotungstic acid, while no pptn. occurred with satd. solns. of both ZnSO_4 and $(\text{NH}_4)_2\text{SO}_4$, thus indicating the formation of peptones.

L. W. HAAS.

Contribution to a physiological theory of chlorophyll. D. IWANOWSKI. *Ber. deut. botan. Ges.* 32, 433-47(1914).—Spectrophotometric studies of chlorophyllins.

B. H.

Inactive lipase and the nature of its coenzyme. NOBUYOSHI UMEDA. King's College, London. *Biochem. J.* 9, 38-52(1915).—*Prep. of inactive lipase*: 2 kg. fresh pig pancreas, freed from visible fat, are minced and mixed with 4 l. glycerol. After 24 hrs. the mixt. is strained through 2 layers of muslin. Portions of 1 l. of ext. are dild. with 10 l. H_2O and allowed to stand 24 hrs. in the ice-box. The supernatant fluid is poured off and the ppt. again suspended in 10 l. H_2O . These washings are repeated 3 times. The flocculent ppt. is next suspended in an equal vol. alc. and filtered through a Pukall (see *Ber.* 26, 1159(1893)) porous clay filter. The ppt. is washed with acetone and ether. After this treatment it easily peels off in flakes from the filter and after drying *in vacuo* is obtained as a fine grayish white powder. *Prep. of coenzyme solns.*: The fluid decanted from the ppt. obtained on dild. of the pancreatic glycerol ext. with water, when boiled, filtered and concd., contains the coenzyme of lipase free from proteoclastic and other enzymes. To avoid the presence of glycerol, the coenzyme may also be prepd. by boiling 500 g. of minced pig pancreas with 500 cc. distd. H_2O for about 30 mins., and filtering after cooling. 620 cc. ext. which can be preserved under toluene is obtained. *Estimation of lipoclastic activity*: Olive oil is used as the zymolyte and the degree of lipoclastic activity is detd. by incubating the mixt. of enzyme and zymolyte for 17-20 hrs. and titrating the fatty acids liberated with 0.1 N KOH, using phenolph. as indicator. Enough alc. is added to give a 50% soln. The soln. of the ash of the coenzyme, when dissolved in HCl, possesses an activating power nearly equal to that of the original coenzyme. Nearly the whole of the activating substance passes through the dialyzing membranes. The ash of the incinerated dialysate, if dissolved in HCl, produces practically the same effect as the original dialysate. Very dil. H_3PO_4 activates inactive lipase, an inhibition being exerted if a certain limit is overstepped. CaCl_2 , if present in the digestive mixt. to the amt. of $M/7000$ to $M/1400$ has no effect on the lipoclastic. As the Ca content of 1 cc. of the ash soln. of the coenzyme corresponds to a $M/4116$ soln., it is probable that the action of the ash soln. is not due to Ca. The results with NaCl are contradictory. The activity of the pancreatic juice is in no way impaired by ordinary filtration; the enzyme exists in a sol. condition. In glycerol ext. of the pancreas, however, the material to which its lipoclastic activity is due occurs as a colloidal suspension and it requires a sol. coenzyme for its activation. The substances able to activate inactive lipase or to accelerate the action of active lipase may be divided into three groups: (1) The salts of Na, K, Ca, Ba, Mg; (2) org. and inorg. phosphates; and (3) bile salts and their derivs. Little is known with regard to their mode of action. In the case of the bile salts, cholic acid, their active constituent, probably acts directly on the enzyme (see Terroine, *Biochem. Z.* 23, 404 (1910); *C. A.* 4, 1990, 2327, 2512).

B. HOROWITZ.

Lignoceric acid from "carnaubon." O. ROSENHEIM AND H. MACLEAN. London. *Biochem. J.* 9, 103-9(1915).—The authors prepd. "carnaubon," a lipid, from ox kidneys and from horse kidneys according to Dunham and Jacobson's directions (*C. A.* 5, 1458) and hydrolyzed the products by alc. H_2SO_4 . Lignoceric, and not carnaubic acid, was obtained; hence the name "carnaubon" is a misnomer. "Carnaubon"

failed to yield palmitic or stearic acid, but phrenosinic acid ($C_{24}H_{40}O_2$) was isolated. The basic products of hydrolysis contained not only choline, but also an ether-sol. base identical with sphingosine. From these results, as well as the fact that the elementary compn. of different preps. of "carnaubon" is extremely variable, the authors conclude that kidney "protagon" represents a variable mixt. of lipoids, mainly of galactosides (cerebrosides) and sphingomyelin. In distinction from brain "protagon," it seems that sphingomyelin preponderates in kidney "protagon." B. HOROWITZ.

Researches on the inhibition produced by certain sera on the coagulating power of rennet. HAGEN C. THAYSEN. London. *Biochem. J.* 9, 110-31(1915).—The inhibiting effect of normal horse serum on the coagulating power of rennin is not due to 2 inhibiting substances, the true anti-body and the pseudo-antirennin (as supposed by Korschun, *Z. physiol. Chem.* 36, 141(1902)), nor to mere adsorption (cf. Hedin, *Biochem. J.* 1, 474, 484(1906); *C. A.* 4, 471). The [H] of normal horse serum is highly important for its inhibiting power. Normal rabbit serum behaves similarly to normal horse serum. B. HOROWITZ.

Counter diffusion in aqueous solution. GEORGE S. WALPOLE. Wellcome Physiol. Lab., London. *Biochem. J.* 9, 132-7(1915).—A re-interpretation of the work of Osborne and Jackson (*C. A.* 8, 2976). B. H.

Visible effects of the Schumann rays on protoplasm. W. T. BOVIE. *Botan. Gaz.* 59, 149-53(1915).—The Schumann region is the particular ultraviolet field with a wave-length of 2000-1250 (in Angstrom units). In this region of the spectrum the destructive action of the light is much more violent than in the regions of longer wave-length. This is probably due to the fact that the Schumann region is one of general absorption for nearly all substances. However, the absorption bands of such substances as egg-white and gelatin begin in the longer wave-lengths before the Schumann region is reached. B. exposed unicellular organisms to the Schumann rays and observed them microscopically during and after the exposure. The Schumann rays were produced by a discharge tube which was so made that it could be placed under the stage of a compound microscope in the position usually occupied by the condenser and other sub-stage attachments. When the discharge tube was in place, its fluorite window, through which the Schumann rays were emitted, was flush with the microscope stage. The Schumann light shone upward toward the microscope objectives. The organisms were exposed above the discharge tube on a special microscope slide which contained a window of fluorite (glass is opaque to these rays). The regular sub-stage attachments could then be swung into place and the organisms observed under high magnifications. The effects produced by the light were immediate. There was marked stimulation, followed by cytolysis, which, with sufficient exposure (usually less than 1 min. duration), terminated in death. The effect of the light was upon the organism itself and not upon the surrounding medium. Vesicle formation and the bursting of spores point to changes in osmotic relations, or to inhibition, which may be connected with the fact that the longer ultraviolet light waves have the power to break down proteins (cf. *C. A.* 7, 798). B. is of the opinion that the Schumann rays have a similar, and probably much greater, power. B. HOROWITZ.

Extreme alterations of permeability without injury. W. J. V. OSTERHOUT. *Botan. Gaz.* 59, 242-53(1915).—The permeability was measured by detg. the elec. resistance of living tissues of *Laminaria saccharina* (for the method used see *C. A.* 6, 2438). The results obtained show that the permeability of protoplasm may be greatly increased or diminished without injury. A rapid alternation of increase (amounting to 20% above normal) and decrease (amounting to 39% above normal) did not produce injury to the tissues. B. HOROWITZ.

Decrease of permeability due to certain bivalent cations. W. J. V. OSTERHOUT. *Botan. Gaz.* 59, 317-30(1915).—While none of the monovalent cations (except H) are able to decrease permeability all the bivalent cations so far investigated (Mg, Ca, Ba, Si, Mn, Co, Fe, Ni, Zn, Cd, Sn) are able to do so to a marked degree. B. H.

The body surface of flounders and its relation to the gaseous metabolism. SERGIUS MORGULIS. *Am. J. Physiol.* 36, 207-16(1915).—The body surface for *normal* flounders may be detd. by using the formula, $S = K\sqrt{W}$, where K has a value of 13.44, which corresponds closely with that for higher organisms. For *fasting* flounders the value for K changes. The O consumption bears direct relation neither to body wt. nor to body surface, diminishing per g. hr. but increasing per sq. cm. as the animal becomes larger. J. F. LYMAN.

The retarding effect of hydrogen ions upon fermentation. ERIK HAGGLUND. *Biochem. Z.* 69, 181-91(1915).—The retardation of fermentation by lactic acid is directly proportional to the H-ion conc. of the substrate. Temps. of between 20° and 35° have little effect, while between 35° and 40° there is a considerable increase in the retardation. C. J. WEST.

Reply to R. Höber: "Physical chemistry of vital staining." J. TRAUBE. Charlottenburg. *Biochem. Z.* 69, 309-12(1915); cf. Höber, *C. A.* 9, 467.

C. J. WEST.

Plant oxidation enzymes. OTTO H. K. BEGEMANN. Univ. Bern. *Arch. ges. Physiol.* 161, 45-232(1915).—The historical side of oxidation enzymes in plants is carefully discussed. Quant. reductase detns. were made by the "porcelain plate method" in which plant ext. was added to a drop of indigo on a porcelain plate until the indigo was decolorized, and by the "drop method" in which the dye soln. was dropped into 2 cc. of the plant ext.; the standard was the number of drops needed to decolorize a mixture of 1 cc. of a 1:1000 grape sugar soln. and 1 cc. of 1% NaOH. In the quant. estn. of peroxidase an aq. soln. of benzidine, satd. at 45°, is used. The reaction with $\text{Na}_2\text{S}_2\text{O}_8$ is considered as the normal action. The test may be carried out in a test tube or on filter paper. Catalase action was also compared with $\text{Na}_2\text{S}_2\text{O}_8$. The iodometric and volumetric methods were used, the latter being very suitable. A large number of plants were examd. for these 3 enzymes. In the 42 cases studied 40 contained peroxidase, 37 catalase, 18 reductase and 17 oxidase; a few contained tyrosinase. In most cases the amts. of peroxidase and catalase were about the same, 23 cases containing much of each, while in 10 cases only a small amt. of each was present. Only in the fungi was this found not true, as these contained very much catalase and no peroxidase. Oxidase and reductase are not as widely distributed and their action is not so marked. The physiol. enzymes are found principally in the mesophyll and other parenchymal tissue. Catalase is found in those places accessible to H_2O_2 and oxygenase, namely the veins and tracheids. The same is true for the peroxidase. The epidermis and its organs do not contain oxidation enzymes. Chlorophyll does not have an oxidation enzyme. It is shown that H_2O_2 may penetrate to those parts of the plant which are stained by eosin. Catalase and peroxidase are both equally influenced by temp.; raising the same increases the quantity of enzyme. Light of different wave lengths influences the enzymes differently. The series seems to be: red > violet > green > light = darkness > blue. During germination both enzymes increase and then remain rather const. The idea is put forth that "catalase" and "peroxidase" actions are only different manifestations of the same principle, "oxygenase," or that the 2 enzymes are identical. Expts. showed that they behave in nearly the same way towards temp., light and dialysis. The following explanation of enzyme action is given: The living cell contains a simply constituted aldehyde, RCHO , which is membrane permeable. The cell also contains a peroxide, ROOR , which is not capable of passing through

the cell membrane. If these two react to form an addition product, a "secondary peroxide," $RCH(OR)O. OR$, results, which is also incapable of passing through the cell membrane. This compd. may give off O, and is thus an oxidizing agent. This may be capable of oxidizing pyrogallol to purpurogallin. If, however, the "secondary peroxide" unites with H_2O_2 , $RCH(OH)O.OH$, the new compd., may be capable of reacting with other chromogens, such as benzidine. If an excess of H_2O_2 is present then O is liberated, with the appearance of the "catalase." The aldehyde itself may react with an easily reducible substance, thus acting as a "reductase." This may be represented as follows: "Oxygenase" + "(cell) peroxide" = "secondary cell peroxide;" "secondary cell peroxide" + chromogen = appearance of "direct oxidase;" "oxygenase" + H_2O_2 = "secondary (artificial) peroxide;" "secondary (artificial) peroxide" + H_2O_2 = appearance of "catalase;" "secondary (artificial) peroxide" + chromogen = appearance of "peroxidase;" "oxygenase" + dye = appearance of "reductase." C. J. WEST.

HOLLAND, J. W.: *Chemistry and Toxicology*. 4th ed. Philadelphia: W. B. Saunders Co. 678 pp. \$3.00.

LUCIANI, L.: *Human Physiology*. Vol. III. Trans. by F. A. Welley. London: Macmillan & Co. 18s.

VILE, J. AND DERRIEN, E.: *Chimie biologique médicale*. Paris: E. Derrien. 400 pp. 6 fr.

B. METHODS AND APPARATUS.

STANLEY R. BENEDICT.

Method of extraction of creatine and creatinine from the tissues and fluids of the body. A. COSTANTINO. Univ. Pisa. *Arch. farm. sper.* 19, 254-8(1915).—The tissue (40 g.) is finely minced, then shaken for 2 hrs. with 200-30 cc. of 2% $HgCl_2$ containing 1% HCl. After standing 2 hrs., the mixture is filtered through a dry filter, the Hg removed by H_2S and the latter by an air current. After neutralizing, the solution is concentrated on the water bath and the creatinine detd. colorimetrically.

A. W. DOX.

Comparative blood sugar determinations by polarization and reduction methods. CARL MAASE AND HERMANN TACHAU. *Z. klin. Med.* 81, 1-9(1914).—The reduction methods of Bertrand and Tachau were in good agreement with the polarization method in 11 cases. In the 12th case the polarization method yielded higher results; this is attributed to the presence of another sugar with less reducing power. One hr. after the ingestion of 100 g. fructose, the reduction methods gave higher results than were obtained by the method of polarization.

M. S. F.

Colorimetric determination of uric acid in urine. H. F. HÖST. *Z. klin. Med.* 81, 113-9(1914).—H. describes a modification of Riegler's method, wherein 2 cc. protein-free urine in a test tube with a 20 cc. mark are treated with 0.6 g. NH_4Cl and heated to 40°. After standing $\frac{1}{2}$ hr. or more, it is filtered through a small filter, and the ppt. washed 4 or 5 times with 2 to 3 cc. 20% NH_4Cl . The NH_4 urate is returned to the original test tube with 15 cc. boiling 5% HNH_2PO_4 . Four cc. 10% phosphomolybdic acid are added and the vol. made up to 20 cc. with the phosphate soln. This is heated to boiling, and after cooling is compared with the standard, prepared by treating 2 cc. (= 2 mg.) uric acid in Li_2CO_3 soln. with 4 cc. phosphomolybdic acid and HNH_2PO_4 in the manner described. This procedure was compared with the Hopkins-Wörner and the Folin-Macallum methods. Advantages over the Folin-Macallum method are claimed.

M. S. F.

Note on the Hopkins-Cole reaction for protein. H. G. D. BREIDAHN. Melbourne. *Biochem. J.* 9, 36-7(1915).—Due probably to the presence of an oxidizing agent (cf. Mottram, C. A. 8, 2403) the H_2SO_4 used invariably gave a brown or yellow-brown ring.

The following reducing substances added to the acid were found to increase the delicacy of the color formation: Mg, NaHSO_3 , Zn (powdered and granulated). B. H.

A new test for reducing sugars in urine. WILLIAM CRAMER. *Biochem. J.* 9, 156-60(1915).—The test depends upon the reduction of HgO in a weakly alk. soln. to metallic Hg. *Prepn. of reagent:* 0.4 g. HgO (red or yellow) and 6 g. KI are dissolved in 100 cc. water. This soln. is weakly alk. The alkalinity must now be so adjusted that 10 cc. of the reagent are neutralized by 2.5 cc. of 0.1 N acid, using phenolphthalein as indicator. This is done by titrating 10 cc. of the reagent with 0.1 N acid and, after the alkalinity of the reagent has thus been detd., adding the requisite amt. of 0.1 N acid or alkali to the bulk of the reagent. The reagent is a clear, colorless soln. which turns slightly yellow on heating and becomes colorless again on cooling. It must remain quite clear on boiling. *Test as applied to urine:* To 3 cc. of the reagent 0.3 cc. of urine is added and the mixt. heated to boiling. The test tube is removed from the flame and, after 30 seconds, the mixt. is acidified with a few drops of acetic acid. The test tube is at once held over ordinary print. If the urine is normal, a slight but distinct turbidity remains and print is clearly readable through the mixt. C. claims that the test is more sensitive than either Fehling's or Nylander's. Uric acid and creatinine do not interfere. B. HOROWITZ.

A greatly improved hemin test for blood, with notes on some recently proposed methods. W. BEAM AND G. A. FREAK. *Biochem. J.* 9, 161-70(1915).—The principle underlying this modification is the slow crystn. of hemin. *Procedure:* A small quantity of the suspected material is placed at the bottom of a flat As sublimation tube about 3 by 6 mm. and 35 mm. long. A few drops of acetic acid containing from 0.01 to 0.1% NaCl are added, and a very fine cotton thread adjusted so that its upper end is near the top of the tube and the lower end reaches to the bottom of the liquid. The thread should be everywhere in contact with the tube, to which it adheres readily by being moistened with the liquid. The adjustment is made by means of a glass rod, one end of which is drawn out for the purpose. The tube is now placed in a rack and allowed to remain until crystn. occurs. The clear liquid, filtered by its passage through and along the cotton thread, is slowly drawn up, by capillary action, to the mouth of the tube. Complete evapn. usually takes from 12 to 24 hrs. Crystals usually begin to appear on or near the upper half of the thread, and are sufficiently large to be distinguishable in about 1 hr. with a power of 75 diameters. Ultimately they become so large that, in place of requiring a magnification of 250 to 300 diameters, they may readily be seen with one of 25 diameters. Of the solvents used, acetic acid was found to be the best. Forms of halides other than NaCl showed no advantage. B. HOROWITZ.

Simple test for sugar in the urine. L. DE JAGER. *Ph. Praxis; Boll. chim. farm.* 54, 39(1915).—Five cc. urine are treated with 10 drops of a soln. (prepd. 24 hrs. previously) of 30 g. Ca(OH)_2 and 100 cc. H_2O ; 5 drops of a 10% CuSO_4 soln. are then added. The red or violet coloration of the ppt. which is formed after a short time indicates the presence of sugar. The limit of sensitiveness is approx. 0.1%. H. S. PAINE.

Simple and accurate method for estimation of sugar in blood. E. B. KNEER. *Kansas City. Missouri State Med. Assoc. J.* 12, No. 4(1915); *J. Am. Med. Assoc.* 64, 1452-3.—The solns. required are 2% $\text{K}_2\text{C}_2\text{O}_4$, 10% K_2CO_3 , 1% glucose, and picric acid (conc. not given). Two-tenths cc. of blood is taken up in a 1 cc. pipet (graduated in tenths) and transferred to a test tube in which has been placed previously about 0.5 cc. of the $\text{K}_2\text{C}_2\text{O}_4$ soln. and well mixed; H_2O is now added to bring the mixt. up to 1 cc., then 1.5 cc. picric acid soln. gradually with thorough mixing. The contents of the tube are then centrifuged or filtered and 1 cc. of the clear yellow liquid transferred to a test tube and evapd. to a few drops. To the conc. liquid 0.5 cc. K_2CO_3 is added and this evapd. to a few drops. The presence of sugar is indicated by the

dark red-brown color of the soln. which is now dild. to 10 cc. A parallel test is made on the 1% glucose and the % of sugar estimated by color comparison. Cf. Lewis and Benedict, *C. A.* 9, 638.

L. W. RIGGS.

Improved technic for the preservation of brains. A. GIANNELLI. *Polislinico* 22, No. 3(1915); *J. Am. Med. Assoc.* 64, 1537.—After removal of the meninges the brain was placed in 5 liters of 5 or 10% HCHO for 15 days, with cotton on the floor of the vessel. It was then placed in alc. for the same length of time, after which it was immersed in glycerol for a month; it was removed then to a slanting shelf of glass to drain. Brains thus treated show no changes in 7 years, while with other methods they become hard or brittle unless permanently covered with fluid. L. W. RIGGS.

Application of the Van Slyke amino-nitrogen determination to the diagnosis of cancer. OTTO LOWY. Newark. *J. Am. Med. Assoc.* 64, 1559-60(1915).—L. points out the difficulties in making tests by the Abderhalden thimble method, and recommends the use of the app. devised by Van Slyke for measuring the amino-N content of the blood. The cancer substrate is prepd. in the same manner as for the thimble method and then dried and added to the suspected serum. Another tube contains the serum alone. Both are covered with toluene and incubated 24 hrs. The increase in the amt. of amino N liberated from the serum plus substrate over that from the serum alone indicates the presence of a proteolytic enzyme in the serum. Care must be taken to rid the substrate of all sol. proteins and to test it to det. if any N is evolved. By this method 35 out of 42 cases of cancer gave positive results; 34 out of 40 nonmalignant cases gave negative results.

L. W. RIGGS.

Estimation of very slight amount of free acid or alkaline substance in liquids of animal or vegetable origin. A. STUTZER AND W. HAUPT. Univ. Königsberg. *Biochem. Z.* 69, 305-8(1915).—Small amts. of free acid may be detd. by adding to 250 cc. of the fluid to be examd. 25 cc. 0.2 *N* NaOH and 1 g. NH_4Cl and distg. off the NH_3 liberated into 0.2 *N* H_2SO_4 . The difference between the amt. thus formed and the amt. formed with distd. H_2O is a measure of the free acid. A second method consists in adding 25 cc. I soln. (20 g. KI and 5 g. KIO_3 in 500 cc. H_2O) and a little starch and titrating with 0.01 *N* $\text{Na}_2\text{S}_2\text{O}_3$ until the blue color disappears. The end point may be made more sensitive by dilg. with CO_2 -free H_2O . In the same way alkalis may be detd. by warming with 0.01 *N* H_2SO_4 to remove CO_2 , adding starch and I soln. and titrating with $\text{Na}_2\text{S}_2\text{O}_3$.

C. J. WEST.

Clinical calorimetry. I. A respiration calorimeter for the study of disease. GRAHAM LUSK. Russell Sage Inst. and Cornell Univ. Med. College. *Arch. Intern. Med.* 15, 793-804(1915).—II. The respiration calorimeter of the Russell Sage Institute of Pathology in Bellevue Hospital. J. A. RICHE AND G. F. SODERSTROM. *Ibid* 805-28.—III. The organization of a small metabolism ward. FRANK C. GEPHART AND EUGENE F. DU BOIS. *Ibid* 829-34.—Introduction and description of respiration calorimeter and organization of metabolism ward. IV. The determination of the basal metabolism of normal men and the effect of food. FRANK C. GEPHART AND EUGENE F. DU BOIS. *Ibid* 835-67.—The metabolism of 7 normal men was studied. The av. metabolism at perfect rest (14-18 hrs. after the last meal) was 34.8 cal. per sq. meter of body surface. The greatest deviation from this av. was 11%. Metabolism is proportional to body surface and not to body weight. The methods of indirect and direct calorimetry agree in 2 and 3 hr. periods and, in health, in hourly periods. The method of indirect calorimetry (O_2 consumed as basis) gives best results in short periods. In these direct calorimetry is made inaccurate by uncertainty as to the correct specific heat of the body and also to the differences in the rate of change of temp. of different parts of the body. Ordinarily the rectal temp. is taken as that of the body, but in typhoid fever better results are obtained with surface thermometers. The ingestion of 200 g. of

glucose or of a mixt. of glucose and dextrin or of a casein meal containing 10.5 g. N increase the heat production by about 12% in a period of 3-6 hrs. V. The measurement of the surface area of man. DELAFIELD DU BOIS AND EUGENE F. DU BOIS. *Ibid* 868-81.—The surface area of the different parts of the body was detd. by making a mold of the surface by pasting paper on tight-fitting underwear. Various regions of the body were marked on the mold, which was then removed, cut in pieces and coated with paraffin. Patterns of these pieces were printed on photographic paper and the patterns cut out and weighed. The area was then readily calcd. The hands were enclosed in gloves which were then coated with paraffin. The area of the region back of the ears and of the penis and scrotum was detd. by measurement. A large number of measurements of the linear dimensions of parts of the body was made. From these, attempts were made to derive formulas for the area of the given region in terms of the linear dimensions and a const. Those which gave smallest deviations from the normal were accepted. These are: *Head*, including ears, AB 0.308, A around vertex and chin, B around occiput and forehead, just above eyebrows; *arms*, $F(G + H + I)$ 0.558, F outer end of clavicle to lower border of radius, G circumference at upper border of axilla, H largest circumference of forearm, I smallest circumference of wrist; *hands*, JK 2.22, J lower posterior border of radius to tip 2nd finger, K circumference of open hand; *trunk*, including neck, breasts in female and penis and scrotum in male, $L(M + N)$ 0.703, L suprasternal notch to upper border of pubes, M circumference of abdomen at level of umbilicus, N circumference of thorax at level of nipples in male and just above breasts in female; *thighs*, $O(P + Q)$ 0.508, O superior border of great trochanter to lower border of patella, P circumference of thigh just below level of the perineum, Q circumference of hips and buttocks at level of trochanters; *legs*, RS 1.40, R from sole of foot to lower border of patella, S circumference at level of lower border of patella; *feet*, $T(U + V)$ 1.04, T length of foot, U circumference at base of little toe, V smallest circumference of ankle. The difference between the areas calcd. from the above formulas and those actually detd. by measurement were rarely more than 10% and usually much less. Cf. C. A. 9, 1801. I. GREENWALD.

Landau's color test for serodiagnosis of syphilis. JOHN A. KLÖMER. Phila. J. Am. Med. Assoc. 64, 1461-3(1915).—Landau's first method was to add 0.2 cc. serum to 2.5 cc. of a reagent prepd. by mixing 5 drops tincture of I with 10 cc. of paraffin oil, and setting aside in a dark place for from 5 to 15 hrs. He claimed that syphilitic serum decolorizes the mixt. while a reddish yellow color persists with normal serum. Later the technic was modified by using a 1% soln. of I in CCl_4 , 0.2 cc. of the fresh clear serum being added to 0.1 cc. of the reagent. Syphilitic serum gave a clear, transparent yellow and nonsyphilitic serum gave an opaque, whitish gray fluid. K. found that both normal and laetic serums and cerebrospinal fluid gave entirely unsatisfactory results with the iodized petrolatum, and with the I in CCl_4 reagent. The error of this test is not only in the low % of correct positive results, but is especially evident in the high % of false positive reactions with non-luetic serums. L. W. RIGGS.

C. BACTERIOLOGY.

ERNEST D. CLARK.

Studies on *Rhizopus* species. II. Physiological. J. HANZAWA. Sapporo. *Mycol. Centrbl.* 5, 257-81(1915).—With the exception of *Rh. nigricans*, practically all of the species ferment glucose, maltose, galactose, fructose, mannose and dextrin, but not lactose, xylose, arabinose, rhamnose, α - and β -glucosides or mannitol. Sucrose, raffinose and inulin are fermented by some species but not by others. All of the species liquefy gelatin, imparting to it a reddish brown color. All coagulate milk, and all except *Rh. nigricans* liquefy starch paste. The possibility of distinguishing the various species by physiological means seems very remote. A. W. DOX.

Nitrogen assimilation in *Aspergillus*. W. ZALESKI AND D. PIJUKOW. *Ber. deut. botan. Ges.* 32, 479-83(1914).—In the presence of glucose and the necessary mineral salts the authors show that *Aspergillus* takes up NH_4 salts more readily than amino acids. Histidine is not utilized at all. Some of the other amino acids, grouped in their order of assimilation, are phenylalanine < leucine < glycine < alanine < aspartic acid. If a mixt. of NH_4 salts and amino acids is given, an increased quantity of the latter is taken up. By substituting glycerol for glucose, N in form of alanine is used just as well as in form of NH_4 salts. B. HOROWITZ.

The destruction of paraffin by *Bacillus prodigiosus* and soil organisms. R. GREIG-SMITH. *Proc. Linnean Soc. N. S. Wales* 39, 538-41(1914).—Dried blood, casein and kieselguhr were coated with paraffin and were then treated with suspensions of *B. prodigiosus* and of some soil organisms. In a month at 28° *B. prodigiosus* caused a loss of extractable paraffin of 14%; the soil organisms a loss of 49%.

M. X. SULLIVAN.

Protein transformations in yeast. II. Influence of medium upon the protein decomposition in yeast. W. ZALESKI AND W. SCHATALOFF. *Univ. Cracow. Biochem. Z.* 69, 294-304(1915); cf. *C. A.* 8, 1136.—The unfavorable action of monovalent alcs. (MeOH , EtOH , $\text{iso-C}_4\text{H}_9\text{OH}$, $\text{iso-C}_5\text{H}_{11}\text{OH}$, allyl alc.) upon yeast proteolysis becomes evident in concns. of more than 4%. The action of aromatic alcs. (PhCH_2OH) is more unfavorable. Phenols also have a retarding effect. The most noticeable effect was obtained with phloroglucinol. Of the alcs. present in the fermentation liquid, only EtOH is present in sufficient concn. to influence the course of the proteolysis. The proteolytic enzymes of yeast act best in a slightly acid medium. Dil. solns. of HCl and HCO_2H have no effect, while other acids, like H_3PO_4 , oxalic, lactic, pyruvic, AcOH and citric exert favorable effects up to certain concns.; above them. retarding effects. No relation was found between the H-ion concn. and the work of the proteolytic enzymes. Alkalies are unfavorable. This explains the unfavorable action of certain salts. The effects of many substances were studied, detns. of protein, peptone, NH_4 - and basic-N being made. C. J. WEST.

The morphological variability of *Mycoderma vini*. R. PEROTTI. *Rome. Atti accad. Lincei* 23, II, 423-6(1914).—Expts. showed that variations in the conc. of glucose, in the source of the C and N, and in the acid and alc. content of the nutritive solns. determine the large morphological variations of *Mycoderma vini*. Under variations of this kind (cf. original for details as to media used and details of results) the cells may become smaller or may increase up to double their normal size; the cell form may become elongated, bacillus-like, round, rod-shaped or be round on one side and prolonged on the other. E. J. WITZEMANN.

Synthesis of protein in yeast. W. ZALESKI AND W. ISRAELSKY. *Ber. deut. botan. Ges.* 32, 472-9(1914).—The authors studied the synthesis of protein in yeast, using various media. The protein content remains const. during fermentation in pure sugar soln. (cf. Ivanov, *Z. physiol. Chem.*, 42, 464). Asparagine and glutamic acid support protein synthesis, while glycocoll and phenylalanine do not. B. HOROWITZ.

D. BOTANY.

CARL L. ALSBERG.

The physiological value of the reserve substances in chestnuts. C. MANICARDI. *Staz. sper. agrar. ital.* 47, 633-6(1914).—The reserve substances are always much in excess of the requirements for a normal germination. The whole action of the reserve substances in germination is upon root development. The chestnut can exist for a certain length of time by means of photosynthetic assimilation alone.

L. J. GILLESPIE.

The germinative force of the seeds of *Cuscuta trifolii* imbedded in stable manure, in mineral fertilizers and in the soil. A. MORETTINI. *Stas. sper. agrar. Ital.* 47, 433-51 (1914); *Chem. Zentr.* 1915, I, 498.—Comparative germination expts. showed that the seeds of clover silk soon lose their germinative force in mineral fertilizers; in dry soils (planted 15-20 cm. deep), although their germination is stimulated at first, the germinative force decreases rapidly after about 3 months. In stable manure it is completely inhibited after a short time so that the view of various investigators that the passage through the digestive tract and the excretion with the feces have no influence on the germinative power, must be considered correct. C. F. MILLER.

The acidity of Sphagnum and its relation to chalk and mineral salts. MACGREGOR SKENE. *Ann. Botany* 29, 65-87(1915).—There is variation in acidity and in sensitivity to chalk in the different species of *Sphagnum*. A correlation exists between the degree of acidity and degree of sensitiveness, though the connection between the two is indirect. *Sphagna* thrive in acid solns.: the injurious effect of chalk, and of alkalis in general, is due to the substitution of an alk. for an acid reaction. Mineral solns. are generally physiologically harmless, but may be ecologically harmful. *Sphagnum* utilize, in growth, bases held by the acid compds. of the cell walls. B. HOROWITZ.

Relation between the concentration of nutrient solution and the rate of growth of plants in water culture. WALTER STILES. *Ann. Botany* 29, 89-96(1915).—If the nutrient solns. in water-culture expts. are changed frequently, so as to maintain more nearly a const. compn. of the soln., the conc. of the soln. may vary considerably without producing much effect on the rate of growth of the cultures as measured by the dry matter produced within a given time. Below a certain concn., however, there seems to be an indication that the rate of growth becomes less. Frequent changing of the nutrient soln. of water cultures produces decidedly better growth of the plants. It is necessary to calculate the probable error of the results obtained in expts. on water-cultures in order to det. the significance of differences between results from different sets of cultures. B. HOROWITZ.

Effect of salt on the growth of *Salicornia*. A. C. HALKET. *Ann. Botany* 29, 143-54(1915).—*Salicornia oliveri*, Moess., and *Salicornia ramosissima* grow better in the presence of NaCl than they do in its absence, the greatest growth occurring in the presence of 2 to 3% of the salt. Higher percentages decrease the growth of the plants. The effect of NaCl on the growth of *Suaeda maritima* is not so marked. Plants grow as well in its absence as when a small quantity (1%) is present. Growth decreases with increase in the amt. of salt above 1%. *Salicornia ramosissima* and *Suaeda maritima* can resist the presence of a large amt. of NaCl, as is seen from "pan" expts., when the plants remain alive and green even if the salinity of water in soil rises at times to 17%, though they are not able to grow. The growth of *Glyceria maritima* is decreased with the increase of the salinity of the soil. B. HOROWITZ.

Respiration of living and dead wheatbuds. S. KOSTYCHEW, W. BRILLIANT AND A. SCHELOVMON. *Ber. deut. botan. Ges.* 31, 432-41(1913).—The O intake of living and dead wheat buds is greatly reduced by a slight lowering of the air supply. Na₂HPO₄ has no influence on the CO₂ output and O₂ intake of living wheatbuds; sugar solns. increase both the CO₂ and O₂, though r. q. remains constant. In the case of dead wheatbuds, sugar solns. increase only the CO₂ output, and this even under excellent aërating conditions; here the r. q. is considerably increased. B. HOROWITZ.

Further researches into the chemical organization of the cell. W. RUHLAND. *Ber. deut. botan. Ges.* 31, 553-6(1913).—(For former work see *Biol. Zentralb.* 33, 337.) The fact that many plant cells show an acid reaction cannot be explained on the basis of non-permeability of the enveloping membrane of protoplasm, since the membrane

is readily permeable to acids. Some other factor must be ascribed to the cell. In several cases R. has studied the acidity of cells by the introduction of indicators.

B. HOROWITZ.

Occurrence of "inklusen" in the leaves of *Pistacia lentiscus* L., and remarks concerning the anatomical structure of these leaves. T. F. HANAUSEK. *Ber. deut. botan. Ges.* 32, 117-22(1914).—With the exception of those cells of the mesophyll which contain Ca oxalate, all the other cells of the *Pentiscus* leaves contain "inklusen;" those with FeCl₃ become dark green to black, with KOH violet, with conc. H₂SO₄, plus vanillin in HCl, red.

B. HOROWITZ.

Formation of anthocyanin in the leaves of the rose. A. M. LÖWSCHIN. *Ber. deut. botan. Ges.* 32, 386-92(1914).—Guilliermond's views (cf. C. A. 8, 2740) on the formation of anthocyanin are held to be erroneous. The following views are advanced: In early development one observes thick clusters of granules and threads near the nucleus. The granules and threads gradually increase in size. The introduction of light leads to the development of a red color; so long as light is absent the granules remain colorless. Along with increase in size there proceeds a gradual union of individual elements, and this ultimately leads to the building of vacuoles containing the anthocyanin. The part played by the mitochondria cannot yet be stated. The granules and threads may be regarded as the mother substances of anthocyanin, and this, under the influence of the nucleus, is synthesized in the cell.

B. HOROWITZ.

Formation of anthocyanin and contents of the ash. A. CZARTKOWSKI. *Ber. deut. botan. Ges.* 32, 407-10(1914).—N deficiency in the mineral food of green plants furthers anthocyanin formation. For the effect of S, P, K, Ca, etc., see tables in the original.

B. HOROWITZ.

Chloroplast formation. A. P. PONOMAREW. *Ber. deut. botan. Ges.* 32, 483-8(1914).—P. attacks the problem from a colloid chem. standpoint. The materials used were *oedogonium*, *vaucheria*, *spirogyra*, etc. The living chloroplasts always appear homogeneous. High temp. and heavy metallic salts cause their coagulation. The substance of the chloroplast has selective permeability; at death it loses its osmotic properties and becomes permeable to sugar. The same colloidal structure must be ascribed to chloroplasts as to protoplasm, though the viscosity of the former is greater than that of the latter.

B. HOROWITZ.

The respiration of sea algae. E. PAUTANELLI. *Ber. deut. botan. Ges.* 32, 488-98(1914).—P. detd. the respiratory quotient of various algae from the Gulf of Naples. At the same time detns. were also made of the fluctuations in sugar content by micro- and macrochemical methods. The r. q. varies so considerably that no general conclusions can be drawn. The r. q. is lower the greater the O content of the water.

B. HOROWITZ.

The chemical action of dry-rot on wood. C. WEHMER. *Ber. deut. botan. Ges.* 32, 601-8(1914).—In studies with pine wood, undergoing dry rot, and of which some of the oxalic acid content could be extd. by boiling water, the author found that such wood cannot be deprived of acidity. This is also true of wood not decayed, though to a less extent. The action of the fungus, then, seems to be accompanied by an increase in acidity.

B. HOROWITZ.

Chemical modifications of plant organs undergoing autofermentations. M. MOLLARD. *Compt. rend.* 159, 512-4(1914); *Expt. Sta. Record* 32, 427.—Sections of squash tissue under sterile conditions used up sugar more quickly under aerobic than under anaerobic conditions. Amino N remained const. in air, but increased under anaerobic conditions. Amido N quickly disappeared and NH₃ increased under both conditions. Autofermentation may be distinguished by the method by which sugars are utilized as well as by the transformation of N materials.

J. J. SKINNER.

The action of various electrolytes on the grain of *Avena sativa*. F. PLATE. *Annali di botanica* 12, 261-343(1914); *Bull. Agr. Intelligence* 5, 1429.—The effect of the different ions of acids, bases, and salts was investigated. The strengths of the solns. used were N , $0.5 N$, $0.2 N$ and $0.1 N$ and the period allowed for absorption was 2 hrs. Observations were made of substances which accelerate or retard germination and on the effect of imbibition on the external morphological characters of the seedlings with special reference to the size of the shoot and root and the fresh and dry wt. of the seedling. The quantities of salt absorbed were likewise detd. Cf. C. A. 8, 360; 9, 1070.
M. X. SULLIVAN.

Certain constituents of lupine seeds. G. MUECK. *Landw. vers. Stat.* 83, 393-416(1914).—The seeds of blue, yellow and white lupines were found to be rich in diastatic, in glucoside-splitting and in peptone-splitting enzymes. An enzyme, capable of fermenting urea, is also present. The blue lupine was found to contain an agglutination enzyme, phasin. The technical and toxicological importance of these enzymes are discussed.
E. H. WALTERS.

Alcohol oxidation by phanerogamous plants. W. ZALESKI. Univ. Cracow. *Biochem. Z.* 69, 289-93(1915).—From 27 to 72% of the alc. taken up by the plants was oxidized. Whether the alc. was completely burned or was oxidized to organic acids was not detd.
C. J. WESS.

The artificial absorption of liquids in plants by means of the aerial part. C. ACQUA. Bot. Ist., Rome. *Atti accad. Lincei* 23, II, 78-84(1914).—The ordinary way of studying the absorption of various compds. by plants is to place the roots in solns. A. had previously shown that the roots themselves have special effects and tried the effects of solns. on the aerial stems without roots. Young mulberry plants (*M. albus*) were cut off at the base of the leaf stalk and transverse cuts were made into the lower end of the stem. Stems so prepared were placed in 2.5, 5 and 10% glucose solns. Considerable absorption took place at once; in the 5% soln. 25 drops (1 drop = 0.034 g.) were absorbed in 12 hrs. When compared with control plants it was found that the plants thus treated acquired a higher resistance to a subsequent treatment which is normally unfavorable to mulberry plants. This increased resistance was greater in the cooler seasons but was quite significant even in the warmer season. The stems show white specks due to solid glucose. The quantity absorbed is inversely proportional to the conc. Expts. with sucrose gave the same result. With NaCl soln. in a conc. equiv. to 5% glucose there was no absorption, showing that the effect is not due to the osmotic properties alone. With 50 and 25% aq. solns. of glycerol immediate wilting took place, but when the stems were restored to H_2O their turgescence reappeared. Solns. of H_3BO_3 and salicylic acid cause rapid death of the plants; the part above the incisions was most quickly affected. The toxic limit with H_3BO_3 is about 1% soln. which the plants could tolerate 3-4 days, after which they died. This method is thought to have many advantages for the study of vegetal biology.

E. J. WITZEMANN.

E. NUTRITION.

PHILIP B. HAWK.

NORMAL.

The influence of certain vegetable fats on growth. E. V. MCCOLLUM AND MARGUERITE DAVIS. Univ. Wisconsin. *J. Biol. Chem.* 21, 179-82(1915).—Rats were fed on a fat-free diet of casein, lactose, dextrin, agar-agar and salts until they were in an enfeebled condition (20-25 weeks). The ration was then changed to fat-free ration 50% and 50% plant product: corn meal, wheat embryo, entire wheat kernel, rye or rolled oats. The corn meal had a pronounced stimulating effect on growth, similar to that observed with animal fats. Wheat embryo exerted similar action

whereas entire wheat kernel arrested further decline but brought about no increase in wt. Rye and rolled oats were not effective in stimulating growth. While the addition of 5% butter-fat to a fat-free diet has marked stimulating action, 50% of corn is much superior; however, the addition of 5% wheat or 5% corn is not sufficient to prevent decline and death. Expts. were also performed in which the fat-free diet was changed to a mixt. of dextrin, Ca lactate and either dried pig heart or kidney. Very temporary benefit was derived from feeding the pig heart as compared with the kidney, but rapid growth occurred when the dried kidney replaced the heart tissue in the diet. The differences observed in the effects of wheat, rye and oats "may well be due to quant. differences in the yield of the unknown accessory substances under consideration rather than to an entire absence of the same. The possibility should also be emphasized that there may be carried by certain of the grains substances sufficiently toxic to cause injury to animals in such an enfeebled condition." A. P. LOTROP.

Utilization of calcium and phosphoric acid compounds by the animal organism. III. Utilization of the chief phosphoric acid compounds by ruminants. G. FINGERLING. *Landw. Versuchs. Sta.* 86, 75-114(1915).—Expts. with lambs in which P was supplied as casein, phytin, lecithin, nuclein, Na nucleate, and Na_2HPO_4 . No essential differences in the results were observed, and the conclusion is drawn that the unsatisfactory results obtained with some foods cannot be due to the form of the P, but to the nature of the food itself. E. H. WALTERS.

Does the cholesterol of the food have any influence upon the cholesterol excretion through the bile? L. D'AMATO. Univ. Naples. *Biochem. Z.* 69, 217-24(1915).—Dogs fed with lipoid-rich diet show a const. though small increase of cholesterol and bile salts in the bile. The slight increase does not justify the supposition that the bile is the principal excretory path for cholesterol nor that the cholesterol of the food is largely changed into cholic acid and thus excreted as bile salts. C. J. WRIGHT.

To what extent is plant protein of the food utilized by the animal body? I. H. BORUTTAU. Berlin. *Biochem. Z.* 69, 225-44(1915).—The value of cereal-protein in bread is somewhat greater than in the isolated form. The same is true of the alc.-sol. part, the gliadin. The availability of the N-substances in spinach is very high. The value of gliadin is increased by the addition of a small amt. of spinach powder. The same is true of the addition of the powder or oat straw, though the straw contains only 0.96% N. The N of bran, as far as it is resorbed, is very suitable for building up the body protein. C. J. WRIGHT.

ABNORMAL.

Digestion and absorption of protein and fat in normal and depancreatized animals. ERNEST W. H. CRUICKSHANK. University College, London. *Biochem. J.* 9, 138-55 (1915).—In normal dogs the N utilization on a high protein diet varied from 95 to 96.5%, while on a low protein diet it was 88%. Fat utilization on a high fat diet was 97 to 98.9%, on a low diet 87.1%. In partially depancreatized animals there is very little difference in power of assimilation, whether the piece of gland is grafted in the abdominal wall or left *in situ*, but the addition of pancreas to the diet exerts a most favorable effect in both cases. Total depancreatization produces severe diabetes which is usually fatal in about a week. This condition is prevented by performing the operation in 2 stages, the first being a partial depancreatization. Immediate depancreatization without pancreas in the diet results in a loss of 22% of N and 67.4% of fat. The addition of pancreas increases the utilization of N to 92% and of fat to 70-88%.

B. HOROWITZ.

A study of the metabolism in experimental diabetes. V. H. K. MOORHOUSE, S. W. PATTERSON AND M. STEPHENSON. University College, London. *Biochem. J.* 9,

171-214(1915).—In exptl. diabetes the increase in metabolism amounts to 15-20% on an average, and this increases with the severity of the condition. Whereas under normal conditions the respiratory quotient increases with the intake of glucose, this increase is markedly diminished or is entirely absent after the removal of the pancreas, thereby indicating an incomplete oxidation of sugar. The increase in the excretion of acetone substances parallels the increase in the *D:N* ratio and the total metabolism, suggesting that the phenomena are expressions of a similar disturbance of protein metabolism, which is secondary to the impairment of sugar utilization. B. H.

Influence of calcium salts upon phlorhizin diabetes. MARTIN JACOBY AND RUDOLF A. P. ROSENFELD. Berlin. *Biochem. Z.* 69, 155-61(1915).—High and very high doses of Ca lactate have an immediate effect upon phlorhizin diabetes; the excretion of sugar and acetone falls rapidly to 0 or nearly 0, and the N decreases. The injury to the kidneys, recognized by the presence of protein and blood in the urine, soon produces death. The same effect is obtained if the Ca salt is given before the phlorhizin. Similar results were observed by using CaCl_2 . The decrease in urine sugar is accompanied by a parallel decrease in the blood. Thus the sugar formation by phlorhizin is retarded by the action of Ca salts. C. J. Wær.

Relation of lactic acid to the carbohydrate metabolism. III. The formation of lactic acid in human diabetes. OTTO VON FÜRTH. *Biochem. Z.* 69, 199-216(1915); cf. C. A. 8, 3456.—Using the aldehyde method for detg. lactic acid, the post-mortal capacity for forming lactic acid by the muscles and liver of normal, cachectic and diabetic individuals was detd. This shows that the introduction of excess of sugar soln. in the organ from a diabetic organism did not lead to any special formation of lactic acid. The supposition that the diabetic metabolism is such that the sugar decompn. ends with the production of lactic acid must be given up. The evidence seems to point to the fact that the capacity of the muscles to form lactic acid was decreased. (This is not true of the liver.) C. J. Wær.

Clinical calorimetry. VI. Notes on the absorption of fat and protein in typhoid fever. WARREN COLEMAN AND FRANK C. GEPHART. *Arch. Intern. Med.* 15, 882-6(1915).—The feces of 7 typhoid patients on the high calory diet were analyzed for fat and protein in 17 periods of 3 to 12 days each. The av. amt. of fat found was 6.25 g. or 4.3% of that ingested. No differences were observed between the early and the late stages of the fever or up to the first week of convalescence. The av. amt. of N was 1.57 g. or 11.2% of that ingested. VII. Calorimeter observations on the metabolism of typhoid patients with and without food. WARREN COLEMAN AND EUGENE F. DU BOIS. *Ibid* 887-938; cf. C. A. 8, 3679.—The heat production of typhoid patients was measured by direct and indirect calorimetry in 61 expts. There was close agreement, the total divergence being 2.2% and the av. 5%. The respiratory quotients were normal. Therefore, in typhoid fever, protein, fat and carbohydrate are oxidized to the same, or approx. the same, end-products as in health, with the liberation of the standard amt. of heat. The rectal temp. does not give an accurate indication of the av. change in body temp. in these patients. Better results are obtained with surface thermometers. The basal heat production roughly parallels the temp. At the height of the fever it averages about 40% above the normal but it may be more than 50% above the normal. The specific dynamic action of protein and carbohydrate is much smaller in the febrile period of typhoid than in health and in some cases seems to be absent. In convalescence, it may be greater than normal. Typhoid patients can store body-fat on an abundant diet while losing body-weight and body-protein. Loss in wt. and loss in protein are usually, but not necessarily, parallel. There is toxic destruction of protein in typhoid fever, since N is lost on a diet containing more than enough calories to cover the heat production and also a normal amt. of N. VIII. On the dia-

betic respiratory quotient. GRAHAM LUSK. *Ibid* 939-44.—Discussion. Cf. C. A. 9, 1794. I. GREENWALD.

JORDAN, W. H.: *Principles of Human Nutrition*. Reprint, 1914. New York: Macmillan Co. 450 pp. \$1.75.

F. PHYSIOLOGY.

ANDREW HUNTER.

The mechanism of urinary secretion by the kidneys. ERICH LESCHKE. *Z. klin. Med.* 81, 14-35(1914).—Rabbits and guinea pigs were injected with solns. of NaCl, urea, phosphates, uric acid and iodides. The animals were killed and pieces of kidney were treated so that the injected materials were fixed *in situ*, and their distribution detd. In the case of the chloride the fixing was accomplished by immersing in a HNO_3 - AgNO_3 soln., washing in H_2O and treating with photographic developing fluid. The urea was fixed by placing the kidney sample in a HgNO_3 soln., the latter being decomposed with H_2S . The phosphates were fixed by means of U acetate and $\text{Na}_4\text{Fe}(\text{CN})_6$. The purines were fixed by placing in an ammoniacal Ag soln. and subsequently treating with photographic fluid as in the case of the Cl. The specimens were then sectioned. The injected materials were found almost exclusively in the tubules, and only in traces if at all in the glomeruli. M. S. F.

Nuclear digestion and uric acid excretion in a case of total occlusion of the pancreatic duct. DANA W. ARCHLEY. Johns Hopkins Hosp. *Arch. Intern. Med.* 15, 654-8(1915).—A patient with carcinoma of the pancreas, with complete absence of trypsin, lipase and diastase from the duodenal contents and presumably total occlusion of the pancreatic duct, was kept on a purine-free diet for several days and then fed calf thymus. There was a prompt increase in the output of uric acid, as large as that observed by other investigators after feeding the same amt. of thymus to normal individuals. The presence of pancreatic secretion in the intestine is apparently not necessary to the metabolism of ingested nuclear material. I. GREENWALD.

The cholesterol metabolism of the hen egg during incubation. J. H. MUELLER. Columbia Univ. *J. Biol. Chem.* 21, 23-8(1915).—Embryos were analyzed for cholesterol and cholesterol esters at 2-day intervals from the 3rd to the 21st day of incubation. The cholesterol of the newly laid egg is practically all in the free condition and remains so up to the 13th day. After that there is gradual esterification until at the time of hatching over 40% is in the form of esters. The sudden production of esters is apparently connected with the process of calcification, the P necessary for this process being made available by the breaking down of lecithin. The fatty acids thus liberated are in part oxidized or recombined as neutral fats with glycerol and the remainder is combined with cholesterol forming non-toxic esters. The esterifying cholesterol thus functions as a detoxifying substance. A. P. LOTHROP.

Cerebrospinal fluid. VIII. The effect of pituitary extract upon its secretion. L. H. WREED AND HARVEY CUSHING. *Am. J. Physiol.* 36, 77-103(1915).—Expts. on etherized dogs indicate that exts. of the posterior lobe of the hypophysis increase the rate of production of cerebrospinal fluid by stimulating the secretory activity of the choroid plexuses. J. F. LYMAN.

The effect of thyroid extracts upon blood pressure. G. C. FAWCETT, JOHN ROGERS, JESSIE M. RAHE and S. P. BEGBE. *Am. J. Physiol.* 36, 113-25(1915).—From fresh pig thyroids, the following fractions were sepd. and their physiol. action on dogs detd.: (1) nucleoproteins, (2) globulins, (3) coagulable albumins, (4) non-coagulable albumins, (5) alc.-sol. residue, (6) alc.-insol. residue. I, while present in all fractions, was contained largely in the protein preps., which gave no depressor effect on blood pressure. The residue free from coagulable proteins gave a strong depressor effect following its

intravenous injection. The active substance is not pptd. by basic Pb acetate, not altered by heat, nor by passage through a Berkefeld filter. J. F. LYMAN.

The physiology of the stomach. XIX. Reflexes from the intestinal mucosa to the stomach. E. H. BRUNEMIER AND A. J. CARLSON. *Am. J. Physiol.* 36, 191-5 (1915).—Gastric hunger contractions are inhibited by the introduction into the intestine of gastric juice, chyme, acids, alkalies, water, milk, and oil. This inhibition is due partly to chem. and partly to mechanical factors, the chem. stimulation producing the greatest effect. J. F. LYMAN.

Action of acids on bird plasma. JOUAN. AND STAUB. *Compt. rend. soc. biol.* 76, 408-9 (1914).—Bird plasma prepd. according to the method of Delezenne and collected with the precautions previously noted by the authors (*Compt. rend. soc. biol.*, Aug. 8, 1910) is not coagulated at 37° by various agents (colloidal Ca oxalate (Nolf), etc.), but invariably sets to a gel in a few hrs. after addition of an equal vol. of distd. H₂O or small amts. of various acids (H₂SO₄, HCl, AcOH, BzOH, lactic, boric). The amt. of acid which is added should not exceed that which is required to neutralize the normal alkalinity with litmus as indicator. If this amt. of acid is exceeded, a ppt. of fibrinogen sol. in an excess of acid is formed; the flocculent ppt. does not become agglomerated in filaments or a clot. The following explanations of this phenomenon are possible: (1) the liquid condition of the blood is maintained primarily by the alk. reaction of the medium; (2) normal antithrombin is dependent in some manner upon the alkalinity of the blood (hypothesis of Dastre and Floresco regarding the nature of the antithrombin of peptone blood); (3) the acids cause the cleavage of a combination of fibrinogen or perhaps play a thromboplastic role in the sense indicated by Nolf. These possibilities will be investigated. The preceding observations were made independently of those of Piettre and Vila regarding the same subject. H. S. PAINE.

Is the Abderhalden reaction a "mutual" phenomenon in so far as woman and the bitch are concerned? SUZANNE DEJUST. *Compt. rend. soc. biol.* 76, 472-3 (1914).—The serum of a non-pregnant bitch did not give dialyzable products which were detectable by ninhydrin: (a) when it was placed alone in the dialyzer; (b) when it was placed in the dialyzer in the presence of placenta of the bitch; (c) when it was placed in the dialyzer in the presence of human placenta. The serum of a pregnant bitch attacked human placenta in the same manner as did the serum of a pregnant woman; the intensity of the color reaction was the same. The serum of a pregnant woman behaved toward the placenta of the bitch in the same manner as toward human placenta. The serum of a pregnant bitch attacked the placenta of the bitch in the same manner as the serum of a pregnant woman attacked human placenta. A negative result obtained in testing the permeability of dialyzers to egg albumen was not always found to be a sufficient guarantee of impermeability to serum albumin; the permeability of dialyzers to the latter should, therefore, always be tested. H. S. PAINE.

Chemical composition of the globulins. MARCEL AYNAUD. *Compt. rend. soc. biol.* 76, 480-1 (1914).—Globulins obtained as pure as possible from the blood of the horse and ass contained approx. 4% ash (on the dry basis) and the presence of P, Fe, S and Ca in the latter was of const. occurrence; the possibility that the presence of Fe was due to contamination (erythrocytes, etc.) was eliminated by special precautions. The globulins contained a relatively large proportion (about 15% of the dry wt.) of substances sol. in alc., Et₂O and CHCl₃. The alc. ext. yielded on evapn. irregular masses of fatty appearance and rancid odor and which contained no crystals. The alc.-Et₂O ext. contained P; it is, therefore, probable that a portion at least of this ext. was composed of lecithin or lipoids. The relatively high content of substance sol. in fat solvents and the presence of P, taken in connection with the color reactions of the globulins, the insolubility of the latter in gastric juice and their digestion by pancreatic

juice, constitute grounds for the assumption of the presence of nuclear substance in a diffuse state.

H. S. PAINE.

Hypophyso-toxic serum. CH. LÉVON. *Marseilles. Compt. rend. soc. biol.* 76, 512-3 (1914).—Intraperitoneal injection of guinea-pig hypophyses in rabbits in a vehicle of physiol. serum was quickly followed by emission of urine containing glucose. Intraperitoneal injection into young guinea pigs of serum from these rabbits resulted in arrested growth and loss of wt.; many of the animals died, while those which survived finally attained a normal development. No effects on the dead or living guinea pigs were observed which warranted the assumption that the rabbit serum was hypophyso-toxic.

H. S. PAINE.

Physico-chemical processes in blood in normal and pathological conditions and their diagnostic value. GOTTFRIED HOLLER. *Z. klin. Med.* 81, 129-55 (1914).—The resistance of washed and unwashed corpuscles was detd. in 102 cases of various conditions.

M. S. F.

G. PATHOLOGY.

H. GIDEON WELLS.

Agglutination of *Spirochaeta pallida*. A. KISSINGER. *Deut. med. Wochschr.* 41, 306-8 (1915).—Serum of syphilitic patients agglutinates *Spirochaeta pallida* specifically. The reaction is not constant but occurs in all periods of the disease. Intravenous injections of cultures of the spirochaetes in rabbits give a blood rich in agglutinins.

S. AMBERG.

Detoxification of diphtheria and tetanus toxin. J. SCHUMACHER. *Deut. med. Wochschr.* 41, 310-1 (1915).—In test tube expts. as well as with patients, $(\text{NH}_4)_2\text{S}_2\text{O}_8$ proved a good antigonorrheic. Guinea pigs on receiving 8 times fatal dose of diphtheria toxin died in 24 hrs. When the toxin was mixed in the syringe with 2 cc. 5% $(\text{NH}_4)_2\text{S}_2\text{O}_8$ the animals did not show any symptoms. A subcutaneous injection of 2 cc. 5% $(\text{NH}_4)_2\text{S}_2\text{O}_8$ preceding the toxin injection by 10 min. prolonged the life of the animals 12 hrs. Analogous results were obtained with tetanus toxin.

S. AMBERG.

† **The cerebrospinal fluid and the effect of lumbar puncture in delirium potatorum.** R. STEINEBACH. *Deut. med. Wochschr.* 41, 369-72 (1915).—The cerebrospinal fluid of patients with delirium tremens frequently contains alcohol, depending upon the time and amt. of the last dose. The alcohol content of the cerebrospinal fluid does not stand in any relation to the delirium. Lumbar puncture is very valuable in relieving delirium.

S. AMBERG.

The simultaneous use of hemolysins and hemagglutinins as indicators in the complement deviation reaction for the demonstration of syphilis. W. PFLEGER AND G. SCHEYER. *Münch. med. Wochschr.* 62, 393-5 (1915).—The so-called conglutination reaction has proved of value in the diagnosis of glanders. A new method is given which permits its applicability in syphilis. It is a complement-fixation reaction whereby horse serum is used as complement, etc., ox heart cholesterol ext. as antigen, and as hemolytic system cattle serum with 1% guinea pig b. c. suspension. This reaction needs only very small amounts of serum. It is called a conglutination reaction because there is a combined effect of hemagglutination and complement fixation.

S. AMBERG.

Cholesterolemia in some acute anemic conditions. COLLATINO CANTIERI. *Univ. Siena. Arch. farm. sper.* 19, 241-53 (1915).

A. W. DOX.

† **Dimethylaminobenzaldehyde reaction of Ehrlich in the urine of children with scarlet fever, measles, diphtheria and various mixed infections.** E. RACHMILEWITSCH. *Jahrb. Kinderheilk.* 81, 168-72 (1915).—300 cases were examd.

M. S. F.

Significance of noncoagulable nitrogen coefficient of blood serum in pregnancy and toxemias of pregnancy. R. D. PLASS. Baltimore. *Am. J. Obst. and Dis. Women and Children* 77, No. 4(1915); *J. Am. Med. Assoc.* 64, 1526.—P. claims that the non-coagulable N coeff. is a better index of kidney function than the total non-coagulable N alone. L. W. RIGGS.

The role of tuberculin in antituberculous vaccination. A. JOURNET. *Bull. acad. de méd.* No. 22(1914); *Schweiz. Arch. Ztg.* 53, 137(1915).—The active principle of tuberculosis, whether of human or bovine, avian, or equine type, is characterized by its dialyzing qualities and its thermostability. It is completely pptd. by EtOH and accompanies the lowest products in the degradation scale of the culture bouillon, the amino acids. Biologically, it appears spontaneously between the 2nd and 3rd week, its formation running parallel with the progress of the bacterial films, rapidly reaching a max. The mechanism of this activation is about as follows: From the bacterial cultures, small amts. of nucleocalbumins are sepd. which are the initial tuberculin substance. They are almost devoid of physiological activity. But upon hydrolysis in slightly alk. soln., they acquire by far-going decomp. all specific properties of tuberculin. S. WALDBOTT.

Influence of shaking, ultraviolet rays, and Röntgen rays, upon the complement and the hemolytic amboceptor. VITTORIO SCAFFIDI. Univ. Naples. *Biochem. Z.* 69, 162-80(1915).—Shaking exerts an injurious effect upon the complementary capacity of the serum. This action is the more pronounced when the temp. is high; temp. is without doubt an important factor in the phenomenon. The hemolytic amboceptor is not modified in any way by shaking, even if continued for 3 days at 37°, while the complement is completely inactivated after a few hrs. The ultraviolet rays inactivate both the complement and the hemolytic amboceptor in the same time, provided the amboceptor is used in a diln. 10 times as great as that of the complement. X-rays do not modify either the complement or the amboceptor. The different action of the 2 rays may be explained by assuming that the ultraviolet rays are absorbed by the proteins while the X-rays easily penetrate these substances; the ultraviolet rays, through their energy transformations, induce permanent changes in the vital and biological properties of the living protein. C. J. WEST.

FISCHER, M. H.: *Oedema and Nephritis. A Critical, Experimental, and Clinical Study of the Physiology and Pathology of Water Absorption in the Living Organism.* 2nd ed. New York: John Wiley & Sons. 695 pp. \$5.00.

H. PHARMACOLOGY.

ALFRED N. RICHARDS.

Acute intoxication due to benzene vapors. A. HEFFMAN. *Deut. med. Wochschr.* 41, 182-5(1915).—A "Gutachten" given by H. concerning a death due to inhalation of vapor of crude benzene. S. AMBERG.

The treatment of syphilis with copper-salvarsan. T. FABRY AND J. SELIG. *Münch. med. Wochschr.* 62, 147-9(1915).—Copper-salvarsan labeled "Cu 3" was obtained from Ehrlich. It contains about 24% As and 11.6% Cu. Salvarsan contains about 34% As, neosalvarsan about 20%. The "Cu 3" does not dissolve readily. The prep. was tolerated very well, but did not seem to act as well as salvarsan. S. AMBERG.

Treatment of lupus by intravenous injection of copper-salvarsan. *Münch. med. Wochschr.* 62, 149-50(1915).—The treatment was without effect. S. AMBERG.

The toxicity of uric and thymic acids in the frog. G. G. COSENTINO. Univ. Rome. *Arch. farm. sper.* 19, 193-202(1915).—Thymic acid, in the frog, whether administered in small, medium, or large doses, is more toxic than equal doses of uric

acid. Simultaneous injection of the two acids is more harmful than an equal dose of either acid separately.

A. W. DOX.

Hematological researches on some cases of acute poisoning by corrosive sublimate. GIOVANNI DONZELLO. Palermo. *Arch. farm. sper.* 19, 203-14(1915).—In all cases of poisoning by HgCl_2 , hyperleucocytosis was observed; this varied in intensity with the amount of the poison introduced into the organism. The red corpuscles undergo no change, numerical or morphological, irrespective of the amount of HgCl_2 assimilated.

A. W. DOX.

Observations on camphorate of quinine and pyramidone. GIULIO NARDELLI. Univ. Rome. *Arch. farm. sper.* 19, 215-20(1915).—This double salt is a splendid antithermic and has the advantage of being without sudorific properties.

A. W. D.

The elimination of iodide in the urine of children. ROBERT AMSTAD. *Jahrb. Kinderheilk.* 81, 222-33(1915).—The elimination starts a few minutes after ingestion and continues for about 36 hrs., about 80% of the whole output appearing in the first 12 hrs. With a dose of 0.1 g. KI in infants, 63.8 to 72.2% was recovered in the urine; with a dose of 0.2 g. KI in children of 3-5 yrs., 37.0 to 49.8% was recovered, and in children of 5-10 yrs., 41.3 to 48% was recovered. In adults, 66.5 to 71% of the ingested iodide reappeared in the urine.

M. S. F.

The influence of temperature and concentration on the quantitative reaction of the heart to ouabain. T. SOLLMANN, W. L. MENDENHALL AND J. L. STINGEL. Western Reserve Univ. *J. Pharmacol.* 6, 533-60(1915).—The toxicity of ouabain for intact frogs, detd. by the 1-hr. systolic arrest dose, increases markedly with the temp., the increase per degree of temp. being much greater at the lower than at the higher temps. The differences are so marked that they cannot be neglected in frog-assay. The M. S. D. for ordinary temps. may be read directly from a curve constructed by the authors. Excized frog hearts show a similar effect of temp. on the activity of ouabain. The temp. activity curves have approx. the same form, for all concs., as the temp. activity curve for intact frogs. The temp. quotients for ouabain activity vary in the direction of van't Hoff's law as applied to biologic phenomena; but quantitatively they correspond more nearly to the square of the ordinary chem. temp. quotients, and to the square of the temp. quotients for the rate of the normal heart. This is explainable by the fact that the activity of ouabain is increased by the temp. not only directly, but also through the increase of heart rate. The temp. quotients are parallel for all concs., but the quotient for a given range of temp. diminishes the higher the conc. The quotients computed for strophanthin and antiarin from a set of Trendelenburg's data vary in the same direction, although they are generally smaller. The concn. coeff., increase of activity/increase of concn., ranges from 1.28 to 4.6, av. 2.5. The feebleness of the action of ouabain, the more is the activity increased by doubling the concn. This is true whether the feeble ouabain action is secured by low conc. or by low temps. At least 4 factors would be concerned in this: The "limit of response," the "inactive dose," "injury by exposure," and "penetration" of the ouabain.

P. J. HANZLIK.

The toxicity of rattlesnake serum and bile, with a note on the effect of bile on the toxicity of venom. WILLIAM H. WELKER AND JOHN MARSHALL. Univ. Penna. *J. Pharmacol.* 6, 563-8(1915).—The intramuscular injection of rattlesnake venom into the same or another snake produced no toxic effects. Serum of rattlesnake injected intraperitoneally into guinea pigs, and intramuscularly into pigeons, appeared to be less toxic than rabbit serum. Captivity of rattlesnake appears to increase the coagulation of blood. Rattlesnake bile possesses low toxicity for pigeons and has no anti-toxic action for rattlesnake venom (contrary to statement of Fraser (*Brit. Med. J.* 2, 125 (1897))).

P. J. H.

Demonstration by the use of arterial rings of the inhibitory action of certain drugs on the vaso-constriction produced by epinephrine. DAVID I. MACHT. Johns Hopkins Univ. *J. Pharmacol.* 6, 591-4(1915).—If an intact animal is previously treated with ergotoxin, an injection of epinephrine produces a fall in blood pressure (Dale's vaso-motor paradox), the pressor effect of epinephrine no longer being obtainable owing to paralysis of the vasoconstrictors. The same phenomenon can be demonstrated with an excized pig carotid artery *in vitro* by immersing it first into Locke soln. containing ergotoxin followed by immersion in Locke soln. containing epinephrine. The simplicity of the expt. with all the essential elements involved present should make it preferable to expts. on the intact animal. The paradoxical effect of epinephrine occurs also with apocodeine, aconitine and nicotine.

P. J. H.

Some vasomotor reactions of the liver. CHAS. W. EDMUNDS. Univ. Mich. *J. Pharmacol.* 6, 569-90(1915).—Injection of epinephrine in the dog usually produces diminution in vol. of the liver; this continues while the blood pressure is reaching its maximum and then returns to normal again. In the cat an increase in vol. is produced usually, and this depends upon the increased cardiac efficiency. Ligation of the hepatic artery with injection of epinephrine results in no marked change in vol. of the liver at first, but later there is a marked increase due to backing of the blood in the vena cava, and it is therefore entirely passive. These changes are not proof of the pressure of vasomotor nerves in the portal vein. However, perfusion of the excized organ with epinephrine reduces the perfusion flow, and treatment of the excized vessels with epinephrine produces constriction. These phenomena, coupled with the fact that an increase of liver vol. with rise in portal pressure in the intact organ follows stimulation of the splanchnics, is considered proof positive that active vasomotors are present in the portal veins.

P. J. H.

The use of "pellidol." KOTTMAIER. *Berl. klin. Wochschr.* 52, 243-4(1915).—"Pellidol" is diacetylaminoozotoluene. It is sol. in oil and fats and has the same stimulating effect on epithelium as aminoazotoluene and scarlet red, but is not so toxic.

JULIAN H. LEWIS.

The action of synthetic camphor. CARL LUTZ. *Berl. klin. Wochschr.* 52, 322-3 (1915).—No harmful action was observed with the use of artificial camphor, and its action on the heart is the same as that of the natural drug.

JULIAN H. LEWIS.

The influence of oxalates, citrates and tartrates on the isolated heart. WILLIAM SALANT AND SELIG HECHT. *Am. J. Physiol.* 36, 126-44(1915).—The toxicity of equimol. solns. of Na salts in the perfused dog heart increases thus: tartrate, oxalate, citrate, and hence cannot be due to pptn. of Ca ions since toxicity does not follow the solubility of the Ca salts. Nor is toxicity due to the formation of nonionized Ca compds. since Ca citrate and tartrate were as well utilized in perfusion expts. as was CaCl₂. It is suggested that the effects are due to extra-cellular changes, possibly to the loss of lipoids or to physico-chem. changes at the surface of the cell.

J. F. LYMAN.

Action of intravenous infusions of sodium chloride, acids and alkalies upon the respiratory metabolism during urethan narcosis. J. C. RAEDER. Univ. Copenhagen. *Biochem. Z.* 69, 257-88(1915).—Urethan narcosis, rightly carried out, makes rabbits suitable for respiration expts. for 2-3 days. The metabolism is quite const., varying about 2% during the course of 1-2 hrs. The kidney secretion is not affected by urethan narcosis. Sudden intravenous injection of physiol. NaCl soln. may cause an increase in the respiratory metabolism. In investigating the action of different solns. upon the respiratory metabolism one can avoid the sudden action upon metabolism by a permanent infusion of physiol. NaCl soln. before the infusion of the soln. to be tested. The work of the heart and kidneys is const. Infusions of NaCl solns. cause increase of the respiratory metabolism. With stronger concns., metabolism sinks, probably because

of poisonous action upon the cells and a high osmotic pressure. As a rule the increased metabolism is accompanied by increased urine secretion. All the NaCl appears a few hrs. after the injection, being retained only in the case of coned. soins. Perhaps the increased metabolism depends upon this NaCl excretion and the increased excretion of fluid. Na_2CO_3 increases the O-consumption. Acids also appear to increase the O consumption, yet the respiratory metabolism soon decreases (poisoning). Concns. of 0.2 N NaOH and 0.166 N HCl cannot be used for intravenous injection.

C. J. WEST.

Urotropine as a disinfectant of the urinary passage. H. F. HÖRST. *Z. Min. Med.* 81, 272-84(1915).—The decompn. of urotropine under various conditions of temp., acidity and alkalinity is considered.

M. S. F.

Soluble aluminium compounds. Their occurrence in certain vegetable products. C. N. MEYERS AND C. VORGMAN. *Publ. Health Reports* 29, 1625-9(1914).—By means of feeding expts. on small animals the presence of a sol. toxic substance in corn, sweet potatoes and other vegetable products was shown. Sol. Al compds. were found in a considerable quantity in the same products. Results are only preliminary but suggest a possible connection between Al in food products and pellagra.

E. R. WEAVER.

I. ZOOLOGY.

R. A. GORTNER.

Fat content and the biological significance of the same for the fish and its habitat; fat content depending upon the age of the fish. OSW. POLIMANTI. Naples. *Biochem. Z.* 69, 145-54(1915); cf. *C. A.* 8, 1170.—The earlier conclusion, that surface swimming fish have the highest fat content, is confirmed. Animals which change their habitat during growth show a similar change in fat and H_2O content. Thus an animal that lives on the surface while young and upon reaching maturity lives 6 to 12 m. from the surface will show a decreased H_2O and an increased fat content. C. J. WEST.

The fats in the liver of the Selachii (*Amyliobatis aquila*). ARFFAERLE PALADINO. Univ. Naples. *Biochem. Z.* 69, 192-8(1915).—The fat shows the following physical constants: d. 0.9245, m. 50° , solidifies at 20° . It shows 2 absorption bands, one in the red near C and the other in the yellow near D. The acid no. is 10.2, sapon. no. 193.8, R.-M. no. 2.66, I no. 104.8. The presence of oleic, palmitic and stearic acids was shown. It contains P and Fe.

C. J. WEST.

12. FOODS.

W. D. BIGELOW.

The velocity of staling of bread. J. R. KATZ. Univ. Amsterdam. *Verslag. Akad. Wetenschappen* 23, 652-5(1914).—In a former communication K. pointed out that the staling of bread depends on a change in the starch of the flour such that it becomes harder and less capable of holding water. (Cf. *C. A.* 7, 3169; 8, 184.) K. now finds that the staling of the bread and its loss of imbibing power do not run quite parallel, the latter taking place more rapidly. Mention is made of the fact that the vapor pressure of both fresh and stale bread is not noticeably different from that of pure water.

L. H. ADAMS.

The staling of bread is connected with a change which takes place not only with wheat and rye starch but also with all varieties of starch, but it leads to practically important results only in the case of wheat and rye starch. J. R. KATZ. *Verslag. Akad. Wetenschappen* 23, 655-8(1914); cf. preceding abstr.—An account of expts. on the imbibing power and solubility of "bread" made of flour or meal from 8 different kinds of grain.

L. H. ADAMS.

Revised method for the determination of crude fiber in flour. K. BAUER. *Z. ges. Getreidew.* 5, 295(1913); *Chem. Tech. Rept.* 38, 341.—The amt. of sample needed for analysis varies with the kind of flour under exam. Of light colored grades 3 g., of dark colored 2 g., and of bran 1 g. should be taken. Introduce the sample into 200 cc. of 1.25% H_2SO_4 and boil for 30 min. In the case of bran, the boiling should last 1 hr. Agitate frequently during boiling. Boiling on an asbestos plate is recommended. After cooling add 15 cc. 30% KOH; this causes the albuminous matter to dissolve. The entire mixt. is now filtered through asbestos and the residue treated in the usual manner. The fiber obtained in this way is free from pentosans and protein, but contains largely lignin, suberin and a pigment.

SIMON MENDELSSOHN.

The microscopical examination of flour and pastry preparations, especially concerning the detection of potato constituents. F. BENGEN. *Stettin. Z. Nahr.-Genussm.* 29, 247-51(1915).—When the potato starch has not entirely lost its outlines treat about 2 cc. of a suspension of the substance with 2-3 drops of Löffler's methylene blue soln., shake, and centrifuge for a very short time, sufficient to bring the least broken down of the starch grains to the bottom of the container. Decant the liquid and wash the residue once by centrifuging and decanting. Potato starch is stained blue whereas the cereal starch remains unchanged. When a potato prepn. in which the starch grains have been entirely disintegrated has been used, rub a piece as big as a walnut with about 30 cc. of water, allow to settle for a short time, decant the liquid, add 25 cc. of 15% NaOH to the residue, stir till a thick jelly forms, add Br-water a little at a time with stirring until the mixt. again becomes limpid, centrifuge and exam. the residue under the microscope, potato being indicated by the characteristic tissue (cork cells, spiral and reticulated vessels, giant cells, and numerous parenchyma cells, the contents of which become stained with methylene blue). When thoroughly cooked peeled potatoes have been used, the microscopical characters are the same as in the last case except that cork cells are absent and the contents of the parenchyma cells do not become stained with methylene blue. Even in cases when potato starch grains are greatly distorted by cooking they often still retain to a considerable degree their peculiarities under polarized light. Some forms of potato starch are imperfectly or not at all stained by methylene blue.

A. F. SEEKER.

Color analysis of bread. C. POSNER. *Berl. klin. Wochschr.* 52, 173-7(1915).—Each variety of meal, when colored with Giemsa's stain, has a characteristic appearance under the microscope, even when it is made into bread. P. advocates this procedure to det. the kind of meal and bread and their purity.

JULIAN H. LEWIS.

A new staining process for potato starch. G. BLUNCK. *Mirow. Z. Nahr.-Genussm.* 29, 246-7(1915).—After trying a large number of stains in an attempt to find a selective one for potato starch in order to detect the presence of the latter in flour and bread, B. found that Metachrom Red G (Agfa Co.) answered the purpose. Sat. boiling 30% EtOH with the dye, cool, filter and dil. with 25% of water. Suspend a little of the substance to be examd. in a drop of water upon a microscope slide, dry, moisten with a drop of the dye soln., wash quickly with water, and dry again. Potato starch as well as cell tissues are stained an intense golden yellow but cereal starches remain unaffected. The sample must be perfectly neutral in reaction to render the test successful.

A. F. SEEKER.

Review of work in chemistry of milk and dairying in 1913. GRIMMER. *Milch-wirtsch. Zentr.* 43, 482-6, 497-503, 513-7(1914).

L. L. VAN SLYKE.

Alizarol test of milk. W. D. KOOPHA. *Milchwirtsch. Zentr.* 43, 487-93(1914). A discussion.

L. L. VAN SLYKE.

Comparative tests of several methods for cheese fat determination with special reference to a modified extraction process. N. A. BRODRICK-PITTARD. *Liebfeld-*

Bern. *Z. Nahr.-Genussm.*, 29, 112-7(1915).—The Ratzlaff method yields too low results owing to the use of ether-petroleum ether as a solvent; it fails to ext. cholesterol, a legitimate fat constituent. Eight detns. showed that in cheese containing from 13 to 37% fat, results were about 0.5% lower than when ether alone was used as a solvent. The Schmid-Bondzynski method also yields low results (from 0.12 to 0.39%) owing to the retention of some of the ether soln. of the fat by the acid aqueous layer. If 2 extns. with ether are made and all except 1-2 cc. of the ether layer removed each time satisfactory results are obtained. The Gerber van Gulik method gives results which may be as much as 1% too high. B.-P. recommends the extn. method of Allemann who employs a special glass vessel, cylindrical in shape, which fits within a Soxhlet extractor. Weigh 1 to 5 g. of cheese into this vessel, add 20 cc. of 20 to 25% HCl, heat on a steam bath until the cheese is dissolved, cool, place a thistle tube in the vessel so that the end of the stem reaches the bottom, fit the whole into a Soxhlet extractor and ext. with ether for 3 hrs. Evap. the ether from the ext. and weigh the fat. Exptl. results were excellent.

A. F. SEEKER.

Significance of *Bacillus coli* in pasteurized milk. L. P. SHIPPEN. Baltimore. *J. Am. Med. Assoc.* 64, 1289-91(1915).—Certain strains of *B. coli* are not killed by a temp. exceeding that commonly used in pasteurization. The thermal death point of this and similar organisms is not a constant quantity but varies for different strains of the same bacterium. In the case of *B. coli communior* this variation was found to be as great as 13°. The presence of *B. coli* in pasteurized milk cannot be taken as an index of its improper pasteurization or subsequent contamination. L. W. RIGGS.

Studies relating to the Roquefort and Camembert type of cheese. CHARLES THOM, J. N. CURRIE AND K. J. MATHESON. Conn. Storrs Agr. Exp. Station, *Bull.* 79, 387-94(1914).—In the mold-ripened cheeses salt is applied after 1 or more days of drainage. It does not, therefore, affect the initial souring which is the 1st step in ripening all these varieties. Its effect upon ripening agents may be estd. by calculating the strength of the brine formed by the soln. of the percentage of salt found in the percentage of water present. The percentage of salt which may be incorporated into a variety of cheese is directly limited by the intensity of the flavors to be developed. In the hard cheeses with their mild flavors, more than 1-1.5% salt becomes offensive. In Camembert 2.5% is acceptable, and in Roquefort, 4%. As a factor in cheese biology, salt restrains the development of *Oidium* in Camembert and prevents it in Roquefort. Salt delays but does not prevent the development of the molds active in ripening Camembert, Roquefort, and the ripened forms of Neufchatel. 10% of salt in culture media stopped or reduced to a negligible quantity the growth of *Penicillium pinophilum*, *P. lilacinum*, *P. luteum*, *P. digitalum*, *P. purpurogenum*, *P. roseum*, *P. duclauxi*, *Aspergillus nidulans*, *A. fumigatus* and *Oidium (Oospora) lactis*. The rate of development of the other species tried was markedly retarded, but more or less characteristic colonies finally developed.

B. E. BROWN.

A synthetic medium for the determination of colon bacilli in ice cream. S. H. AYERS AND W. T. JOHNSON, JR. *Science* 39, 802-3(1914).—A method for the determination of colon bacilli in ice cream is given. The culture medium is agar 1.5%, asparagine 0.3%, NaH_2PO_4 0.1%, lactose 1%, satd. soln. of litmus 2%. Most bacteria do not grow in this medium, while the colon colonies are readily found by reason of their acidity.

WM. P. GARRETY.

Composition of frozen meat. ARIGHT. *L'industria lattiera e zootecnica* 1913; *Boll. chim. farm.* 53, 430(1914).—A. analyzed portions of lamb and ram flesh which had been kept for 160 days at -17° and -7°. The modifications observed in the comp. of this meat were of little consequence. The proportion of sol. substances was much greater in putrefied meat. Freezing caused the meat to lose 2-3% of H_2O ; the amt.

of peptones was increased and the content of coagulable N was decreased. The degree of acidity and the nutritive value of the meat were not affected. H. S. PAINE.

The Fiehe reaction in mixed honeys. O. LÜNING. Braunschweig. *Z. Nahr.-Genussm.* 29, 117-20(1915).—A suspected case of adulteration was investigated and found to be caused by the methods employed by the packer in heating the honey previous to blending. The honey (Cuban and Haitian) was liquefied by heating for $\frac{1}{2}$ to 4 hrs. at about 65 to 90°, strained through a screen and mixed in a blending tank in which over 24 hrs. was required before a normal temp. was regained. A bbl. of honey which before the initial heating gave a negative test was found after this process to give a slightly positive Fiehe reaction. Eight other bbls. were found to give negative tests even after heating. These results were explained by the fact that the honey in the first bbl. had a higher acidity (2.2 mg. equivalents per 100 g.) than the others (1.1 to 1.3 mg.). The diastase test in all cases both before and after heating was positive. L. points out the possibility that suspicious reactions in other cases are due to a like practice on the part of other packers. A. F. SEEKER.

Comment on the work of Sprinkmeyer and Diedrichs. "The determination of vegetable fats in animal fats." E. SALKOWSKI. Berlin. *Z. Nahr.-Genussm.* 29, 49-50(1915); cf. C. A. 9, 940.—Controversial. H. L. LOURIE.

Investigations on fatty fruits and seeds of our (German) colonies. IV. *Canarium polyphyllum*. H. WAGNER AND B. LAMPART. Duisberg. *Z. Nahr.-Genussm.* 29, 105-11(1915).—The nuts of the tree *Canarium polyphyllum* (Burseraceae) (plentiful on the island of New Guinea) are extensively eaten by the natives and produce a com. oil called "Java almond oil." Analysis of the kernels showed 4.87% moisture, ash 3.51 (of which the P_2O_5 was 1.16%), fat 69.58, N 2.23, crude fiber 0.84, and N-free ext. 7.46%. The fat gave negative Halphen and hexabromide tests and both the Bellier and Baudoin reactions gave faint violet colorations. Further analysis gave: $d_{40} 0.9042$, refract. reading (40°) 47.4, m. p. 22.0°, solidifying p. 9-10°, acid no. 1.49, sapon. no. 189.7, I no. (Hübl) 52.95, R.-M. no. 0.33, Polenske no. 0.40. The mixed acids showed: m. p. 45.0°, solidifying p. 38.0-37.5°, neutralization value 200.9, mean mol. wt. 279.2, I no. 59.41, refract. reading (49.5°) 27.4, and contained 48.54% stearic acid. The liquid fatty acids had an I no. of 103.3 and a refract. reading (40°) 41.4. The solid fatty acids had a m. p. between 57.5 and 58° and a solidifying p. of 52.0 to 51.5°, neutralization value 209.7, mean mol. wt. 267.5, the pure Pb salt m. 110.5° and solidifying at 106.0°. No evidence of myristic acid could be found in the acids prepared from the alc.-sol. Li salts of the mixed fatty acids. The fat contained 0.1492% of phytosterol and the m. p. of the solid glycerides was 11.0° higher than that of their fatty acids (Bömer method). Reference is made to the work of others upon this nut and upon the nuts of 2 other *Canarium* species, *C. oleosum* (Lam.) and *C. commune* (L.) (pili nut) both of which resemble the *C. polyphyllum* nut very closely. These nuts all have a high food value and the press cake makes an excellent feed for cattle. A. F. S.

Glass apples. G. PARIS. *Stas. sper. agrar. ital.* 47, 702-32(1914); *Chem. Zentr.* 1915, I, 493-4.—Apples whose pulp is entirely or partly transparent are called glass apples. Numerous varieties are represented and described. Tables contg. the results of analyses of sound and glassy apples hardly show a difference. In the glassy ones, the dried material is somewhat lower and richer in cellulose, pectin materials, and fats, while on the other hand, it is slightly poorer in sugars, pentosans, S and protein compds. The vitrification cannot be attributed to bacterial action or diastatic changes, but is due rather to other influences, above all lack of air, produced by a diseased condition of the sarcocarp which is rendered impermeable to air. This is proved by artificial cpts. (coating with paraffin) and also by photomicrographs. C. F. MILLER.

Some varieties of olives of Umbria. G. B. GIAMMARONI-CHERUBINI. *Stas. sper. agrar. ital.* 47, 575-602 (1914).—G.-C. gives descriptions of the tree, leaf, olive, and stone, and data of the moisture and crude fat content of the pulp. In some cases the yield of oil is given. L. J. GILLESPIE.

Studies on the factors affecting the culinary quality of potatoes. O. R. BURLING, F. B. MORRISON AND F. E. BOLL. *J. Am. Soc. Agronomy* 5, 1-33 (1913).—Mealiness is modified by the water content, potatoes high in water being less mealy than those relatively low in water. The % of starch in a potato is not indicative of mealiness. The ratio of Condon and Bussard, albuminoid N/starch, does not appear to be a very reliable indicator of the degree of mealiness of potatoes. The presence of sugar in a potato is detrimental to its quality. The %, however, that may be tolerated varies with diff. varieties. The ratio total N/starch is no criterion of quality. B. E. BROWN.

Coconut meal. J. B. LINDSEY. Mass. Agr. Expt. Sta., *Bull.* 155, 182-90 (1914).—Expts. were conducted to det. the digestibility and food value of coconut meal. It is equal in nutritive value to gluten feed, and in moderate amts. is favorable to the production of firm-textured butter. B. E. BROWN.

The effect of pressure on certain microorganisms encountered in preserving fruits and vegetables. B. H. HITE, N. J. GIDDINGS AND C. E. WEAKLEY, JR. West Va. Expt. Sta., *Bull.* 146 (1914).—Grape and apple juice were effectively sterilized by high pressures (30,000 to 80,000 lbs.) applied from 30 min. to 16 hrs. Tomatoes spoiled after pressure treatment, but more slowly than without the treatment. The problems studied were: "Whether or not a certain organism could be killed by such pressures as we could safely and easily apply; the time pressure death point curve, that is the relation between amt. of pressure and length of time it is applied; the effect of high and low temps. on death point curve; the effect of reaction of the media on death point curve." Technic and app. are described in detail. WM. P. GARRETT.

Love gifts upon the (German) food market. A. JUCKENACK. Berlin. *Z. Nahr.-Genussm.* 29, 241-6 (1915).—Many new forms of gifts in the way of foods have appeared upon the German market to meet the demands of those wishing to send tokens of affection to soldiers in the field. Among them are so-called rum or grog cubes containing alc. and made in the form of a jelly by means of gelatin, so-called alc.-free exts. consisting of various flavoring substances, sugar and coal tar colors, compressed cubes and tablets of coffee, tea and cocoa, and milk tablets. A number of these have been examd. and found to be frauds. A. F. SEEKER.

Testing apparatus used in the manufacture of carbonated beverages. KARL ALPERS. Univ. Tübingen. *Pharm. Ztg.* 60, 204-6 (1915).—The investigation carried out from a hygienic standpoint involved the detection of Cu, Zn and Pb not only in the beverages themselves after standing 12 hrs. but also in the solder and lining of the containers. In view of the strict application of the police regulations, the opinion is expressed that it might be well to substitute Ag for Sn as a lining material. W. O. E.

Determination of carbon dioxide in baking powder, etc. (BRUBAKEN) 7. Root crops of Sweden (SÖDERBAUM) 15. Determination of sugar, dextrin and starch (GROSSFELD) 28.

SHERMAN, H. C.: *Chemistry of Food and Nutrition*. 4th reprint, 1914. New York: Macmillan Co. 355 pp. \$1.50.

U. S., 1,139,646, May 18. J. W. DAVIES. Apparatus for homogenizing milk.

U. S., 1,140,229, May 18. W. G. SCARBOROUGH. Apparatus for homogenizing milk. Cf. C. A. 9, 944.

U. S., 1,140,629, May 25. N. SULZBACHER. Flavoring cottonseed oil, peanut oil, butter or luttanase by heating for several hrs. at 50-60° with hay or clover (previously dried at 110°) to impregnate it with the aromatic constituents of the latter. Cf. C. A. 9, 829.

U. S., 1,140,638, May 25. T. B. WALKER. Making a stock food from sawdust, bagasse, straw, husks or similar cellulosic material containing incrusting substances, by heating under pressure with dil. HCl to effect hydrolysis and break up the incrusting substances, sepg. the liquid from the solid product and neutralizing the excess acid present with NaOH. The resinous substances present are eliminated in the process.

U. S., 1,140,717, May 25. A. RUTTER. Sterilizing milk or other liquids by adding about 0.05-0.15% of Na₂O₂ and a combining proportion of citric acid at atm. pressure and heating to about 30°.

U. S., 1,140,934, May 25. G. C. ZIMMERMANN. Preparing kola for use as a food by cutting the fresh fruits to pieces, allowing them to ferment and roasting the fermented product at 180-200°.

U. S., 1,140,995, May 25. J. D. MILLER. Preparing a moisture-proof table salt by heating the salt and mixing with it about 0.1% of stearic acid and 0.1% of MgO.

U. S., 1,141,056, May 25. A. HELBRONNER and M. VON RECHLINGHAUSEN. Sterilizing milk or other liquids by heating to about 55-60° and then exposing in a thin film to the action of ultraviolet light.

U. S., 1,141,079, May 25. D. Y. STRAUSS. Making a stock food from bean vines by boiling in H₂O to ext. part of the nutritious constituents, sepg. the ext., crushing and rinsing the remaining loosened fibrous residue to obtain additional ext., mixing the exts., evapg. and combining with bran.

Brit., 541, Jan. 8, 1914. E. KRAUSE. A food preparation. See U. S., 1,113,021 (C. A. 8, 3828).

Brit., 1,159, Jan. 15, 1914. C. D. A. HANSEN. In mfg. milk preparations, milk powder is mixed with rennet powder, the mixt. curdling when added to H₂O, etc., to make puddings, cheese, etc. A strong ext. of vanilla, coloring matter, and gum tragacanth may be mixed with sugar, and then dried and mixed with rennet powder, hypophosphite or other salt of Ca which insures the production of a firm curd, and milk powder. Flavorings such as orange, lemon, maple, pistachio, raspberry, coffee, chocolate, etc., may be used.

Brit., 1,409, July 1, 1914. E. P. CARPENTER. In mfg. dried milk preparations, sepd. or poor milk is condensed in a vacuum pan to about 16° B $\acute{e}$, mixed with an oil such as cottonseed, maize, coconut, etc., or a fat such as lard or cacao butter, heated in the pan for a further 15 to 20 mins., and finally dried by a vacuum, spraying, hot cylinder, or other process.

Ger., 280,316, May 22, 1913. TEXTILMASCHINEN-FABRIK B. COHNEN. App. for drying fruits and vegetables.

Ger., 281,234, Feb. 26, 1913. UNGEMACH AKT.-GES. In mfg. colored caramel, the sol. color is worked up with easily comminuted sol. additions, such as sugar and caramel masses, with the addition, if desired, of gelatin or the like, to a dry, easily measured mixt. containing the color in dissolved form, and melting readily in the heat, and this mass is added to the molten caramel mass to be colored.

14. WATER, SEWAGE AND SANITATION.

EDWARD BARTOW.

FULLER, C. A.: *Designing Heating, and Ventilating Systems*. New York: D. Van Nostrand Co. 220 pp. \$2.00.

U. S., 1,139,618, May 18. W. H. WILLIAMS. Utilizing hot slag by passing it, while molten, into a pit containing H_2O to reduce it to a finely divided condition and form a soln. of the lime in the slag. This soln. is drawn off in portions, from time to time, for use in H_2O jackets of blast furnaces or boilers and replaced by fresh H_2O . City H_2O supplies may be similarly treated with slag to correct acidity and remove temporary hardness.

U. S., 1,139,873, May 18. G. JAYME. Removing scale from boilers. A mixt. of crude oil and kerosene is placed in the lower end of a boiler, H_2O is then introduced to raise the mixt. and steam is introduced at the upper end of the boiler to agitate the liquids.

U. S., 1,139,969-70, May 18. H. B. HARTMAN. Apparatus for purifying water by electrolysis, sedimentation and filtration. Cf. C. A. 8, 2914.

U. S., 1,140,262, May 18. R. GANS. A composition for softening water is made by lixiviating a melt formed from K_2CO_3 9, Na_2CO_3 78, kaolin 16 and feldspar 36 parts, with a 15% aq. soln. of water glass, for 5 hrs. at 90-100°.

U. S., 1,140,302, May 18. J. C. ECKLIFF. Apparatus for purifying water for boilers by heating to effect pptn.

U. S., 1,140,818-9, May 25. V. HENRI, A. HELBRONNER and M. VON RECKLINGHAUSEN. Apparatus for treating water or other liquids with ultraviolet light.

U. S., 1,141,050, May 25. L. C. FRANK. Apparatus for disinfecting sewage by treatment with steam.

Brit., 729, Jan. 10, 1914. W. JONES and JONES & ATTWOOD. App. for the purification of sewage or other impure H_2O by aerating, agitating, and circulating. Cf. C. A. 9, 831.

Brit., 782, Jan. 12, 1914. F. P. CANDY. In the purification of water, a soln. of alum or other substance made in closed chambers is added to the H_2O flowing in a conduit. The 1st of the 2 chambers contains pieces of the solid, and the satd. soln. is conveyed through a pipe to the bottom of the 2d chamber. A return pipe conveys the lighter and less satd. liquid back to the 1st chamber; the level of the satd. soln. in the 2d chamber is substantially below the flange upon which a portion of the conduit H_2O is directed and from which point the portion, now containing a small amt. of alum in soln., returns to the conduit, the constriction in which causes the circulation referred to.

Brit., 1,266, Jan. 16, 1914. L. LINDEN. Purifying water, sewage, etc. See C. A. 8, 2915.

Ger., 280,999, Jan. 10, 1913. H. KERSKEN and E. BODSTEIN. Mfg. a comp. for preventing boiler scale. The compns. used heretofore, containing fatty constituents, have proved unsatisfactory because of failure to adhere to the surfaces of the boiler or tubes. In this process an emulsion of mineral, animal, or vegetable oils, without the use of alkalis, is made so complete that the walls remain coated permanently with a layer of fat. Furthermore, the product has a direct solvent action upon the scale already present. See C. A. 8, 2440.

15. SOILS AND FERTILIZERS.

M. X. SULLIVAN.

Thomas Kosutiny. FRITZ V. KONEK-NORWALL. *Chem. Ztg.* 39, 105(1915).—An obituary. J. H. MOORE.

The engineering properties of soils. R. O. E. DAVIS. *J. Ind. Eng. Chem.* 7, 422-5(1915).—The engineering properties of the soil, *e. g.*, rigidity, cohesiveness, penetrability and porosity, are influenced by mechanical compn., mineralogical compn. and moisture content. The moisture relations have been studied and results are shown by curves. ISADOR MILLER.

Lithium in soils. L. A. STEINKOENIG. *J. Ind. Eng. Chem.* 7, 425-6(1915).—S. reviews the occurrences of Li in various substances as mentioned in the literature (references given) and gives a table showing the amt. of Li found in a number of soils collected from 6 different areas. All contained Li in small amts. ISADOR MILLER.

Effect on soil moisture of changes in the surface tension of the soil solution brought about by the addition of soluble salts. P. E. KARRAKER. *J. Agr. Res.* 4, 187-92 (1915).—The results from the expts. indicate that changes in the surface tension of the soil soln. arising from the application of fertilizing salts are of no importance in affecting the moisture condition of the soil. M. X. S.

Colloidal properties of acid soils of Japan. II. T. TAKODORO. *J. Coll. Agr., Tokoku Imp. Univ.* 6, 117-29(1914); cf. *C. A.* 9, 231.—The colloidal properties of 3 neutral soils, a sandy soil, a clay, and a humus soil, and 2 mineral acid soils of Japan are compared. The degree of swelling (increased vol.), detd. in alc., water, Na phosphate, Na tartrate, Na_2CO_3 , NaOH, HCl, and acetic acid, was greatest in NaOH and Na_2CO_3 and lowest in alc. The degree of swelling is greater for the mineral acid soils than for the neutral soils, especially in NaOH and Na_2CO_3 . The order of the degree of swelling for the different soils is: mineral acid soils > humus soil > clay soil > sandy soil. There is no relation between the absorbing power for NH_3 and that for dyes or the degree of swelling or the hygroscopic power in the different soils. The NH_3 absorption coeff. of soils from $(\text{NH}_4)_2\text{HPO}_4$ soln. is greater than that from NH_4Cl soln. This coeff. is usually greater in the acid soils than in the neutral soils. In the case of the neutral soils it is highest in the humus soil and lowest in the sandy soil. The absorbing power for dyes is greatest in the humus soil and lowest in the sandy soil. The absorbing power of the mineral acid soils for dyes is much less than in the neutral soils. For the neutral soils the hygroscopic power is in the order: clay soil > humus soil > sandy soil. There is no relation between the hygroscopic power of the acid soils and the neutral soils. The results are variable. E. H. WALTERS.

The fixation of nitrogen in Colorado soils. The distribution of the nitrates and their relation to the alkalis. WM. P. HEADDEN. Colorado Agr. Expt. Sta., *Bull.* 186, 47 pp. (1913).—"The distribution of the nitrates in our soils cannot be consistently accounted for by any theory of concn. of preëxisting nitrates. Their distribution is wholly independent of that of the alkalis, the latter being practically free from nitrates, while the aq. ext. of our soils, especially those showing the brown color due to *Asotobacter*, are extremely rich in Ca and Mg nitrates." It is pointed out that the shales and sandstones do not furnish the nitrates, as the well waters are not richer in nitrates than is usual; and, furthermore, that so-called "nitre spots" occur in localities where the shales and sandstones do not occur. The nitrate alone could not produce the brown color of these spots. *Asotobacter* in the presence of nitrates produce a dark brown color. It is therefore claimed that the accumulation of nitrate is due to bacterial agencies.

B. E. B.

The action of foliage and needle forests upon the soil and the plants growing on it. A. KOCH. *Centr. Bakt. Parasitenk., Abt. II* 41, 18-23(1914); *Bied. Zentr.* 44, 87-9. —Buckwheat grown in pot cultures of beech humus gave nearly twice as great a yield as that grown in humus from a pine forest. Both beechnuts and pine seed thrived in beech humus, whereas both developed imperfectly in the pine humus and finally died. To det. the cause for the poor vegetative condition of the pine humus, K. observed the effect of various substances obtained from pines either directly or as a result of decompn., on seeds, seedlings, yeasts, and bacteria. Among the substances used were turpentine, carvene, bornyl esters, silver fir oil, tannin, HCO_2H and rosin. Turpentine, carvene, silver fir oil and HCO_2H had a toxic action on dwarf corn seedlings while tannin and rosin did not appear to have any influence on them. Turpentine and carvene were not toxic to wheat, rye, buckwheat, peas, rape, or cauliflower seeds, and old, normal plants sprinkled with varying amts. of turpentine, carvene, and fir oil were only injured slightly. A marked difference was found in the behavior of cress and rape towards the vapors of the substances used. Cress was killed more quickly by turpentine than by carvene while, on the other hand, rape was killed by carvene, but revived after treatment with turpentine vapors. All of the substances inhibited the fermentation of yeast and some prevented its reproduction as well. Bornyl esters and carvene were strongly toxic to the growth of soil bacteria, 10% turpentine only slightly so, while 1% turpentine exerted a stimulating effect. All of the substances with the exception of HCO_2H also lessened nitrification in the soil. $(\text{NH}_4)_2\text{SO}_4$ was perceptibly nitrified in the beech humus but no reaction took place in the pine humus. The investigation showed that the toxic action of the decompn. products of pines is at least partly responsible for the poor vegetative condition existing in pine forests.

C. F. MILLER.

The alkaline reaction of soils provoked by acids in relation to the nutrition of plants. I. Making iron compounds in the soil soluble. GIULIO MABONI. *Stas. sper. agrar. ital.* 47, 674-701(1914); through *Chem. Zentr.* 1915, I, 498.—Continuation of earlier work (cf. C. A. 7, 3381) with special reference to lime soils contg. Fe. The investigation explains chlorosis in such soils as a consequence of the sepn. of insol. Fe compds. through the alk. soil solns. which are formed.

L. J. GILLERPIE.

Relations between total phosphoric acid and that soluble in "water and citrate" in some soils of middle Peru. A. HUTIN. *Ann. chim. anal.* 20, 31(1915).—Analyses are reported of 6 soils and their subsoils for total P_2O_5 and P_2O_5 sol. in water and citrate (method of Dyer). The figures show total P_2O_5 higher in the soil than in the subsoil, though the ratio of sol. to total is more nearly the same for both. In most cases 39-53% of the total was sol.

L. J. GILLERPIE.

Changes of sulfur and sulfur compounds in soils. H. KAPPEN AND E. QUENSELL. *Landw. Versuchs-stat.* 86, 1-34(1915); *J. Chem. Soc.* 108, II, 203.—When moist soil is treated with H_2S , the soil is blackened owing to the production of FeS , and a portion of the sulfide then undergoes a process of oxidation, in which all of the S is liberated, so that the whole of the H_2S absorbed is converted into free S. The S is then oxidized to H_2SO_4 , the change being more rapid in normal than in sterilized soils. It is, however, doubtful whether the slower oxidation of S in sterilized soils is due to the sterilizing process. Sulfides and sulfites are decomposed more quickly in presence of soil than without soil. In soils the decompn. is so rapid that no injurious effects on germination and growth are to be expected.

E. H. WALTERS.

The effect of fertilizers on the physical properties of Hawaiian soils. WILLIAM McGEORGE. Hawaii Agr. Expt. Sta., *Bull.* 38, 31 pp.(1915).—Results are given of expts. made to det. the effect of various fertilizers upon capillarity, percolation, flocculation, cohesion, apparent sp. gr., vapor pressure, and hygroscopic moisture. Capil-

larity is diminished in clay soils by the addition of salts but increased in sandy soils. Percolation is most rapid in sandy soils and slowest in types, the particles of which are most likely to swell. Fertilizers increase the resistance to percolation. Salts increase or diminish the size of the soil aggregates. Salts, in most instances, increase the cohesion of soil particles as well as apparent sp. gr. Hygroscopic moisture is increased by the addition of salts, with few exceptions. Vapor pressure is lowered in most cases.

B. E. B.

The quantitative determination of mono-, di-, and tricalcium phosphates and their application. GEO. A. OLSON. Washington Agr. Expt. Sta., *Bull.* 116, 1-18 (1914).—O. criticizes the use of NH_4 citrate for detg. available P_2O_5 as being empirical and inaccurate. Substances sol. in NH_4 citrate are not necessarily mono- and di-Ca phosphates; tri-Ca, Fe and Al phosphates are also sol. in this soln. " NH_4 citrate-soluble" is not a measure of available P_2O_5 . If it is desirable to estimate the mono-, di- and tri-Ca phosphates, this can be done by dissolving the substance in HNO_3 and pptg. the soln. with NH_4OH . For the mono-Ca phosphate $\frac{1}{2}$ of the P_2O_5 will be present in the filtrate and for the di-Ca phosphate $\frac{1}{3}$ the P_2O_5 will be present in the filtrate. The NH_4OH method is applicable for the testing of the purity of phosphate chemicals. It can also be applied to differentiate between the different forms of P_2O_5 that may be present in soils, plant, and animal tissue. Indirectly, by adding the equiv. of a base with Ca the different forms of phosphate salts can be detd. In soil, mono- and di-Ca phosphates tend to react, forming tri-Ca phosphate. There is then nothing to be gained by applying either superphosphate or reverted phosphoric acid to soil.

R. C. ROARK.

Some facts about commercial fertilizers in New York State. L. L. VAN SLYKE. New York Agr. Expt. Sta., *Bull.* 392, 585-625 (1914).—The following points are discussed: (1) compn. of fertilizers and cost of plant-food constituents; (2) relation of guaranteed to actual compn. in fertilizers; (3) some defects in the present New York State fertilizer law.

R. C. ROARK.

Comparison of magnesian and non-magnesian limestone in rotation experiments. JACOB G. LIPMAN, *et al.* New Jersey Agr. Expt. Sta., *Bull.* 267, 5-40 (1914).—Five-yr. rotation tests were made. Both forms of lime resulted in an increased crop yield. The yields were usually somewhat higher with the magnesian than with the non-magnesian limestone. In the great majority of cases, the dry matter of the crops from the limed plots showed a higher % of N than that from the unlimed plots.

R. C. ROARK.

The composition of root crops grown in Sweden. H. G. SÖDERBAUM. *Centr. för För. på Jord. Stockholm* 96, 1-25 (1914); *Biedermanns Zentr.* 44, 100-3 (1915).—Analyses of both tops and roots of rape and turnips were made to det. the % of ash, total and proteid N, P_2O_5 , K_2O and CaO. From the results obtained a table was prepared, showing how much of each of the above substances is removed from the soil by a small, medium, and large crop. If the amt. of P_2O_5 taken up is used as a unit, turnips remove 2.7 parts N, 6.2 K_2O , and 2.1 CaO, while rape removes 2.4 parts N, 3.5 K_2O and 1.4 CaO. These values agree quite closely with those given by Lierk.

C. F. MILLER.

Effect of certain organic compounds on wheat plants in the soil. Preliminary paper. F. W. UPSON AND A. R. POWELL. *J. Ind. Eng. Chem.* 7, 420-2 (1915).—This paper deals with the behavior of vanillin, salicylaldehyde, cumarin, quinone and dihydroxystearic acid. No definite conclusions were reached.

ISADOR MILLER.

The action of different nitrogen fertilizers in comparison with liquid manure and nitrogen compounds from air. W. KROGER, H. ROEMER AND O. RINGLEBEN. *Berichte der Landes.* 1914, *Hefi* 34, Sept. 43 pp. (1914); *Chem. Zentr.* 1915, I, 394.—The expts.

covered 3 yrs. and were conducted with barley, oats and potatoes. Though regarded as inadequate on account of their extent and unfavorable weather, the expts. led to the following conclusions: $\text{Ca}(\text{NO}_3)_2$ is in general at least comparable to NaNO_3 ; $(\text{NH}_4)_2\text{SO}_4$ is in general less active. With oats $(\text{NH}_4)_2\text{SO}_4$ is comparable to NaNO_3 , but with potatoes it is less efficient. CaCN_2 behaves like $(\text{NH}_4)_2\text{SO}_4$. In the case of potatoes, liquid manure showed little action. The favorable action of $\text{Ca}(\text{NO}_3)_2$, especially in the case of potatoes, is very striking. The results are given in tables.

M. X. S.

The action of calcium nitrate and sodium nitrate. Field experiments of the year 1912. O. REITMAIR. *Z. landw. Versw.* 17, 729-807(1914).—A summarizing presentation of fertilizer expts. undertaken by a large number of agriculturists.

L. J. GILLESPIE.

Manurial experiments with decomposition products of calcium cyanamide. H. KAPPEN. *Landw. Versuchs-stat.* 86, 115-36(1915); *J. Chem. Soc.* 108, II, 203.—Expts. in small garden plots, on the growth of mustard manured with different forms of N. The yield with carbamide, prepared from Ca cyanamide (Kappen, *Habilitationschr.*, Jena, 1913), was between those obtained with NaNO_3 and $(\text{NH}_4)_2\text{SO}_4$, while carbamide nitrate gave much lower results; guanidine nitrate gave the smallest yields. The relatively low results obtained with carbamide nitrate were due to the presence of a considerable amt. of dicyanodiamidine, produced from dicyanodiamide. The results of an expt. in which dicyanodiamidine was added to soil showed that very little NH_3 was formed in 3 days, and that no further increase was found in 10 days.

E. H. WALTERS.

Nitrogen utilization in field and cylinder experiments. JACOB G. LIPMAN, *et al.* New Jersey Agr. Expt. Sta., *Bull.* 268, 5-25(1914).—In expts. with barley and buckwheat to det. the influence of the mechanical compn. of the soil on the availability of NaNO_3 and dried blood, it is shown that when sand was mixed with shale soil (Penn. loam) in varying proportions, the yield of dry matter and the % of N recovered from NaNO_3 were greater with 10 to 70% of sand than they were with the shale soil alone, or with 80, 90 or 100% of sand. The highest yield of dry matter and % of N recovered occurred with 50% of sand. With dried blood the yield of dry matter and the % of N recovered were higher in pure sand, and in all dilns., than with the shale soil alone. With the first crop, barley, the highest av. yield of dry matter and N were from the NaNO_3 cylinders; with the residual crop of buckwheat, from the dried blood cylinders. In expts. on the continuous growing of wheat and rye, with and without legumes, the 1913 results show that the yields of grain were just about twice as great from the legume plots as from the non-legume plots. In order to test the influence of bacteria supplied in manure on the decompn. of green manure, legume and non-legume, plots were grown in corn, followed by crimson clover or rye. In the legume section the plots receiving manure showed little or no increase over the check plot; but in the non-legume section in every case the plots receiving manure showed an increase over the check plot. The increase is not, however, proportional to the amt. of manure applied, showing that the bacteria conveyed in small quantities of cow manure are instrumental in bringing about a more rapid decompn. of the green manure crop, and thus make available more N for the succeeding crop. If the green manure crop consists of legumes, the additional N thus secured tends to obscure the effects of the manure.

R. C. ROARK.

Lime sensitiveness of lupines and their inadaptability to heavy soils. ADOLFO CAUDA. *Staz. sper. agrar. ital.* 47, 727-32(1914).—Yellow lupines grown in pots on an argillo-humiferous soil supported in the first vegetative stage 10% CaCO_3 , but were damaged by 2% CaO, by 5% pptd. phosphate, or by 5% $\text{CaH}_2(\text{PO}_4)_2$. The bad action

of the last was quite eliminated by addition of CaCO_3 , and in part neutralized by KCl . Heavy soils proved capable of supporting a good vegetation of lupines.

L. J. GILLESPIE.

Fertilization of coffee. ANON. *India Rubber J.* 49, 424 (1915).—During the growth of the berry there is a markedly steady increase in the % of potash; from this it is concluded that potash in an available form is needed all the time. The N content of the berry also increases steadily during the growth of the berry. On the other hand, the P_2O_5 content appears to be more const. in quantity, and reaches a max. in October; hence the P_2O_5 is needed in an available form in the beginning of the season.

EDWARD J. KELLEY.

Fertilizers, feeds and fungicides. J. W. INCE. *North Dakota Special Bull.* 3, No. 9, 140-51.—Results of analyses of fertilizers, stock feeds, lead arsenates, Paris greens, etc., are presented in tables. As a result of spraying tests upon 150 small plots of potatoes it is shown: (1) that lead arsenate and zinc arsenite are superior to Paris green in adhesive power. Soap, glue, the carbonates of Fe, Pb and Zn, and apparently flour and slaked CaO , increase the adhesive property of sprays. (2) Sulfur sprays are not suitable for potatoes. (3) No effect upon "tip burn" was noticed. (4) The combination of arsenicals and fungicides seem to be quite effective in prolonging the life of the vines.

R. C. ROARK.

The application of insecticides containing arsenic and lead. G. SONNTAG. *Arb. kais. Gesundh.* 49, 502-20 (1914); *Chem. Zentr.* 1915, I, 450-1 (1915).—Expts. were carried out with various insecticides and fungicides to det. whether or not any of the substances injurious to health are taken up by the fruit and leaves, and how long they are retained after their application. Arsenic was found in weighable quantity in gooseberries, currants, apples and pears 41 to 87 days after its application with Bordeaux mixture. It was also found in 5 out of 8 samples of leaves analyzed 87 days after double spraying. Both As and Pb were found in weighable quantities in grapes and stone fruits 24 days after application of a As-Pb spray; in gooseberries and currants, 39 days after spraying; out of 3 samples of apples and pears investigated, As was found each time and Pb once, 80 days after spraying. Upon treatment with As-S dust, As was found in 7 out of 7 and Cu in 4 out of 7 samples of grapes and stone fruits after 24 days; both As and Cu were found in currants and gooseberries 39 days; and in pears and apples 106 days after treatment. The analytical procedure used is described in detail.

C. F. MILLER.

Potassium fertilizer from dust of cement manufacture (SCHMIDT) 20. The destruction of paraffin by soil organisms (GREIG-SMITH) 11C.

U. S., 1,140,437, May 25. C. A. BLACK and W. H. TEARE. Fertilizer formed of dried granulated loggerhead sponge treated with 10% of H_2SO_4 . Cf. C. A. 9, 349.

U. S., 1,140,962, May 25. G. L. DAVISON. Apparatus for washing phosphate rock.

Fr., 18,325, Oct. 14, 1913, addition to 462,357 (C. A. 8, 2917). CHEM. FABRIK RIENANIA and A. MESSERSCHMITT. In mfg. fertilizers from natural K silicates and phosphorites, the required amt. of lime for the disintegration of the rock is replaced in part by soda, whereby concd. products and low reaction temps. are secured. Leucite (100 kg. of 18% K_2O), phosphorite (100 kg. of 40% $\text{Ca}_3(\text{PO}_4)_2$, and 60% CaCO_3), CaO 15 kg., and Na_2CO_3 10 kg., are fused together. The citrate-sol. product contains 8% K_2O and 10% P_2O_5 . By operating in 2 phases (disintegration by lime) phosphorites low in lime may be employed.

Ger., 281,012, Nov. 28, 1912. H. NAEGBEL. Mfg. enriched phosphate fertilizer. See Fr., 455,926 (C. A. 8, 1636).

16. FERMENTED AND DISTILLED LIQUORS.

ROBERT WAHL.

The forms of combination of sulfur in wine and their determination. W. I. BARAGIOLA AND O. SCHUFFELI. *Wädenswil. Z. Nahr.-Genussw.* 29, 193-221 (1915). —A comprehensive review and discussion of the literature relating to the detn. of the different S compds. in wine are given together with the results of expts. by the authors in trying the various methods that have been proposed. In the detn. of total S, the chief sources of error were found to be absorption of S through the employment of illuminating gas for burners during ignition and the use of insufficient oxidizing agents to prevent loss of S through reduction by incandescent C. In the detn. of organic sulfates such as $\text{KC}_2\text{H}_3\text{SO}_4$, 100 cc. of wine must be boiled for 1 hr. with 25 cc. of concd. HCl in order to hydrolyze the $\text{C}_2\text{H}_3\text{SO}_4$ group. Weaker acid produces incomplete hydrolysis. In the sepn. of free and combined SO_2 , methods which provide for the oxidation of the free SO_2 , volatilization of the combined SO_2 , and subsequent pptn. in the residue of the S representing the free SO_2 by means of BaSO_4 yield high results if H_3PO_4 is employed for acidifying previous to distn. This can be avoided by the use of HCl instead of H_3PO_4 . H_2O_2 was found to be more convenient than I for oxidizing SO_2 in the distillate in the detn. of total and combined SO_2 . The methods and scheme of computation finally adopted are as follows: *Total S*: Render 50 cc. of wine alk. with Na_2CO_3 , add 0.5 cc. of Merck's Perhydrol, evap. to dryness, add a little KNO_3 , and ignite; treat the ash with HCl, take up in water and filter, pptg. as BaSO_4 in the usual way. Use only C_2H_4 burners for heat throughout the entire process. *Total H_2SO_4* : Boil 100 cc. of wine with 25 cc. of concd. HCl for 1 hr. in a const. stream of CO_2 ; cool, neutralize with NH_4OH , acidify with 2 cc. of HCl and ppt. as BaSO_4 in the usual way. *Inorganic H_2SO_4* : Acidify 125 cc. of wine with 100 cc. of dil. HCl (8 cc. conc. HCl and 92 cc. water), and add, without stirring, 25 cc. of 5% BaCl_2 soln. Allow to stand for 2-3 hrs. in an atm. of CO_2 , decant the clear supernatant liquid through a filter (1st filtrate), add 150 cc. of water and 2 cc. conc. HCl to the residue in the pptg. vessel, digest for a while upon a steam bath and then bring the ppt. upon the filter, wash, ignite and weigh. *Organic H_2SO_4* : To 125 cc. of the first filtrate from the last operation add 20 cc. of conc. HCl and boil in a current of CO_2 for 1 hr.; cool, neutralize with NH_4OH , acidify with 2 cc. HCl and ppt. as BaSO_4 in the usual way. *Total SO_2* : Acidify 100 cc. of wine with 2 cc. of conc. HCl and distil in an atm. of CO_2 , collecting the distillate in 0.5-1.0 cc. of the perhydrol dild. with a little water, a second receiver containing I-KI soln. being placed beyond the first. Ppt. the H_2SO_4 contained in the two receivers as BaSO_4 in the usual way. *Combined SO_2* : To 100 cc. of wine contained in a vessel filled with CO_2 add a little starch paste and titrate with 0.02 N I soln. until a slight excess is present; then add as much 0.02 N Na_2AsO_3 as has been used of the 0.02 N I, acidify with 2 cc. conc. HCl, and distil the combined SO_2 as in the last operation. *Free SO_2* : Ppt. the H_2SO_4 remaining in the residues from the distn. of both the total and combined SO_2 , the difference representing free SO_2 . *Neutral S* (representing free S and S in combinations other than the above, the nature of which is unknown): Treat 100 cc. of wine with 25 cc. conc. HCl, boil for 1 hr., ppt. the total H_2SO_4 as BaSO_4 , filter, add HNO_3 to the filtrate, and evap. to dryness, adding a little HNO_3 from time to time. Treat the residue with fuming HNO_3 , remove HNO_3 by evapg. several times with HCl, take up in water, filter, ignite and weigh the ppt. of BaSO_4 representing the so-called neutral S. In computing the balance of S compds, the sum of S as inorganic and organic H_2SO_4 , free and combined SO_2 , and neutral S as found by sep. detns. should balance the detn. of total S. The sum of free and combined SO_2 as found by sep. detns. should balance the detn. of total SO_2 . The sum of inorg. and org. H_2SO_4 should balance the detn. of total H_2SO_4 . No difficulty is experienced with this scheme except

in the case of incompletely fermented wines and fruit juices containing invert sugar when the partition of SO_2 into the free and combined forms is apt to be uncertain.

A. F. SEEGER.

The clouding of wines through iron phosphate compounds. H. WEIL. *Z. Nahr.-Gewissm.* 29, 60-6 (1915).—An exam. of the sediments in 6 different wines showed them to be ferric phosphate compds. W. carried out a series of expts. to det. the cause of this pptn. and found that SO_2 had no effect on its formation; that in the presence of free acids that ionize, such as tartaric and malic, the ppt. would dissolve, but that lactic and succinic acids did not affect it. If a wine clouded with Fe phosphate compds. be exposed to the light the ppt. dissolves but on standing in the dark for a few days it will reappear. He explains this photochem. reaction as due to the reduction of Fe^{++} compds. to Fe^+ under the influence of light, these being reoxidized to Fe^{++} when kept in the dark. If the Fe originally present in the wine was in the Fe^+ state no ppt. of phosphate is formed until the air oxidizes it to the Fe^{++} state. Through bacterial action malic acid is broken down to lactic acid and CO_2 , causing the pptn. of Fe phosphate compds.

H. L. LOURIE.

Glycerol determinations in wine. FRANZ WOHACK. *Z. landw. Versw.* 17, 684-97 (1914); through *Chem. Zentr.* 1914, II, 1209-10.—W. has adapted the procedure of Klemenc (*C. A.* 7, 3292) with satisfactory results, and recommends its general introduction. He uses a current of O_2 instead of air. The P used must be treated with CS_2 , ether, alc. and water. The detn. usually requires about 1 hr.; complete decompn. may require as long as 3 hrs. in the case of sweet wines.

L. J. GILLESPIE.

Examination of the must of 1914 from the Pfalz. O. KRUG AND CHR. SCHÄTZLEIN. *Z. Nahr.-Gewissm.* 29, 57-9 (1915).—Statement of the quality and quantity of the grape crop and description of various parasites and molds fought. Analyses of different kinds of pressings are given.

H. L. LOURIE.

Stability of aqueous solutions of sulfurous acid. P. FÖRSTER. *Arb. kais. Gesundheits.* 49, 468-87 (1914); through *Chem. Zentr.* 1915, I, 447.—P. investigated the stability of SO_2 under different methods of manuf. and the influence of the condition of water used for its absorption and kind of storage vessel, i. e., the presence of greater or smaller quantities of positive catalysts. Further, he sought to det. whether by addition of negative catalysts and by the manner of storage the stability of SO_2 solns. can be increased; especially the conditions most favorable to preserving stability of SO_2 solns., which should be stored for prolonged time (over a year) were investigated. The expts. led to the conclusion that the stability of aq. SO_2 (not too dil.) is in general far greater than usually assumed. The loss of SO_2 is nearly exclusively due to volatilization and not to oxidation. Solns. in fully filled and well closed bottles proved sufficiently stable if kept at moderate temps. (in cellar or ice-box). Neither water accelerated nor alc. retarded oxidation of SO_2 . In employing conductivity water the loss of SO_2 due to oxidation was only half that with hydrant or distilled water.

L. W. HAAS.

Proteolytic enzymes in malt. EMIL WESTERGAARD. *J. Inst. Brewing* 21, 344-55 (1915).—W. attempted to det. to what extent the proteolytic enzymes in malt are active under the conditions prevailing in a brewer's or distiller's mash tun. For this purpose 1.0 to 1.2 kg. malt was used in each expt. The malt was finally ground and further disintegrated by being triturated with an equal wt. of sand in a large mortar, sufficient water being added to form a dough. The liquid was then expressed, employing 300-350 atm. pressure. By this method it was possible to obtain a liquid containing nearly all the sol. constituents of the malt with very little of the products of the various enzymic reactions. The liquid was immediately freed from suspended particles by centrifuging. The results from digestion expts. at different temps. show that

the proteolytic activity increases fairly rapidly to about 50°, then more slowly to 56–8°; it then begins to fall, the decrease becoming very marked above 60°. As the av. temp. in a brewer's mashtun is about 65°, and that in a distiller's mashtun not far from 50°, the proteolytic activity is considerably increased in a brewery by lowering, and in a distillery by raising the mashing temps. In a number of expts. with green malt the presence of peptolytic activity was sought. Exts. were made from the ground malt with CHCl_3 -water and the residues ground with sand and expressed as previously described. Both exts. were allowed to act partly upon Witte peptone and partly upon Roche peptone at different temps. In both cases the optimum temp. lies between 25 and 37°. The results show clearly the existence of two forms of peptolytic activity; one rises sharply from nothing in the ungerminated seed till it reaches its max., whereupon it remains fairly const., while the activity in the second form rises comparatively slowly from slightly above zero in the ungerminated seed till it reaches its max. a few days later than in the first named form, after which it rapidly falls again. One of these peptolytic enzymes is destroyed at 50°, while the activity of the other is greatly decreased at that temp. Neither of them seem to be active under the conditions existing in a brewer's mashtun, but one of them may exercise some influence in a distiller's mashtun. So far as brewing is concerned, it is therefore obvious that the quantity of polypeptides is largely regulated by the mashing temp., while the quantity of amino acids is, under normal circumstances, solely detd. by the malting process. From expts. with yeast it is seen that brewer's yeast possesses extremely little proteolytic activity; the peptolytic activity, however, is extremely pronounced. The presence of unmodified proteins and amino acids and the activity of peptases during the mashing process are accordingly unnecessary for the development of the yeast. On the contrary, the presence of these substances might be a source of considerable danger due to strongly favoring bacterial growth. It seems possible that in this there is at least a partial explanation of many hitherto unexplained facts, such as instability of beers made from slack malt, or from malt which during the drying process had been kept comparatively long at low temp., or finally, beers which have been mashed at temps. most suitable for peptolysis.

L. W. HAAS.

Distribution of phosphoric acid in malt. F. SCHÖNFELD AND H. KRUMHAAR. *Wochschr. Brau.* 32, 101–3, 114–6(1915).—It is shown that boiling with alc. for several hrs. to check the action of the enzymes present in malt leads to entirely erroneous results. Such treatment effects extensive changes in the distribution of phosphorus pentoxide. The influence of enzymic action was found to be very slight if the malt meal was extd. directly by ice-cold distd. water. Comparative detns. with malts which had been extd. in this way for 2 to 6 hrs. gave fairly const. values for the alk. earth, alkali and total sol. P_2O_5 content, so that the authors recommend detg. these without any preliminary treatment of the malt.

L. W. HAAS.

Notes on caramel. W. A. HANDCOCK. *Brewers' J.* 51, 167–9(1915).—Certain caramels which appear perfectly satisfactory under the usual tests and with fairly strong worts, will form an amorphous deposit when mixed with weaker worts. Analysis of a sample of such deposit showed 5.1% N, suggesting a combination of caramel and protein matter. Expts. with invert sugars also showed that many specimens will produce a bad "haze" when mixed with second wort. To avoid trouble caramels and sugars should be divided between the various coppers. Samples of caramel which give a ppt. with waters contg. $\text{Ca}(\text{HCO}_3)_2$ are too unstable to be satisfactory for brewing purposes.

L. W. HAAS.

Malt and beer. F. P. SIEBEL. Master Brewers' Assn., U. S. A. *Western Brewer* 44, 80–5(1915).—A lecture.

L. W. HAAS.

Stability of some yeast enzymes. A. BAU. *Wochschr. Brau.* 32, 141-3, 151-4, 159-62(1915).—To the most resistant enzymes in yeast belong invertase, maltase and melibiase (the latter with bottom fermenting yeasts only), further emulsin, amygdalase, carboxylase (if a salt of $\text{CH}_3\text{COCO}_2\text{H}$ is used as reagent), lipase, and endotryptase. Carboxylase is sensible to strongly acid reaction, for only yeasts of high fermentative capacity cleave $\text{CH}_3\text{COCO}_2\text{H}$. One of the most sensitive enzymes apparently is trehalase; oxidase is also very unstable. The order in which the yeast enzymes are to be enumerated according to their stability cannot be decided at present. As to the quantity of these enzymes, it is rather certain that in fresh yeasts zymase, invertase, maltase, melibiase, carboxylase and catalase are present plentifully, then follow endotryptase, oxidase and reductase, while trehalase, emulsin, amygdalase, lipase, and yeast rennet are only present in minute quantities. Only yeasts from German practice were examd.

L. W. HAAS.

Contribution to the chemistry of malt, with special reference to the lipoids. H. LÖNN. Kgl. Technische Hochschule, München. *Dissertation* 1914; *Z. ges. Brau.* 38, 97-101, 106-11, 116-20, 123-5(1915).—The extensive exptl. work which cannot be briefly abstracted may be summarized as follows: If malt is extd. with 80% alc., there are dissolved (1) the protein bynin, (2) considerable quantities of invert sugar and sucrose, (3) roast and aroma substances, (4) fats distinguished by a high content of free fatty acids, (5) a lipid, which according to its P- and N-content belongs to the group of diaminophosphatides (N:P = 2:0.94). It is especially distinguished by a high sucrose content (1.02%). This phosphatide proved to be a secondary product, as is shown by comparison with the lipid obtained by extg. the same malt with C_2H_5 . No clear insight as to the changes of the phosphatides during malting could be gained. Apparently they have little practical significance; they possibly take part in the formation of aroma. In this connection the relations and behavior of phosphatides to carbohydrates were studied. It was found that phosphatides dissolved in organic solvents are able to take up considerable quantities of sucrose provided the latter is insol. in the solvent (that used was C_2H_5). This taking up of sucrose follows an absorption curve and is conditioned by the colloidal nature of phosphatide solns. with organic solvents. An exam. of fat of malt and barley proved that the fatty acids consist of stearic, palmitic, oleic, linoleic and linolenic acids; in the unsaponifiable matter sitosterin, para-sitosterin and a hydrocarbon, probably $\text{C}_{18}\text{H}_{38}$ (octadecane), were identified.

L. W. HAAS.

Germ-destroying power of ultraviolet rays applied to sterilization of water and disinfection of trade packages in breweries. E. MOUFANG. *Kirn a. d. Nahe. Allgem. Z. Bierbrau. Malsfab.* 43, 151-5(1915).—From his expts. M. concludes that by the application of ultraviolet rays for sterilizing barrels (by means of a specially constructed quartz lamp which could be moved through the bung hole) the biological condition of pitched barrels may be greatly improved, but that perfect sterilization in a biological sense is not obtained by the present appliances. L. W. HAAS.

Investigations on hops. VI. Amount of lupulin in plants raised by crossing. J. SCHMIDT. *Compt. rend. lab. Carlsberg* 11, 165-83(1915); cf. *C. A.* 9, 688, 1657. —The relation between the lupulin percentage of the mother plant and that of the offspring varies greatly according to the lupulin content of the mother plant. VII. **Employment of artificial light in titration of the hop resins.** SVEND HÖRG LARSEN. *Ibid* 184-7. —To carry out titrations in artificial light L. employs a titration table which consists of a wooden box (13 X 18 X 14 cm.), the upper side of which has been removed and replaced by a removable plate of ground glass, which is illuminated from below by an elec. lamp. For the purpose a metal filament lamp of 25 c. p. was found most practical. The box is arranged to open sideways to facilitate the removal of the lamp.

Comparative detns. showed that this method of titration is by no means inferior in accuracy to titrations in daylight. VIII. Flowering time of plants raised by crossing. J. SCHMIDT. *Ibid* 188-98. L. W. HAAS.

Rewards for methods of utilizing alcohol. *Chem. Eng.* 21, 220(1915).—The Russian government offers prizes totaling \$136,475. E. J. C.

Use of raw sugar in distilleries. K. WINDISCH. Inst. Hohenheim. *Z. Spiritusind.* 38, 121-2, 129-31(1915).—W. gives an account of experiences in working up sugar alone and with admixts. of different proportions of various other raw materials. The raw sugar is to be dissolved in hot water (minimum temp. 75°), the resulting soln. being practically sterile. It is necessary to acidify pure sugar mashes. Lactic acid did not prove superior to H_2SO_4 for this purpose; 1.5 cc. concd. H_2SO_4 (As-free) per 1 kg. sugar is recommended. If sugar is mashed together with other raw materials acidification is not absolutely necessary; not even previous neutralization of the sugar soln. is necessary, if a larger quantity of the other material is used. No advantage is attained by inverting the sucrose by acid previous to pitching the mash with yeast. To ensure most favorable conditions of fermentation a mash is required of a concn. below 17% with abundant nutrition for yeast, and a warm fermentation. Fermentation is started at such a temp. that the max. (30°) is reached as soon as possible and at which the fermentation should be completed as far as possible. If the temp. drops quickly all chances of a satisfactory final fermentation are lost. The most suitable proportions of raw sugar and other raw materials (potatoes, sugar beets and corn) for compound mashes are recorded and many directions are given with reference to a successful fermentation and distn. and to the culture of yeast adapted to such changed conditions. L. W. HAAS.

Results of working raw sugar in distilleries. W. BÜCHLER. Weihenstephan-Munich. *Z. Spiritusind.* 38, 129(1915).—B. reports on expts. carried out with sugar alone and with admixts. of potato mashes in various proportions. Cf. preceding abstr. L. W. HAAS.

Complete fermentation of rather concentrated raw sugar solutions by yeast which is nourished by mineral salts exclusively. C. NAGEL. *Z. Spiritusind.* 38, 122-3 (1915).—Yeast is not able to ferment solns. of raw sugar completely if no yeast nutrient is added. N. obtained a satisfactory yield of alc. (58.44 l. abs. alc. per 100 kg. raw sugar, first quality) with 16% sugar solns., if there was added 0.9 kg. $(NH_4)_2SO_4$, 0.3 kg. $NH_4H_2PO_4$, 0.6 kg. K_2SO_4 , 0.4 kg. cryst. $MgSO_4$, and 0.3 kg. $CaSO_4$ per 1000 l. mash. The first 4 salts are dissolved in about 20 l. lukewarm water; $CaSO_4$ is separately suspended in much water (about 10 l.). Mash and salts are well mixed. The yeast which was added in the proportion of 1.5 kg. per 1000 l. soln. developed and multiplied plentifully (giving a crop yield of 7.8% of wt. of sugar employed). L. W. HAAS.

The working up of raw sugar into spirits and brewer's yeast. OTTO REINKE. Braunschweig. *Chem. Ztg.* 39, 149(1915).—A 92% sugar in 20% soln. after preliminary treatment with acid and the addition of malt, etc., or of 20 kg. brewer's yeast per cu. m. soln., of which 18 kg. has been heated for 2 hrs. at 68°, will yield about 58 l. alc. per 100 kg. sugar. J. H. MOORE.

Working up sugar beets into alcohol. F. EHRLICH. *Z. Ver. Zuckerind.* 65, 70-5(1915).—At present it may be commercially feasible (in Germany) to make alc. from sugar beets. The beets are heated 1-1.5 hrs. with steam at 2 atm.; this softens them so that the mass can be blown through perforations to give a product that can be directly fermented. A top yeast is used; considerable foam is formed, which is the chief difficulty. The alc. so formed is not inferior in quality to that from potatoes. It contains little fusel oil. From 100 kg. beets of 16% sugar, 9 to 10 l. of alc. may be prepd. The slop is as readily eaten by cattle as potato or grain slop. W. L. BADGER.

Comparative experiments on fermentability and yield of alcohol of refined sugar and raw sugar. G. FOTH. *Z. Spiritusind.* 38, 138-9(1915).—The fermentation of mashies from refined sugar was (even with large quantities of pitching yeast in association with larger amts. of yeast nutriment) more sluggish than that of those from raw sugar. With small quantities of pitching yeast (5 g. per l. sugar soln.) and without yeast nutriment, even after 5 days no complete fermentation was attained with both sugars; but while in this time only 41% of the refined sugar was fermented, 98% of the raw sugar was transformed. Employing larger quantities of yeast (10 g. per l.) without yeast nutriment, raw sugar fermented completely in 4 days, refined sugar to only 77.5% in 5 days. Complete fermentation of refined sugar is only attained if yeast nutriment is added, but the time required is 5 days (for raw sugar under the same conditions only 2 days).
L. W. HAAS.

Influence of cellar treatment on acid retrogression in wine. C. SCHÄTZLEIN. (Neustadt a. d. Haardt) AND O. KRUG (Speyer). *Arb. kais. Gesund.* 49, 521-9(1914).—The influence of time of racking, "stirring up" of settled yeast, and sugaring were investigated. The expts. confirmed the authors' opinion that it is possible by observing the different cellar technical measures favoring the biological acid degradation, to improve even very poor vintages to marketable products without violating the legal regulations.
L. W. HAAS.

Molasses as a source of alcohol for the production of power. T. H. P. HERRIOT. *J. Soc. Chem. Ind.* 34, 336-40(1915).—The suitability of alc. for generating power in the internal-combustion engine has been sufficiently established by exact tests and practical experience and there is little doubt that alc. could be substituted for petrol and coal in most sugar-producing countries. The possible production of alc. from cane and beet molasses is about 200,000,000 gal. per year. If the K and N in molasses are recovered after fermentation and production of alc., their fertilizing value covers all expenses of distn., leaving alc. as a by-product free of cost. According to different authorities the cost of manufacturing 95% alc. without recovering K and N, and excluding the cost of molasses itself, is stated as follows: 8 c. per gal. in U. S. A., 5 c. in Demerara (exclusive of fuel), 10.2 c. in Hawaii and 10 c. in Cuba. L. W. HAAS.

Experiments on diastase (BOKORNY) 11A.

DILBECK, M., et al.: *Illustriertes Brenner-Lexikon*. Berlin: P. Parey. 790 pp. 28 M.

U. S., 1,139,507, May 18. P. G. HESTRÖM. Apparatus for fermenting sulfite liquors to obtain alcohol. Cf. C. A. 8, 2251, 2803.

U. S., 1,140,882, May 25. R. DE FAZ. Alcoholic fermentation of saccharin solutions is carried out under the influence of ultraviolet light, using yeast cultures which have been acclimated to the ultraviolet light. This treatment facilitates the alc. fermentation and retards some undesirable secondary fermentations.

Brit., 849, Jan. 12, 1914. Addition to 9,170, 1913 (C. A. 8, 3343). E. W. KUHN. In brewing the mashing process described in the principal patent is modified as follows: The mash, prep'd. in the cold and after removal of some of the ext., is heated to 80° to coagulate the albumins, but to prevent the coagulation taking place around the starch granules. The mash is boiled and cooled to 70-80° so as to destroy the dextrinase but not the amylase.

Brit., 1,335, Jan. 17, 1914. R. DE FAZI. Alcoholic fermentation is carried out in the presence of ultraviolet light, either sunlight or rays from uvioi lamps, or by yeast which has been cultivated under the action of ultraviolet light. The lamps may be im-

mersed in the liquid, or the fermenting vats may be made of uvial glass. The liquid may be decolorized before treatment. Cellulose in the form of torn filter-paper or the like is added to the fermenting liquid and forms a layer on the top.

17. PHARMACEUTICAL CHEMISTRY.

M. I. WILBERT.

Determination of the hydrastine content of rootstocks and extracts of *hydrastis canadensis* L., according to the methods of the different pharmacopeias and a new method for the quantitative determination of berberine in extracts. L. DAVID. *Pharm. Post* 48, 1-4, 21-3(1915).—(1) At 15°, hydrastine is sol. in 227 parts Et₂O, 22727 parts petr. ether (b. 40-60°), 11628 parts petr. ether (b. 50-85°), 18 parts C₆H₆ and very sol. in CHCl₃. (2) Comparison of the methods for the detn. of hydrastine in exts. in the different pharmacopeias shows that the German is the best, the Belgian fairly good, the Hungarian not so good, and that the Dutch, French, Swiss, and the U. S. (IX) are not usable. (3) The U. S. equals the German in accuracy if the alc. is evapd. off before shaking out with Et₂O. (4) In the detn. of hydrastine the following points are important: (a) Alc. should be evapd. from the ext. before shaking out with Et₂O; otherwise too much extractive is taken up. (b) Berberine should be pptd. with HCl or KI. If HCl is used the ext. should be shaken with talc and filtered to remove the berberine-HCl and the coloring matter; too much HCl should not be used since it will cause the talc to take out the hydrastine also. (c) The ethereal soln. should be dild. with petr. ether and shaken with powdered tragacanth to remove the H₂O. (5) The methods in the German and Belgian pharms. for the detn. of hydrastine in rootstocks are both accurate. (6) Berberine detn.: ppt. berberine and hydrastine with potassium bismuth iodide reagent, dissolve the hydrastine ppt. with EtOAc, liberate the berberine in the residue with 10% NaOH, shake out with Et₂O-CHCl₃ mixt., evap. and weigh. C. O. EWING.

Blood charcoal. F. WISCHO. *Pharm. Post* 48, 73-4(1915).—The more voluminous a blood charcoal is the greater is its power of adsorption for coloring matter, and also for toxins, bacteria, etc. Therefore only very light finely powdered blood charcoal should be used for medicinal purposes. Blood charcoal, after being shaken with blood serum, mucilage, pepsin-HCl or carbohydrates, still retained its power of decolorizing a methylene blue soln. The activity of the charcoal seems therefore not to be affected when administered internally. Since it is sometimes used internally it should be tested as follows for cyanogenetic compds. which may be formed in its prepn.: ash some of the charcoal with powdered Fe, ext. the ash with H₂O, filter, to filtrate add FeCl₃, FeSO₄ and HCl; no blue color should appear. C. O. EWING.

Determination of alcohol in pharmaceutical preparations. A. REUSS. Dresden. *Pharm. Zentralhalle* 56, 61-8(1915).—Richter (cf. C. A. 8, 3218) shakes out ethereal oils with NaCl soln. and petr. ether before distg. R. modifies Richter's method by first adding an alkali to prevent volatile acids from distg. over. The whole alc.-H₂O soln. is used for the distn. after the ethereal oils have been removed instead of an aliquot portion as recommended by Richter. C. O. EWING.

Microscopic studies of the reaction of cacao seeds and myristica seeds (nutmegs) to several unknown (little used) reagents. HANS FREUND. *Pharm. Zentralhalle* 56, 83-5, 91-3(1915).—Descriptions are given of the microscopical appearance of the seed before and after treatment with clove oil and solns. of I-KI, Cl-ZnI₂, picric acid, nigrosin and carbolfuchsin. C. O. EWING.

Russian barley ergot. A. SCHNEIDER. *Pharm. Zentralhalle* 56, 101(1915).—Russian ergot from barley has the normal color of ergot; the size is about that of the

barley grain; the color is lighter than that of rye ergot, often being as light as the barley itself. It may therefore be easily detected in official ergot. C. O. EWING.

Hesperidin and the crystals in *Hyssopus officinalis*. O. TUNMANN. *Pharm. Zentralhalle* 56, 135-41 (1915).—Although hesperidin has been reported to be present in a number of plant families, up to the present its presence has been proven with certainty both microscopically and macroscopically only in the Rutaceae and Umbelliferae. T. has positively demonstrated its presence in the Labiatae also, having obtained pure ash-free hesperidin (m. 252°) from *Hyssopus officinalis*. The hesperidin was colorless (white), did not reduce Fehling soln. and hydrolyzed only upon boiling 6 hrs. with dil. H_2SO_4 . It was easily sol. in pyridine, slowly sol. by heating in AcOH and $\text{C}_6\text{H}_5\text{NH}_2$, insol. in CHCl_3 , Et_2O and Et_2O -alc., easily sol. with a yellow color in dil. alkalis, insol. in dil. mineral acids. T. holds that hesperidin is a by-product of the plant metabolism. Expts. are in progress to det. why hesperidin crystals were still visible with a microscope in *Citrus* and *Hyssopus* after 40 years, while in *Verbascum* and *Tilia* they had disappeared, and to det. whether the method of drying alone influences the decompn. of the very stable hesperidin or whether it is due to the action of other substances. C. O. EWING.

Use of carbon tetrachloride in the extraction and estimation of the active principles of drugs and medicinal plants. GIULIO GORI. *Siena. Boll. chim. farm.* 52, 891-5 (1913); cf. *C. A.* 8, 1440.—In pursuance of his previous suggestion that CCl_4 be substituted for various solvents which are usually employed (especially CHCl_3) in toxicology, G. has detd. the solubility at 20° of a number of alkaloids in CCl_4 . The number of g. caffeine, theobromine, quinine, strychnine, brucine, cocaine, atropine, morphine, codeine, papaverine, narcotine and narceine which were sufficient to sat. 100 g. of CCl_4 were, resp., 0.258, nil, 0.544, 0.220, 2.030, 31.942, 1.760, 0.025, 2.940, 0.518, 1.040 and 0.002. The method of extn. by CCl_4 was applied to several substances containing caffeine. Fifteen g. of dry, powdered cola beans were finely pulverized and intimately mixed with 10 g. MgO ; this mixt. was made into a paste with approx. 40 cc. H_2O , dried slowly at $25\text{--}30^{\circ}$ and again finely pulverized. This dry powder was then extd. for 10-12 hrs. with 150 cc. CCl_4 in a Soxhlet extn. app. After the extn. was finished, the solvent was evapd. on a H_2O bath. The slightly rose colored residue was extd. 3 times with boiling H_2O , the aq. soln. was filtered and the filter was washed with boiling H_2O ; the filtrate was evapd. on a H_2O bath and the white, cryst. residue was dried at 100° to const. wt. Fifteen g. of the powdered cola beans (moisture content = 11.70% when dried to const. wt. at 100°) were found by use of CCl_4 as a solvent to contain 0.222-0.244 g. anhydrous caffeine as compared with 0.220-0.242 g. when CHCl_3 was employed as a solvent. The residue from the CHCl_3 ext. was less pure than that left from the CCl_4 soln. and it was necessary to purify the caffeine by dissolving the residue in dil. HCl , filtering, rendering the filtrate alk. with NH_4OH and extg. with CCl_4 (in order to leave behind the theobromine extd. by CHCl_3). From 15 g. powdered green coffee beans there were obtained 0.273 g. and 0.244 g. anhydrous caffeine by CCl_4 and CHCl_3 extn. resp.; the method of extn. by means of CCl_4 was also applied to the detn. of caffeine in tea leaves. In both the CCl_4 and CHCl_3 extns. it was necessary to purify the residue left after evapg. the solvent by extg. it 3 times with boiling H_2O ; the CHCl_3 soln. was much more intensely colored than the CCl_4 soln. Inasmuch as theobromine is practically insol. in CCl_4 (almost wholly so at 18° and to the extent of 1 in 4703 at the b. p.), it is possible to effect a sepn. of caffeine and theobromine by means of this solvent. When 0.25 g. each of caffeine and theobromine were intimately mixed with sand, 0.240 g. and 0.241 g., resp., were recovered by extg. first with CCl_4 and next with CHCl_3 . Twenty g. fluid ext. of cola beans were concd. on a H_2O bath to about $\frac{1}{2}$ the original vol. and made into a paste with 15 g. MgO , this

paste being extd. successively with CCl_4 and CHCl_3 ; 0.059 g. theobromine and 0.314 g. hydrated caffeine were obtained. The applicability of CCl_4 as an extractive agent for other alkaloids will be investigated.

H. S. PAINE.

Color reaction of gelatin. R. LIESEGANG. *Pharm. Praxis; Boll. chim. farm.* 53, 736(1914).—Solns. of tricalcium phosphate and CuCl_2 , when mixed with gelatin, give a violet coloration without turbidity instead of a green ppt.

H. S. PAINE.

Argaldine. ANON. *Dermat. Woch.; Boll. chim. farm.* 54, 70(1915).—This prep. consists of a combination of Ag albuminate with hexamethylenetetramine; formaldehyde is produced by contact with animal tissues. Injections of a 1% soln. of the prep. are proposed in gonorrhea and, in view of the slight irritation produced, a soln. of even 10% strength may be employed.

H. S. PAINE.

Gray oil. P. LAMI. *Formulario farm. osped. maggiore Verona; Boll. chim. farm.* 54, 136(1915).—In order to prep. this oil take equal parts Amer. vaseline and metallic Hg, mix intimately and add sufficient oil of vaseline to yield a mass containing 30% Hg; then add several drops of "gomenol" and $\frac{1}{4}$ the vol. of Et_2O containing 20% camphor, mix and preserve in closed vials. One cc. contains 0.20 g. Hg.

H. S. P.

Oleate of mercury and cholesterol. P. LAMI. *Formulario farm. osped. maggiore Verona; Boll. chim. farm.* 54, 170(1915).—The following prep. has been proposed by Sero on under the name of "mercurio coleolo." It is a simple oil soln. of Hg oleate and cholesterol and is prepd. by taking 7.5 g. Hg oleate (Merck or Kahlbaum) containing 40% Hg, 3 g. cholesterol (or 12 g. of the 25% oil soln. of cholesterol Merck) and sufficient oil of bitter almonds to make 100 cc., then heating and mixing on a H_2O bath until a perfect soln. is obtained. The prep. is preserved in 1 cc. vials; each cc. contains 0.03 g. Hg and 0.03 g. cholesterol. A milder prep. may be obtained by using only 3 g. Hg oleate to 100 cc.

H. S. PAINE.

Content of cornutine in *Secale cornutum* and its extract. H. WASTENSON. *Svensk Farm. Tid.* 36, 602-5(1914).—Applying the Pharm. Helvet. tests for the alkaloid in *Secale cornutum* to the powders of the Swedish plants, W. obtained but meager reactions. From quant. analysis he concludes that the alkaloid content varies with seasonal conditions and locality of growth. Swedish plants gathered in 1911 gave a max. of 0.016; those of 1900, 0.14%. The Spanish and German products ranged from 0.02 to 0.15% alkaloid, whereas the samples from Russia exceeded 0.4%.

A. R. ROSE.

Notes on the British pharmacopeia 1914. C. W. KEMSEY-BOURNE. *Pharm. J.* 94, 521-2(1915).—Under *Acidum acetylsalicylicum* the Brit. Pharm. is silent as to odor. Some com. samples have a strong odor of AcOH , but pure aspirin is odorless. Under *Acidum picricum*, no mention of its explosive property is made. *Ammonii carbonas* cannot be brought up to the official standard. Three com. samples were 81.2-83.9% of the official strength. Infusa do not keep in summer, and should be replaced by weak tinctures. The directions of the Brit. Pharm. for *liquor calcis* and for *syrupus ferri iodidi* lead to understrength preps. Com. *unguentum gallae cum opio* sometimes becomes moldy, perhaps because when it is prepd. in large amts., some makers rub the opium first with a little H_2O so as to get a smooth ointment. When *pulvis gentianae* is overfermented, it gives a low H_2O ext. number. ZnO should not be kept in paper bags. It absorbs H_2O and CO_2 , becoming lumpy and gritty.

S. WALDBOTT.

Pharmacopeia revision. WILLIAM KIRKBY. *Pharm. J.* 94, 548-50(1915).—An historical account of the development of English pharmacopeias.

S. W.

Quinidol, iodized powdered cinchona bark. A. MOUCHET and MALBEC. *Paris médical; Rép. de pharm.* 27, 83(1915); *Pharm. J.* 94, 625.—Quinidol is a mixt. of I

with powdered red cinchona bark, used as an antiseptic dusting powder for wounds. 5 or 10 g. I are dissolved in 100 or 200 g. Et_2O , this soln. is added to 100 g. of the finely powdered bark, and the mixt. is triturated until the Et_2O is evapd. For gangrenous wounds, the 10% mixt. is recommended. It is very effective, and cheaper than CHI_3 .

S. W.

U. S., 1,139,774, May 18. W. J. KNOX. Antiseptic surgical dressing formed of globules of conc. H_2O_2 embedded in paraffin or other inert hydrocarbon of the CH_4 series.

U. S., 1,140,716, May 25. E. RIETZ. 1,2,3-Diacetoxybenzoic acid, a white powder, m. $148-150^\circ$, sol. in organic solvents and insol. in H_2O , is made by heating $(\text{HO})_2\text{C}_6\text{H}_3\text{CO}_2\text{H}$ 300 with Ac_2O 600 parts at $100-110^\circ$ for 2 hrs. and crystg. from alc.

Brit., 663, Jan. 9, 1914. F. E. MATTHEWS and E. H. STRANGE. Pharmaceutical preparations for external application contain salicylic esters of isopropyl or butyl alcs. or of polyhydric alcs., together with solvents, oils, fats, waxes, or anointing prepn.s., or with solid or semi-solid materials to form a paste. Antiseptics such as cresol may also be added. The esters mentioned are those of isopropyl, and normal butyl alcs., and of the glycols and glycerols. The additional substances mentioned are petroleum jelly, paraffin wax, wool fat or lanolin, carron oil (olive or linseed oil with lime water), linseed oil, isoamyl salicylate, ZnO , MgCO_3 , and pptd. chalk.

Brit., 1,247, Jan. 16, 1914. FARBW. v. M. L. & B. Alkali salts of the copper and silver compounds of 3,3'-diamino-4,4'-dihydroxyarsenobenzene described in 24,420, 1912 (C. A. 8, 1488), are prepd. by treating these compds. with alkali or by prepg. them in the presence of alkali, and sepg. the product by evapn. or pptn. The products are useful in therapeutics.

Ger., 277,111, Nov. 28, 1912. CONSORTIUM FÜR ELEKTROCHEM. IND. Mfg. ethyl acetate from acetaldehyde. See Fr., 465,965 (C. A. 8, 3489).

Ger., 280,091, July 30, 1911. BAUER & Co. Mfg. sugar-formaldehyde compounds. Cf. U. S., 1,062,501 (C. A. 7, 2452).

Ger., 280,695, Mar. 1, 1914. Addition to 256,998 (C. A. 7, 2454). J. D. RIEDEL, ART.-GES. In mfg. hydrolecithin, lecithin is treated with H_2 or gas mixts. containing H_2 in aq. colloidal soln., or in aq. suspension, in the presence of finely divided or colloidal Pt metal. Cf. C. A. 9, 1097.

Ger., 280,740, Aug. 9, 1913. ART.-GES. FÜR ANILIN-FABRIKATION. Mfg. methyl- and ethyl halides by bringing MeOH or EtOH , in an open vessel at water-bath temp.s., into reaction with aq. hydrohalogen acids and the corresponding Ca halides.

Ger., 280,970, Aug. 23, 1913. Addition to 268,830 (C. A. 8, 1855). VEREINIGTE CHEMIFABRIKEN ZIMMER & Co. Mfg. quinolyl ketones (the higher alkyl homologs of quinolyl methyl ketone and their nucleus substitution products) by treating the esters of quinolyl acetic acids or their nucleus substitution products with alkylating agents and subjecting the resulting β -ketonic acid ester alkylized in the side chain, by the usual methods, to the ketone decomp.

Ger., 280,971, Aug. 3, 1913. CHEM. FABRIK AUF ACTIN (v. B. SCHERING). Mfg. pyrrolidine derivatives by condensing acylated pyrroacemic acid ester in non-alc. soln. with BzH and *o*-substituted PhNH_2 , or with substituted PhNH_2 , or with BzNH_2 and heterocyclic compds., or with heterocyclic aldehydes and amides.

Ger., 281,007, June 5, 1913. R. WOLFFENSTEIN. Mfg. esters of 8-hydroxyquinoline by allowing the chloride of salicylic acid or *o*-acetoxybenzoic acid to act upon 8-hydroxyquinoline.

Ger., 281,045, Aug. 5, 1913. Addition to 263,459 (C. A. 7, 3843). C. v. GISE-WALD. Mfg. an organic peroxide compound by allowing urea and HCHO to react, in the presence of an acid, upon H_2O_2 .

Ger., 281,047, Aug. 7, 1913. AMÉ PICTET. Mfg. condensation products of tetrahydropapaverine and its derivs. by acting on tetrahydropapaverine or its nucleus substitution products with aliphatic or aromatic aldehydes, preferably in the form of their acetates, in the presence of a mineral acid.

Ger., 281,049, July 24, 1913. BAYER & Co. Mfg. arsenic compounds of the aromatic series by treating at high temps. diarylamines of the benzene or naphthalene series with the halogen compds. of As.

Ger., 281,051, Dec. 16, 1913. BAYER & Co. Mfg. methylglycocycamidine (creatinine). *N*-Methylglycocycamine (methylguanidoacetic acid) is treated with organic acids, with heating.

Ger., 281,054, Jan. 27, 1914. H. TERRISSE. Separating *m*- and *p*-cresol. See Fr., 463,221 (C. A. 8, 2781).

Ger., 281,055, Oct. 7, 1913. H. BART. Mfg. complex aryldiazo compounds of boron and fluorine by acting on aromatic diazo compds. with complex acids of B and F or their salts.

Ger., 281,083, May 21, 1911. Addition to 259,826 (C. A. 7, 3197). CHEM. FABRIK G. RICHTER. Mfg. a stable product from hydrogen peroxide and urea. Cf. U. S., 1,045,451 (C. A. 7, 682).

Ger., 281,097, May 30, 1913. Addition to 252,643 (C. A. 7, 538). CHEM. FABRIK AUF ACTIEN (v. E. SCHERING). Mfg. derivatives of 2-piperonylquinoline-4-carboxylic acid and their homologs by the usual methods for converting these compounds into their arylides. Cf. C. A. 9, 1095.

Ger., 281,102, Aug. 1, 1913. Addition to 204,772 (C. A. 8, 417). BAYER & Co. Mfg. anthraquinone mercaptans by acting with anthraquinonesulfonyl chlorides, with heating, on alkali sulfides or polysulfides.

Ger., 281,175, July 10, 1913. CHEM. WERKE ICHENDORF. Mfg. monohydric phenols and their monochloro substitution products by heating mono- and dichloro substitution products of aromatic hydrocarbons with alkali hydroxides and MeOH, with or without the addition of other solvent, for a long period, at high temps.

Ger., 281,176, Oct. 5, 1913. J. OBERMILLER. Mfg. *o*-aminobenzenesulfonic acid by nitrating a sulfonating mixt. of benzene containing the least possible amt. of H_2SO_4 at an elevated temp., and crystallizing the resulting mixt. of the 3-nitrobenzenesulfonic acids, in the form of the Mg salts, either before or after reduction by the usual method. In both cases, the salt of the *o*-compd. remains longest in the mother liquor, as the most sol.

Ger., 281,212, Aug. 7, 1913. C. F. BOEHRINGER & SÖHNE. Mfg. aromatic aldehydes by acting on aromatic hydrocarbons or their substitution products, in the presence of $AlCl_3$, with CO under pressure.

Ger., 281,213, Feb. 2, 1912. Addition to 270,859 (C. A. 8, 2223). H. DECKER. Mfg. tetrahydroisoquinoline derivatives (*N*-alkyl homologs of hydrohydrastinine or derivs. of hydrohydrastinine substituted in position 1 by alkyl or aryl, and other *N*-alkyl derivs. of norhydrohydrastinine) by treating 6,7-methylenedioxy-1,2,3,4-tetrahydroisoquinoline (norhydrohydrastinine) with alkylizing agents (other than methylating), or by alkylizing derivs. of these bases substituted by alkyl or aryl in position 1.

Ger., 281,214, Oct. 25, 1913. BAYER & Co. Mfg. pyrocatechol-*o*-carboxylic acid and its nucleus homologs by treating the derivs. of the specified acids, substituted at

the O atom by alkyl or aralkyl, with saponifying agents, such as strong mineral acids or AlCl_3 .

18. ACIDS, ALKALIES, SALTS AND SUNDRIES.

T. LYNTON BRIGGS.

Progress in the field of inorganic chemical industries in 1914. H. VON KÉLER. *Z. angew. Chem.* 28, I, 177-82, 201-8, 214-24(1915). E. H.

Industrial research. L. A. HAWKINS. *Gen. Elec. Rev.* 18, 416-27(1915).—Includes a detailed, illustrated account of the new research laboratories (director, W. R. Whitney) at Schenectady. C. G. F.

The new technical chemistry laboratories of the Imperial College of Science, South Kensington. ANON. *Engineering* 99, 551(1915). E. J. C.

Mechanical refrigeration in manufactures. C. E. LUCKE. *J. Ind. Eng. Chem.* 7, 462-3(1915).—An editorial. ISADOR MILLER.

The technics of low temperatures. I. X. *Rev. gén. chim.* 17, 79(1914). II. The industrial development. *Ibid* 18, 56-73(1915).—A detailed description and discussion with numerous illustrations of industrial processes for liquefaction of air and prepn. of O, N, and H; uses, etc. The probable use in the future of the noble gases, A, Xe, Kr, Ne, and He, is pointed out. F. W. SMITHER.

The Kayser-Cowles process for alumina, hydrochloric acid, and other products from clay and salt. K. PIETRUSKY. *Chem. Ind.* 38, 58-61(1915); see *C. A.* 7, 869, 1673, 2455. F. W. SMITHER.

Industrial resources and opportunities of the south. A. D. LITTLE. *J. Ind. Eng. Chem.* 7, 373-9(1915).—An address. ISADOR MILLER.

The French chemical industry and the war. ANON. *Chem. Ztg.* 39, 186-6(1915). J. H. MOORE.

Notes on the Swedish chemical industries. H. GROSSMANN. *Chem. Ind.* 38, 35-8(1915).—A statistical review. F. W. SMITHER.

The role of the industrial chemist. Organic plastic materials. Cellulose derivatives. Fats. W. K. MAIN. *Rev. gén. chim.* 18, 75-8(1915).—A general review and discussion. F. W. SMITHER.

Crude calcium cyanamide as a raw material for chemical industries. O. B. CARLSON. *Z. angew. Chem.* 27, III, 724-5(1914).—Crude Ca cyanamide has come into use as raw material for the industrial production of such compds. as NH_3 , cyanides, guanidine, urea, thiourea, dicyanodiamide and veronal. Some details are given regarding the method of treatment to obtain these products. Ca cyanamide has such great reactivity that it is difficult to obtain high yields and pure products on account of the ease with which secondary reactions take place. E. J. C.

Algae ashes. C. KLINGBIEL. Biebrich. *Chem. Ztg.* 39, 121(1915).—General remarks, with analyses of 2 samples of French ashes. J. H. MOORE.

Furnace for roasting pyrites (BARTH) I.

REIMENOWSKY, E.: Erdmann-König's Grundriss der allgemeinen Warenkunde unter Berücksichtigung der Technologie und Mikroskopie. Aufl. XV. Leipzig: J. A. Barth. 954ss. 23 M.

U. S., 1,139,741, May 18. J. G. VAN and J. D. CARTER. Dry efflorescent powder

for use as an egg preservative, ingredient of "cold water paint," etc., formed by adding about 10% of Na_2SO_4 to a 36% aq. soln. of Na silicate, and evaporating the mixt. to dryness.

U. S., 1,140,351, May 25. F. T. BREER. Distilling nitric acid in a still heated by hot oil which is circulated through a jacket around the still, the temp. of the still being regulated by varying both the quantity and the temp. of the oil brought into contact with the still.

U. S., 1,140,373, May 25. T. GRISWOLD, JR. and E. O. BARSTOW. Apparatus for generating oxygen from bleaching powder, copper sulfate and water.

U. S., 1,140,760, May 25. J. C. MORRIS. Luting composition for stopping leaks in kitchen utensils, etc.; formed of S 100, powdered Al 4, plaster of Paris 3 and borax 3 parts.

Brit., 468, Jan. 7, 1914. NORSK HYDRO-ELEKTRISK KVAELSTOFKYLINGSKAB. Granulating calcium nitrate and other metallic salts without the formation of dust by causing them to flow in a molten state through a perforated plate, the drops so formed being hardened or solidified by causing them to move through air or other gas. The plate is disposed across a shaft or the like through which the air may be forced to reduce the velocity of the drops; in the case of an hygroscopic substance, the air may be circulated and, if desired, cooled. An inert gas may replace the air. To facilitate quick solidification, the same substance in a pulverized solid state may be added to the molten mass before it reaches the plate. Cf. C. A. 8, 216.

Brit., 1,133, Jan. 15, 1914. F. ROWLEY and SANRAINE SYNDICATE. An electric and heat insulating material is made from silk cotton, such as kapok, roa fiber, and the fibers of *Bombax malabaricum* and *Gallotropis gigantea*. The silk cotton is compressed and may be mixed with other materials or mounted upon a strengthening base, such as a slab of slate. In the latter form, it may be used in elec. switches. For waterproofing purposes, the sheets formed of the silk cotton may have a matrix or be secured by adhesive. For heat insulation, the material is placed between the double walls of a vessel.

Brit., 1,188, Jan. 16, 1914. J. ARMSTRONG. In the manuf. of fuel, ore, and like lumps by mixing the material with an agglomerant that will cake or coke under heat, the caking or coking operation is performed automatically and continuously in closed molds out of contact with air.

Brit., 1,446, Jan. 19, 1914. F. DEMOVN and E. MARIUS. Whitening or glazing corks for stoppers and the like by shaking them in a receptacle containing starch or talc powder. After removal, they are shaken in a muslin straining bag to remove any surplus material.

Brit., 1,550, Jan. 20, 1914. CHEM. FABRIK GRIESHEIM-ELEKTRON. Reduction of sulfurous acid or its salts by spongy zinc. See C. A. 9, 518. Sodium thiosulfate is obtained by passing SO_2 into a well cooled mixt. of spongy Zn and H_2O and treating the ZnS_2O_3 soln. with Na_2CO_3 .

Ger., 280,368, July 31, 1913. A. THODE & Co. Mfg. flexible plates, such as artificial leather and the like, from fibrous material, by immersing the material in an emulsion containing H_2O -sol. artesian oil (1-10% oil to 90-99% H_2O), and which may also contain glue or other binder. Animal fats (fish or whale), or oils, may be added also. The materials remain in this emulsion until impregnation is complete, whereupon they are worked in a rag engine or the like until reduced to fiber which is worked up into plates on a paper or pulp machine, and then compressed by a hydraulic press and dried. Scrap leather may be used, also vegetable fibers such as jute, rags, hemp, also cellulose, wood fiber, cork, gum, camel hair, asbestos fiber, and the like.

Ger., 281,044, Feb. 11, 1913. H. HAAKE. In the manuf. of ammonia and formic acid, compds. of the type of the ferrocyanides are decomposed with H_2O or bases at an elevated temp. *E. g.*, 135 parts $K_4Fe(CN)_6$ are heated with 260 parts H_2O in an Fe pressure vessel to about 200° . The mass is maintained at this temp. until no more increase of pressure is observed, and NH_3 and HCO_2K are obtained in the known manner. Or, 2 equivs. of $Ca(OH)_2$ are added to $K_4Fe(CN)_6$ lye (from gas purifying masses), and the whole is heated in the autoclave to $200-50^\circ$ until no more increase of pressure is observed. After recovery of the NH_3 the Ca formate is worked further in the usual manner. Or, gas-purifying mass mixed with excess lime is blown with steam, at $200-50^\circ$, until the reaction for NH_3 disappears, and the Ca formate is extd. from the residue.

Ger., 281,084, Apr. 24, 1913. E. HERMAN. In mfg. nitrogen oxides by the combustion of air with the aid of C compds., CH_4 is burned with air enriched with O in a reaction chamber communicating with a cooler for the gases of combustion, and under high pressure, in such manner that condensed H_2O cannot return into the reaction chamber. The operation is carried out either directly, with formation of flame in excess of O, or indirectly with flameless combustion with a zircon mass. While CH_4 burned alone in air enriched with O in excess, yields a N oxide product of about 1.3 vol. %, when the yield is calcd. to the whole amt. of the gases, including water vapor, the concn. of the N oxide in the gases of combustion increases materially when the CH_4 is burned, at 20-30 atm. pressure, with proportionally the same amt. of O and N, with the addition of air rich in O (50-60%) and an excess of 10-20% O, to form NO_2 readily. Since the steam condenses without more than 5-10% of the resulting N oxide combining to form HNO_3 , there is obtained without combustion under pressure, a N-concn. in the dry products of combustion of about 2 vol. %; this yields a com. HNO_3 of about 30° Bé.; with pressure combustion, a N oxide yield of 3-4 vol. % is obtained. To form 1 kg. HNO_3 (100%), not more than 2.5 cu. m. CH_4 are necessary. The granular zircon material withstands the necessary temps. without being altered in the least; also the combustion products of CH_4 have no injurious action on the zircon mass.

Ger., 281,095, Apr. 29, 1913. AKT. GES. DER CHEM. FABRIK POMMERENHOF. Obtaining ammonia, contained in gases, vapors and liquors, in the form of a highly concd. NH_4 salt soln., by means of an acid gas, especially SO_2 . In an atm. of steam the $(NH_4)_2SO_4$ seps. as a concd. aq. soln. under the influence of centrifugal force, while the dissociated salt remaining is converted into sulfate. HCl may be employed instead of SO_2 . The sulfite soln., in part oxidized to sulfate, is obtained in a soln. with 10-14% NH_3 and a sp. gr. of 1.2-2.25, continuously, through the suction app. If necessary, moisture is supplied to the gases.

Ger., 281,096, Aug. 15, 1913. C. WALDECK. Obtaining ammonia from coke breeze with the aid of steam or a mixt. of steam with other gases, at a temp. favorable to the conversion of the N in the initial material into NH_3 . The liberation of the N of the coke breeze in the form of NH_3 is possible only by processes in which the C content is at the same time decreased, *i. e.*, burned. So far all attempts to correct this condition have failed, since the NH_3 breaks up into its elements at $500-50^\circ$, while the oxidation of the C by means of the O of the air requires a higher temp. (above 700°). The coke must therefore be brought to the suitable temp. between the formation and the decomp. of the NH_3 , if the conversion of the N into NH_3 is to be approx. theoretical. To accomplish this, interior elec. resistance heating is employed.

Ger., 281,132, May 4, 1913. F. KOPP and R. GOGRO. App. for obtaining carbon dioxide from the alk. earths by igniting them on a band passing through the heating zone.

Ger., 281,133, Mar. 12, 1914. A. BERNUTAT. Sulfuric acid concentrating apparatus, wherein the acid is led through a series of chambers, counter to the hot gases.

Ger., 281,134, July 4, 1913. J. AUER. Preps. with much higher content of active O than possible heretofore (10.5%), such as pertetraboric acid or its salts, are obtained by treating $H_2B_4O_7$ with H_2O_2 or other peroxides containing active O, at temps. not above 15° , preferably below 0° . E. g., 1000 g. crystallized H_2BO_3 are converted, by ignition, into $H_2B_4O_7$. This is pulverized and the powder is placed in 14 kg. of 3% H_2O_2 , which is cooled below 0° . Also, a soln. of 350 g. Na_2O_2 in 2 kg. of H_2O cooled below 0° is prepd. Both solns. are mixed, with constant stirring and cooling. The resulting compd. is a white cryst. salt, sol. in H_2O , and yielding large quantities of active O upon boiling or when acted upon by acids. The compn. corresponds to the formula $Na_2B_4O_{11} + 6H_2O$. The active O content is, on the average, over 16%. Other pertetraborates, especially of the heavy metals, can be prepd. from these.

Ger., 281,174, Feb. 27, 1913. BADISCHE. $CaSO_4$ or gypsum can be converted into ammonium sulfate and $CaCO_3$ by means of solns. of $(NH_4)_2CO_3$. The difficulty experienced in this process is the sepn. of the fine lime slime from the $(NH_4)_2SO_4$ soln. To overcome this difficulty, immersion filters are employed, as in Au extn. The carbonate slime coats the filter with a uniformly pervious film, which remains equally effective after washing out. A small amt. of wash water only is needed.

Ger., 281,235, Feb. 11, 1913. F. HOFFMANN-LA ROCHE & Co. In evaporating and drying calcium caseinate solutions, for the purpose of obtaining a non-dielec. powder, aq., e. g., 10%, Ca caseinate solns. are conducted, drop-wise, through the drying chamber counter to a current of air and against auxiliary currents of air directed at an angle from the bottom of the chamber, to prevent deposition of the soln. on the walls of the chamber, and repeatedly in this manner through this drying chamber, until all the H_2O has been removed, whereupon the dry powder is carried out of the chamber by means of the current of air.

Ger., 281,302, Apr. 22, 1914. Addition to 276,553 (C. A. 9, 730). C. KRUG and H. BÖLLERT. Application of the principal process of waterproofing and graining artificial leather, to paper, pulp, textile materials, and like materials. The initial materials are heated *in vacuo*, satd. with resin solns., and then treated *in vacuo* with $HCHO$ vapors. The materials are claimed to be strengthened throughout, and rendered waterproof, since the $HCHO$ vapors can penetrate open pores.

Ger., 281,317, Dec. 11, 1912. J. WOLF. In mfg. ammonia from a mixt. of CO, N and H_2O , a gas mixt. rich in CO and N, such as is obtained, together with other constituents, by leading air over coke, coal, and other carboniferous material, is brought into contact, after it leaves the generator, with H_2O in a finely divided vapor form or in the liquid state, whereupon NH_3 , NH_4 salts, or derivs. and CO_2 are formed. The yield is increased by applying pressure. The temp. should remain between 300 and 450° . Instead of a mixt. of CO and N, CO alone may be employed when the N is present with the added H_2O or is mixed therewith.

19. GLASS AND CERAMICS.

G. E. BARTON, A. V. BLÄNINGER.

The process of gilding on glass. ANON. *Poll. Gaz.* 40, 547(1915). — The method of prepg. a glass surface in applying gold leaf is described. A formula for "sizing" is given and also the details of applying the leaf. C. S. K.

Present position of the ceramics industry in France. *Bull. soc. d'encour. ind. nat.* 122, 181-98 (1915). R. J. C.

Saggars: Past, present and future. J. P. GUY. *Pott. Gaz.* 40, 54-6 (1915).—G. describes some of the older saggars and mentions the proper kind of marl suitable for use in connection with fire clay in the manuf. of saggars. A new kind of saggarr mix containing asbestos is described as being very satisfactory and capable of withstanding severe temp. changes. C. S. K.

Nickel and cobalt colors. J. W. MELLOR. *Pott. Gaz.* 39, 679-81 (1915).—M. explains the use of the tri-axial diagram in dealing with 3 materials, such as is the case, e. g., in a study of Ni and Co colors. C. S. K.

Some casting slip troubles. J. A. AUDLEY. *Pott. Gaz.* 40, 538-41 (1915).—The trouble discussed here is the more or less dark discoloration produced at the spot where the slip, when poured in, strikes the surface of the mold. Some of the suggested causes are: properties of raw materials, comp. of the body, presence of sol. salts, etc., iron rust, condition of slip, condition of the plaster in the mold and mode of introducing the slip. The use of water-glass, instead of Na_2CO_3 , frequently helped to remedy this trouble. C. S. K.

The distribution of heat in ceramic ovens. BIGOT. *Pott. Gaz.* 40, 286-8 (1915).—B. dwells at some length on ancient firing processes, and describes briefly the design of the kilns. Attention is called to the extremely small amt. of heat used in the actual burning of the ware and the very large amt. consumed in heating the large air excess, the walls, by radiation, conduction, etc. The efficiency of the Dressler tunnel kiln is emphasized and it is stated that this is the solution of the clay-worker's fuel problem. C. S. K.

The clay trade from the British and German standpoint. W. R. ORMANBY. *Pott. Gaz.* 40, 178-82 (1915).—O. shows that the use of the "osmose" process of purifying clays electrically will make the English clays as good as the German deposits. C. S. K.

Clay and shale deposits of the Western Provinces. IV. H. RING. Canada Dept. Mines Geol. Surv., *Mem.* 65, 83 pp. (1915).—An exam. of the clay and shale deposits found in the Western Canadian Provinces from the viewpoint of their adaptability for the making of brick, tile, sewer-pipe, etc. The theory that the plasticity of clay is due to colloidal material was confirmed although there is strong evidence to show that other factors besides colloids are operative. Fifty g. samples of 4 different clays were shaken up in 1 liter of distd. water and allowed to stand. At the end of 24 hrs. but one had settled while the others had material in suspension at the end of 20 days. Pipet samples were then taken from different depths and examd. The particles in suspension in two of them could not be seen with magnification of 600 diams. while the particles in a third were visible and measured 0.002 mm. in diam. The difference in diam. suggested a possible difference in the nature of the colloidal material present; investigation showed a difference in content of carbonaceous matter. Organic matter has a greater effect on plasticity than inorganic matter, probably because it increases the viscosity of a mixt. of water and suspended clay particles and because it acts as a protective colloid and holds the clay particles in suspension. In all, 37 samples of clay are reported, including a record of their air shrinkage, fire-shrinkage, and absorption per cent. at different temps. Cf. following abstr. R. L. SIBLEY.

Clay and shale deposits of the Western Provinces. V. J. KEELER. Canada Dept. Mines Geol. Surv., *Mem.* 66, 74 pp. (1915).—The addition of about 3% of caustic lime to a clay in the raw state destroys the stickiness, reduces the plasticity, makes the wet body workable and assists in the drying. Expts. seem to show that while the

clay may be rendered workable by means of quicklime, it causes a weakening of the burned body and increases the tendency toward scumming. In working a calcareous clay, a good strong yellow color should be produced in the burned product. A pink color is an indication of underburning. Ca carbonate existing in coarse particles or pebbles in a clay is usually fatal to the permanency of the brick made from it although hard burning reduces the loss from this source. Several of the clays examd. could not be used because large cracks developed on drying. These cracks seemed to be caused by the presence of silica in a colloidal, jelly-like form. To overcome this tendency to crack during drying, several methods may be used. As much as 50% sand will usually prevent cracking although the substitution of calcined clay produces a better burned body. Pre-heating the clay in a rotary kiln to 400-500° destroys the adhesive, pasty qualities and makes it easier to work. Chemical coagulants, such as Na_2CO_3 , $\text{Ba}(\text{OH})_2$, HCl , NaCl were used, but none of the objectionable features of the clays were overcome except in the last case where the drying qualities were improved but not the working qualities. Quicklime hastens the drying and improves the working qualities but produces a white scum on the surface unless burned to a high temp. Expts. with lime upon various clays must be made before a full report of its effect can be made. Cf. preceding abstr.

R. L. SIBLEY.

Use of gas for furnace heating (BRAYSHAW) 21. Electrical pyrometry (PAUL) 1.

SEARLE, A. B.: *The Clayworker's Handbook*. 2nd ed. Philadelphia: J. B. Lippincott Co. 416 pp. \$2.00.

U. S., 1,139,637, May 18. T. M. CAVEN. Making light, porous bricks from kieselguhr by agitating it with H_2O and successively added portions of sawdust or other vegetable fibrous material, molding, drying and heating to a temp. high enough to burn out the vegetable fiber. Less H_2O is required for mixing than is necessary if all the sawdust is added at once.

U. S., 1,139,739, May 18. J. G. VANL. and J. D. CANNON. Forming abrasive wheels of carborundum by mixing it with a filler, e. g., hydrous clay, and sufficient 60° B ϕ . Na silicate soln. mixed with 5% of KMnO_4 to form a plastic mass, molding and baking. The KMnO_4 prevents defects which might be caused by formation of H in the mixt.

Brit., 1,039, Jan. 14, 1914. PERMUTIT AKT.-GES. In mfg. double silicates, melts of aluminiferous substances, SiO_2 and alkalis are lixiviated, to obtain base-exchanging substances, with H_2O to which has been added SiO_2 in a form capable of combining with alkali, e. g., amorphous SiO_2 , colloidal SiO_2 , and water-glass soln. rich in SiO_2 . Or substances capable of pptg. colloidal SiO_2 may be added to the H_2O , such as dil. acids, acid salts such as bisulfates or bisulfites, or neutral salts of strong acids such as KCl , NaCl or Na_2SO_4 . These additions prevent the extn. of SiO_2 from the melts. Cf. C. A. 9, 1235.

20. CEMENT AND OTHER BUILDING MATERIALS.

C. N. WILEY.

Combating dust in the manufacture of portland cement by means of Cottrell's electrical precipitation method. W. A. SCHMIDT. *Rev. metal.* 11, I, 1266-34(1914).—A description of the arrangement installed by the Riverside Portland Cement Company, Calif., for abating the dust nuisance. During the manuf. of cement the amt. of dust discharged from one furnace during a 24-hr. period amounted to 4-5 tons. This

ment has been very materially reduced following the introduction of the Cottrell process. Electrodes, between which a p. d. of 45,000 v. was maintained, were mounted on the summit of the chimney. The dust deposited by the process is removed mechanically and the cleaning of the electrodes is attended with little difficulty. As feldspar is utilized in the manuf. of the cement, the principal constituents of the dust are volatilized K salts, so that the process may furnish an important source of K for fertilizer manuf.

L. T. FAIRHALL.

A modern hydrated lime plant. R. K. MEADE. *J. Ind. Eng. Chem.* 7, 427-30 (1915); cf. *C. A.* 8, 228.—Description, with illustrations and drawings, of the new plant of the Dutchess County Lime Co. at Dover Plains, N. Y. ISADOR MILLER.

Paints to prevent electrolysis in concrete (GARDNER) 26.

LANDINI, A.: *Le costruzioni in cemento armato*. Bologna: 288 pp. 10L.

MARSH, C. F. AND DUNN, W.: *Manual of Reinforced Concrete and Concrete Block Construction*. London: Constable & Co. 480 pp. 10s, 6d.

WEST, P. C. H.: *The Modern Manufacture of Portland Cement*. Vol. I. New York: D. Appleton & Co. \$4.50.

U. S., 1,139,934, May 18. F. M. E. VON MOLLENBRUCK. Artificial stone slab formed of two layers of a mixt. of hydraulic cement and fiber. The outer layer is thinner than the main body layer and contains coloring matter, and the 2 layers are firmly united and interlocked together by fibers which extend from one layer into the other. CaCO_3 or CaSO_4 may be added as fillers.

U. S., 1,140,127, May 18. J. A. DECREW. Composition for preserving wood; formed of waste sulfite liquor, creosote oil and ZnCl_2 .

U. S., 1,140,559, May 25. G. ATTERBURY. Artificial stone formed of asbestos tailings 1 and hydraulic cement 2 parts, with or without sand 2 parts or other filler. Its texture is such that nails or screws may be driven into it.

U. S., 1,140,958, May 25. W. COWAN. Plastic mixture for coating floors; formed of paper pulp 6 lbs., glue 1 lb., portland cement 4 lbs., dry coloring 8 oz. and H_2O 2 qts.

Brit., 838, Dec. 12, 1912. C. H. SCHOL. Rendering basic slag more viscous by adding siliceous or aluminous material, such as pumice, and forming into porous lumps, *e. g.* by the process described in 839, 1914 (*infra*), the lumps being used in compositions such as are described in 28,642, 1912 or in the manuf. of blocks as described in 26,704, 1911. In an example, 5 to 8% of a powdered siliceous material is added to the molten slag.

Brit., 839, Dec. 12, 1912. C. H. SCHOL. Slag is converted into porous bulky lumps by causing it to flow over wet sand or the like. The sand may be formed into a sloping bed or may be spread on a conveyor band and carried past the slag outlet. The lumps are used as an aggregate in the manuf. of artificial stone. Cf. *C. A.* 8, 2792.

Brit., 1,155, Jan. 15, 1914. A. MASCHKE. Fireproofing roofing-material, etc. See Ger., 267,407 (*C. A.* 8, 1011).

21. FUELS, GAS, TAR AND COKE.

J. D. PENNOCK.

Feasibility of coal ash in various atmospheres. A. C. FIELDNER AND A. E. HALL. *J. Ind. Eng. Chem.* 7, 399-406, 474-81 (1915).—Results on 63 samples of coal ash fused

in 8 furnaces with atmospheres of varying degrees of oxidation and reduction. Ash ground to an impalpable powder tended to soften 6-40° lower than 100-mesh ash. Vertical cones gave the most concordant results. Slower rates of heating gave lower softening points. The most important factor is the atmosphere. ISADOR MILLER.

Results of the investigation of five lignite samples from Alberta. B. F. HAANEL AND JOHN BLIZARD. *Summary Rept., Mines Branch, Canada Dept. Mines* 1913, 109-32.—Results of gas producer tests made with various Canadian lignites to det. their adaptability for use as gas fuel were favorable. With a Westinghouse double zone producer no serious difficulties of operation were encountered, the gas was sufficiently clean to be used in a gas engine, and little or no clinkering was noticed. The efficiencies (ratios of heat of gas formed to that of coal charged) varied with the different lignites from 61% to 72%. Certain lignites have a N content sufficiently high to make the NH₃ recovery profitable. H. L. OLIN.

Canada's peat bogs. ANON. *J. Can. Peat Soc.; Chem. Trade J.* 61, 440(1915).—Their possibilities for development as a result of the European war are discussed. E. J. C.

The use of gas for furnace heating. S. N. BRAYSHAW. *Pott. Gas.* 40, 442-3 (1915).—The main difficulty in burning gas in the ordinary way is to get enough air, 5½ vols. of air being required per 1 vol. of gas. Several types of burners, designed to overcome this difficulty, are described. C. S. K.

Burning blast furnace gas. K. HUESSENER. *Iron Age* 95, 612-3(1915).—Description of the Bradshaw-Huessener gas burner with gas ejector that automatically controls the amt. of air according to the wt. of the gas. H. V. MAIN.

Purifying producer gas. A. J. WALLACE. *Iron Age* 95, 896-7(1915); *Chem. Eng.* 21, 217-8(1915).—A mixt. of shavings and oxidized iron, 22-4 lbs. per bu., is used to remove H₂S. Rotation of purifiers, 4 to a set, permits the regeneration of the oxides by the O from leaks. H. V. MAIN.

Regenerators and recuperators. M. STEIN. *Rev. metal.* 11, I, 1191-6(1914).—A general discussion of the comparative merits of the 2 types of furnaces. L. T. F.

Composition of gas in relation to its calorific value. ANON. *Gas World* 62, 563-4.—Discussion of calorific value, "combustive power" and thermic value with tables containing a list of the principal heat-giving constituents of coal gas and showing their relative power and values. M. L. TROWERIDGE.

Gasholder without water of the *Maschinenfabrik Augsburg-Nürnberg*. ANON. *J. Gasbel.* 58, 13-4(1915).—The walls are built full height and smooth inside. The top slides up and down inside this cylinder, and is provided with an annular space between its edge and the walls for the sealing liquid. The bottom of this space is closed by a ring which slides on the walls and allows only slight leakage. The leakage collects in an annular trough at the bottom of the holder and is pumped to a container at the top which feeds the seal. As there is no loss of liquid, any material may be used for the seal. Gas tar does not freeze, is always available, leaks only slowly through the sliding contact, and protects the inside of the walls from corrosion. For a 25,000 cu. m. holder, 0.1 h. p. is needed. This represents 3% of the cost of heating H₂O in an ordinary holder of the same capacity. Advantages claimed are low first cost, low operating cost, absence of H₂O reservoir and of heating, certainty of operation, simplicity of repainting (none needed inside), accessibility of all working parts during operation. W. L. BADGER.

Variation in composition of natural gas from different sands in the same field. G. A. BURRELL AND G. G. OBERFELL. *J. Ind. Eng. Chem.* 7, 419(1915).—Invariably

the gas from the shallower sand was found to contain less of the heavier paraffin hydrocarbons than that from the deeper sands. IRADOR MILLER.

The German gas industry in relation to the war. DEUT. CONTINENTAL-GAS-GESELL. Dessau. *Chem. Ztg.* 39, 81-2(1915). J. H. MOORE.

The fractional collection of crude tar. GEO. T. PURVES. *J. Soc. Chem. Ind.* 34, 339-39(1915); *J. Gas Lighting* 130, 200-2(1915).—P. describes a device for condensing tars by fractional pptn. The crude gas from the main is scrubbed with a screen of anthracene oil to remove the tar fog containing free C and after partial cooling is again scrubbed to remove anthracene oil. The process is repeated with successive temp. lowerings and scrubblings in such a way that the tar may leave contact with the gas only at a temp. at which it cannot dissolve the next lighter fraction. This method obviates the necessity for tar distg. with attendant cracking losses. Benzene and toluene may be left in the gas to increase the candle power or they may be removed by a simple washing process. H. L. OLIN.

Commercial and economic phases of the coal-tar situation. HORACE C. PORTER. Bur. of Mines, *Tech. Paper* No. 89, 18-9(1915). E. J. C.

Coal-tar products, and the possibility of increasing their manufacture in the United States. HORACE C. PORTER. Bur. of Mines, *Tech. Paper* No. 89, 5-15(1915).—This paper points out the present opportunity for developing in the U. S. some industries hitherto comparatively neglected. P. discusses with data the supply of coal suitable for by-products manuf., the production and disposal of coal tar and of benzole, and coal-tar products, such as creosote oil, light oil, benzole, solvent naphtha, heavy tars, pitch products, phenol, dyestuffs, drugs, photographic developers, etc. E. J. C.

Discolored sulfate of ammonia. ANON. *Gas World* 62, *Coking and By-Product Sect.* 18-9.—The discolorations most frequently experienced are grey, brown, yellow, blue and red. A discussion is given of the conditions under which they occur and their prevention. M. L. TROWBRIDGE.

Nitrogen determination in coke. B. M. MARGOSCHES. Brunn. *Chem. Ztg.* 39, 167-8(1915).—General remarks on the Kjeldahl method and modifications. J. H. MOORE.

The German coke and tar industry and the war. FRITZ FRANK. Berlin. *Chem. Ztg.* 39, 97-8(1915). J. H. MOORE.

Improvements in by-product foundry coke. C. S. LOMAX. *Iron Age* 95, 1116(1915).—Improvements have been made in choice of coal, design of furnace, quenching and handling. H. V. MAIN.

Experience with a by-product coke oven plant. C. C. BOARDMAN. *Am. Gas Light J.* 102, 289-94(1915).—B. describes the app. and methods used in by-product coke ovens in general, and gives a detailed description of the plant of the Coal Products Mfg. Co. at Joliet and its partner the Western United Gas & Electric Co. Special attention is paid to failures of various app. (e. g., gas app., batteries, coal and coke handling app.) and the necessary remedies and improvements. P. J. COLE.

Molasses as a source of alcohol for power (HERIOT) 16. Luminous efficiencies (IVRS) 2. Fissure coals (VERSFELD) 8. Use of coal in blast furnace practice (LANGR) 9. Heating an open hearth furnace with tar (GREINER) 9.

CHALKLEY, A. P.: *Diesel Engines*. 3rd ed. New York: D. Van Nostrand Co. 298 pp. \$3.00.

PHILLIPS, H. J.: **Fuels: Solid, Liquid, and Gaseous. Their Analysis and Valuation.** New York: D. Appleton & Co. \$0.70.

WILLIAMS, C. W. AND CLARK, D. K.: **Fuel, its Combustion and Economy.** New York: D. Appleton & Co. \$1.20.

U. S., 1,140,113, May 18. H. A. CARPENTER and D. D. BARNUM. Reducing stand-pipe stoppage in the manufacture of coal-gas. Different retorts of a series are charged with coal at different times, in sequence such that the carbonization periods of the different retorts overlap and that adjacent retorts are charged at considerably different times, and the distillation products from all the retorts are led to a common stand-pipe, in which a substantially uniform temp. is maintained because of the overlap in the periods of discharge of the retorts.

U. S., 1,140,124, May 18. G. DALEN. Porous mixture for storing acetylene dissolved in acetone. See Ger., 273,964 (C. A. 8, 2940).

U. S., 1,140,198, May 18. H. F. SMITH. Removing tar from gas by passing the gas through glass wool fabric or other pervious diaphragm which causes the particles of tar to coalesce so that they are sepd. from the diaphragm by the flowing gas. The coalesced particles are then sepd. from the gas by gravity deposition in a baffle-plate tar separator.

U. S., 1,140,337, May 18. J. M. RUSBY. Heating coal-gas retort chambers by generating producer gas from a fire with air, burning the gas with additional air to heat the retort chamber and controlling the fire and chamber temps. by passing sufficient steam through the fire to avoid formation of clinker or injury to the producer and by adding inert combustion gases to the producer gas used.

U. S., 1,140,339-40, May 18. J. H. TAUSSIG. Vertical gas retorts and door-operating and charging devices for the retorts. Cf. C. A. 8, 3233.

U. S., 1,140,395, May 25. W. RAKOWSKI. Fuel briquet formed of coal dust and sawdust with an unstrained decoction of bran as a binder.

U. S., 1,140,735, May 25. J. EVANS. Briquetting fine coal. See Brit., 18,270, 1913 (C. A. 9, 370).

U. S., 1,140,797, May 25. H. A. CARPENTER. Coal-gas generating retorts and connected stand-pipe structure.

U. S., 1,140,798, May 25. H. A. CARPENTER. Coal-gas generating apparatus including a series of door-closed retorts connected to a stand-pipe by a conduit in which a spray jet is placed for discharging cooling liquid into the gas as it passes from the retort to the stand-pipe. Cf. C. A. 9, 521.

Brit., 437, Jan. 7, 1914. Addition to 24,491, 1913 (C. A. 8, 1361). W. A. HALL. A motor spirit is obtained from the surplus gases resulting from the process of cracking oils described in the principal patent, by absorbing them in C_6H_6 or toluene, or a mixt. of them, and then mixing the soln. with the liquid product described in the principal patent.

Brit., 476, Jan. 7, 1914. INTERNATIONAL NITROGEN AND POWER Co. and O. D. LUCAS. In a gas producer for use with moist fuel such as peat, the fuel is fed to the top of the producer through a long pipe, within which is a feed-worm. The pipe terminates in a hopper from which the fuel passes into the producer through an air-locked feeding device. The gases leaving the producer pass through a pipe surrounding the fuel feed pipe, thereby heating the fuel and driving off its moisture. At the same time, air is drawn through the fuel in the pipe by a fan, this air carrying off the moisture driven out of the fuel and passing by a pipe to the underside of the grate.

Brit., 1,121, Jan. 15, 1914. J. J. ALLEN. Constructional details of a pivoted push-plate charger for coke ovens, etc.

Brit., 1,308, Jan. 17, 1914. DRAKES, LTD. and J. W. DRAKE. In gas manufacture, hydraulic mains are constructed with extended cooling surfaces and with means of access for the removal of deposited matter. Cf. C. A. 8, 3237.

Ger., 279,689, Sept. 11, 1913. STETTINER CHAMOTTEFABRIK AKT.-GES. V. DIDIER. Facilitating the removal of ash and slag from gas generators by introducing steam into the shaft near the clean-out door, with a view to preventing the formation of slag at that point. The ash is removed from below the slag, which is later broken up and removed.

Ger., 280,040, Apr. 25, 1912. L. SCHMIDT and F. KRIEGER. App. for the flameless combustion of gases, with the employment of a refractory body containing a catalytic agent.

Ger., 280,828, Aug. 6, 1913. H. MACK. App. for mixing coke ash with wash water from coal, with a view to rendering the sediment more porous and thus hastening the flowing off of the H_2O .

Ger., 280,869, June 14, 1914. F. VON KALITSCH. Utilizing forest trimmings as fuel. Much of this waste contains considerable amts. of starch granules, albumin, and the like, and the pine twigs contain, in addition, large amts. of resin, and, in fact, a mixt. of true resin, ethereal oils, and hydrocarbons. The treatment consists in comminuting the material, mixing it with ground charcoal, and briquetting the mass. The briquets are especially suitable for glass and porcelain works. Cf. C. A. 8, 2938.

Ger., 281,275, July 3, 1913. O. BUSSE. In a heating and combustion furnace with muffle, the air or gas content of the muffle is circulated continuously by means of a fan, in order to maintain a uniform temp. within the muffle and thereby effect more rapid heating of the charge.

22. PETROLEUM, ASPHALT AND WOOD PRODUCTS.

F. M. ROGERS.

Gasoline from "synthetic" crude oil. WALTER O. SNELLING. *Bull. Am. Inst. Mining Eng.* 1915, 695-704.—S. describes lab. methods by which he has produced gasoline from heavy oils and discusses their industrial application as well as their relation to the problem of the genesis of petroleum. In a typical test, 300 cc. of a solid white paraffin, m. 50° , sp. gr. 0.925, was used. This was sealed in a vessel of 1100 cc. capacity and heated until a pressure of 800 lbs. was indicated, then cooled. The pressure of the residual gas was 130 lbs. The product was a heavy liquid resembling Penn. crude oil, dark green by reflected light, dark red-brown by transmitted light. Its vol. was 305 cc., sp. gr. 0.770 and the gasoline yield on distg. to 150° was 48 cc., or 16%. By removing the gasoline and repeating the process he has obtained from paraffin 70% of water white gasoline, the remaining 30% representing the gas formed, and some free C. Cf. C. A. 9, 1388. H. L. OLIN.

The cracking of oils. E. I. DYER. *Mining Sci. Press* 110, 717(1915).—A brief discussion of the cracking of oils in "concentrates." It is stated that "the com. objection to the cracking processes is that the distillate evolved usually contains olefins and similar complicated members of the aromatic and other series which impart an undesirable color and odor to the product, so that excessive treatment is necessary to get a merchantable material. Such treatment usually results in almost total loss of everything except the paraffin series." It is concluded that in most cases it is usually better to adhere to the ordinary distn. methods. F. W. SMITHER.

The time factor in making oil gas. M. C. WHITAKER AND C. M. ALEXANDER. *J. Ind. Eng. Chem.* 7, 484-95(1915).—The compositions of the products obtained in making oil gas vary with the rate of oil feed and hence with the time factor. This variable is as important as the other three, temp., pressure and concn. Only by proper adjustment of all four can max. and min. % of the various constituents in the products formed by the decompn. of petroleum and petroleum distillates by heat be obtained.

ISADOR MILLER.

Naphthenic acids of high molecular weight in Baku petroleum. E. PYHALA. *Baku. Z. angew. Chem.* 27, I, 407(1914); cf. *C. A.* 8, 2800, 3361.—The acids in the waste lyes from the refining of Baku machine oils were liberated with dil. H_2SO_4 , washed, dried, and distd. *in vacuo*. The distillate was extd. with alc. KOH, the alc. evapd. off and recovered and the naphthenic acids liberated from the soap by dil. H_2SO_4 , washed and dried. The product (naphthenic acids) was a light yellow, very viscous, almost odorless oil with acid no. = 100. When dissolved in ether, shaken with concd. HCl, washed with H_2O till free of acidity, filtered, and the solvent evapd., it left a residue of $d_{16}^{19.8} = 0.9470$, acid no. = 168.7, I no. = 2.54 (Hübl-Waller). On fractional distn. at atm. pressure 2 fractions were obtained: (a) 310-320° about 13%; d. detn. not made; acid no. 180.4; identified as eicosan-naphthenic acid ($C_{19}H_{37}COOH$); (b) 340°, about 63%; $d_{16}^{21} = 0.9400$; acid no. 147.6; identified as pentacosan-naphthenic acid ($C_{24}H_{47}COOH$). Both fractions had the typical naphthenic odor; it was hardly perceptible when cold.

F. W. SMITHER.

Power plant oil filter, Richardson Phenix Co., Milwaukee. *Iron Age* 95, 838-9.—Oil is heated to reduce the viscosity so that it will flow easily off a series of water traps and through filter cloth.

H. V. MAIN.

The utilization of wood waste. R. C. DENINGTON. *Chem. Trade J.* 56, 393-4, 415-6(1915).—A general review and discussion, especially of the process based on Clasen's British patent (No. 12,588 of 1901).

F. W. SMITHER.

Trinidad asphalt from the point of view of dispersoid chemistry (RICHARDSON) 2. *Scottish oil shales (BERG) 8.*

BOORMAN, T. H.: Asphalts, their Sources and Utilizations. Road Edition. New York: D. Van Nostrand Co. 205 pp. \$2.00.

U. S., 1,141,072, May 25. W. MITCHELL. Apparatus for generating fuel gas from kerosene or heavier hydrocarbons.

Brit., 1,269, Nov. 30, 1912. R. A. DORNES. In fractionating oil, the oil vapor or the mixt. of oil vapors and steam from a vapor generator is passed through a series of fractionators, each constructed with cold and hot zones, whereby the vapors entering each fractionator are partly condensed, and the condensate is partly revaporized. Cf. *C. A.* 8, 1871.

23. CELLULOSE AND PAPER.

A. D. LITTLE.

Chemical analysis of paper. H. A. BROMLEY. *Chem. News* 111, 136-40(1915).—A general article discussing and describing methods employed for the various detns. made in the chem. analysis of paper.

V. NUNEZ.

The German pulp and paper industry and the war. EMIL HEUSER. Darmstadt. *Chem. Ztg.* 39, 141-3(1915).

J. H. MOORE.

Strength of air-dry and of wet parchment paper. W. HERZBERG. *Papier Ztg.* 40, 354(1915).—Parchment paper was tested for strength in (1) air-dry condition; (2) after lying 10 min. in cold water; and (3) after lying 30 min. in water at 70°. The breaking length of the samples in cases (2) and (3) was about the same, being less than half as great as in air-dry condition. Loss in strength was greater in machine direction than in cross-direction. The stretch of papers was increased about 50% by wetting.

V. NUNEZ.

Retention of stuff. F. CYSTER. *Paper Making* 34, 487-9.—Loss of fiber through the wire of the paper machine is governed to a marked degree by the manner in which the stock was beaten, retention by a slow stock being much greater than by a free stock. The questions of plasticity of the filler, thickness of the sheet, and nature of sizing are considered comparatively unimportant.

V. NUNEZ.

Cellulose derivatives (MAIN) 18.

U. S., reissue 13,919, May 18. W. H. STORIE. Apparatus for disintegrating fibrous material in the manufacture of paper-pulp, by forcibly projecting a mixt. of H_2O and the paper-stock, from a nozzle, against a roughened surface. (Reissue of original Pat. 1,062,306, cf. C. A. 7, 2472.)

U. S., 1,140,181, May 18. T. H. NASH. Beating-engine and other apparatus for refining paper-making pulp.

U. S., 1,140,253, May 18. E. H. CLIFTON. Preparing safety paper for checks, drafts, etc., by dipping calendered paper in a bath composed of H_2SO_4 6, HCl 24 and H_2O 700 parts until thoroughly permeated with the soln. and then drying.

U. S., 1,140,626, May 25. A. STEPHEN. Apparatus for impregnating paper or cardboard with wax or similar waterproofing material. Cf. C. A. 9, 2482.

U. S., 1,140,711, May 25. C. E. POPE. Fourdrinier paper-making machine.

U. S., 1,140,737, May 25. H. A. FRAMBACH. Apparatus for beating paper-stock.

U. S., 1,140,799, May 25. J. A. DECREW. Preparing strong paper-pulp by treating the cellulose stock with alkali and CS_2 in small amts. such that the product is still capable of absorbing about 2% of alkali.

U. S., 1,140,873, May 25. W. L. CARTER. Apparatus for treating paper with wax or other waterproofing material.

Brit., 944, Jan. 13, 1914. C. BACH-WÜG. Paper-pulp. See C. A. 8, 1010.

Brit., 1,145, Jan. 15, 1914. E. OMAN. Utilizing sulfite liquor for the digestion of 3 or 4 charges of wood, especially for the production of half-cellulose, by treating it after each digestion with lime, or magnesia, or alkali, and SO_2 . Part of the waste liquor is used for the recovery of organic and inorganic substances, either by fermenting and distg. off the alc. and then concg., or by removing part or the whole of the non-fermentable substances and then fermenting and distg. For digestion, a suitable quantity of washing H_2O , with or without other pure H_2O , may be added.

Brit., 1,156, Jan. 15, 1914. AET.-GES. FÜR ANILIN FABRIKATION. Addition to 10,706, 1912 (C. A. 7, 3414). The process of prepg. cellulose esters described in the principal patent is modified by subjecting to the usual methods of esterification the cellulose deriv. obtained by the action on cellulose of more or less concd. HNO_3 . The latter product is stated to have the same properties distinctive from ordinary nitrocellulose as had the parent material described in the principal patent, and, in an example, is prepd. by treating cotton with from 10 to 30 times its wt. of 68-70% HNO_3 . The ester may be hydrolyzed, as by treatment with an acid.

Brit., 1,223; Jan. 16. 1914, A. R. VON S. SZOLATSKY. A celluloid substitute is made by dissolving 200 g. of glue or gelatin in H_2O and mixing it with 30 g. each of casein and Na_2SiO_3 . The mixt. is poured upon glass sheets, dried, and hardened by means of alum, tannin, etc.

24. EXPLOSIVES AND EXPLOSIONS.

C. E. MUNROE.

C. E. Bichel. W. KÖNING. *Z. ges. Schiess-Sprengstoffw.* 10, 73-4(1915).—An obituary. C. G. S.

Influence of temperature and pressure on the explosibility of methane-air mixtures. G. A. BURRELL AND I. W. ROBERTSON. *J. Ind. Eng. Chem.* 7, 417-9(1915).—With an initial temp. of 500° the low limit of complete propagation of flame is 3.75-4.00% CH_4 . Lowering the temp. raises the low limit, the latter being 5.5% CH_4 at ordinary temp. ISADOR MILLER.

Inflammable limits of mixtures of gasoline vapor and air. G. A. BURRELL AND H. T. BOYD. *J. Ind. Eng. Chem.* 7, 414-7(1915).—The lower limit of complete inflammation has a value between 1.9 and 2.0% gasoline vapor. The upper limit is 5.2, 5.3%. These figures hold when ignition takes place from the top. Igniting from the bottom, the figures are 1.5-1.6%, and 6.0-6.4%, resp. Increasing the initial temp. before ignition decreases the low limit. ISADOR MILLER.

Coal-tar products used in explosives. C. G. STORM. Dept. Interior, Bur. Mines, *Tech. Paper* 89, 16-7(1915).—A brief review of the uses of the aromatic nitro-substitution compds. as explosives or as constituents of explosive mixts.; nitrobenzenes, nitrotoluenes, nitromaphthalenes, nitrophenols and their various derivs. are included. These compds. and their derivs. find use as bursting charges for explosive projectiles, torpedoes and mines, or in detonators and primers, as ingredients of low-freezing dynamites, as colloidizing or gelatinizing agents in plastic explosives or smokeless powders, as stabilizers in nitrocellulose smokeless powders, as sensitizers in NH_4NO_3 explosives, etc. C. G. STORM.

Fuses and igniters. A. OELKER. *Z. ges. Schiess-Sprengstoffw.* 10, 66-8, 78-9(1915).—A list of 26 U. S. and 3 British patents relating to fuses and means of ignition of fuses, giving brief specifications. C. G. STORM.

Sensitiveness of dynamite. ANON. *Eng. Mining J.* 99, 820(1915).—The test is made by rolling the two halves of a stick in a sheet of letter paper, varying the distance sepg. them from 12 to 2 inches. At the latter distance the detonation of one-half detonated the second half, but it failed to do so at greater distances. C. E. MUNROE.

Comparative strength of detonators. LEB. REIFSNIEDER. *Eng. Mining J.* 99, 818(1915).—Detonators were tested with 40 and 60% semi-gelatin dynamite, using "influence" method on steel plates. 60% grade was detonated at a distance of 52 inches with No. 8 and at but 26 inches with No. 6 detonator. A large number of tests were made. CHARLES E. MUNROE.

Vacuum-drying apparatus in the explosives industry. E. SCHWEIZER. *Z. ges. Schiess-Sprengstoffw.* 10, 38-40, 53-5(1915).—The advantages to be gained by vacuum drying as compared with drying in a current of air by the usual methods are: (1) greater rapidity of drying, (2) economy of heat, (3) increased safety. In drying such explosives as nitrocellulose, smokeless powder, fulminate of mercury, and detonating compns., vacuum drying insures greater safety because the b. p. of the liquid to be removed is lower at the reduced pressure, and because the effect of the vacuum is to diminish the readiness with which explosions may be propagated. It has long been known

that ordinary gunpowder is ignited imperfectly, if at all, by means of an incandescent wire in rarefied air, and under the same conditions guncotton burns very slowly, while even mercury fulminate does not propagate explosion readily. Tests made in the Royal Prussian works at Spandau showed that large quantities of fulminate could be exploded in a properly constructed vacuum drier without material damage to the app. This special type of drier (described in detail) has automatically opening vents for relieving sudden pressure in case of explosion. Drying is hastened by circulation of warm water through the hollow shelves. Black powder is dried in 1 hr., mercury fulminate in $\frac{3}{4}$ hr. with a vacuum of at least 700 mm. Another type of drier is installed at the Spandau works for rapid drying of smokeless powder. At a temp. of about 30°, 95-97% of the original solvent is recovered by means of condensers, and rapid drying of the powder is effected.

C. G. STORM.

Accidents in the explosives industry. BADERMANN. *Z. ges. Schiess-Sprengstoffw.* 10, 57-8(1915).—Includes short accounts of 7 accidents in explosives factories. Of especial interest is an account of an explosion of 100 kg. of trinitrotoluene at the govt. factory at Magdeburg. The material was being washed and exploded from unknown cause, killing 4 workmen and wrecking the wash- and dry-houses. C. G. STORM.

Explosives in Greece. A. LOGOTHETIS. *Z. ges. Schiess-Sprengstoffw.* 10, 52-3(1915).—A brief review of the explosives industry in Greece. Raw materials except HNO_3 and H_2SO_4 are imported from Germany and Austria. A system of govt. inspection controls the manuf. and use of explosives.

C. G. STORM.

Tungsten projectiles (VASSELIN) 9.

U. S., 1,141,009, May 25. C. SECHANANDOAH. An explosive for blasting is formed by moistening a mixt. of alum 1 and sugar 16 parts with coffee ext. and then adding MeOH and boiling the mixt. until moisture is eliminated and a solid mass remains. The latter is mixed with about $1\frac{1}{7}$ times its wt. of KClO_4 whenever desired to complete the explosive., *e. g.*, just prior to the time of use.

Brit., 1,283, Jan. 16, 1914. ACCUMULATOREN-FABRIK AKT.-GES. In a device for detecting the presence of methane or other inflammable gases in air by means of glowing catalytic conductors heated from an exterior source, a number of heated conductors are employed, so that the number which become luminous serve as an indication of the quantity of inflammable gas present.

Brit., 1,493, Jan. 20, 1914. R. CREMER. In suppressing explosions in mines by means of stone or other dust, the dust is pressed together to form self-sustaining walls, banks, blocks, slabs, columns, etc., which are placed at the sides of the roadways and in the working places and are adapted to be broken up and scattered by the force of an explosion. The dust may be mixed with a binding material, such as cement, concrete, tar, sizing, clay, etc., or the compressed walls, blocks, etc., may have their surfaces treated with such material. The dust may also be enclosed in millboard, wicker-work, expanded metal, wire gauze, etc., the interstices of which are closed by plastering over with cement, concrete, lime, plaster, clay, etc., or by a lining of fabric, preferably in loose sheets.

25. DYES AND TEXTILE CHEMISTRY.

L. A. OLNEY.

Otto N. Witt. A. BINZ. *Z. angew. Chem.* 28, I, 193-6(1915).—An obituary.

E. H.

The export of German coal tar products to the United States. K. PIETRUSKY.
Chem. Ind. 38, 51-4(1915).—A discussion.

F. W. SMITHER.

The new English color industry. OTTO N. WITT. *Chem. Ztg.* 39, 117-9(1915).
J. H. MOORE.

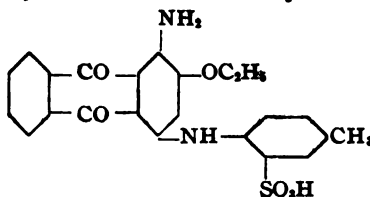
Determination of the weighting of silk. HEERMANN AND FREDERICK. *Chem. Ztg.* 39, 149-50(1915).—A rapid and accurate method worked out by the authors is to weigh the sample after exposing to air of 65% humidity, treat in a Pt dish on a boiling H₂O bath for 15-20 min. with a 2% HF soln., then in the usual way with 5% HCl, wash, dry and weigh. A table gives the weighting based on a found content of fibroin from 10 to 90% and 20, 22 and 24% sericin. Cf. *C. A.* 2, 1050, 1889. J. H. M.

The chemist in the textile industries. X. *Rev. gén. chim.* 18, 79-83(1915).—A discussion and review. F. W. SMITHER.

Coal-tar products (PORTER) 21. Field gray (ZIMMER) 26. Preparation of thioethers and thioxanthenes of the anthraquinone series (SCHAARSCHMIDT) 10. Indigoid dyes containing sulfur (ALBERT) 10. Analysis of Turkey-red oil (HERBIG) 27.

BALLS, W. L.: The Development and Properties of Raw Cotton. London: A. & C. Black. 221 pp. 3s.

U. S., 1,139,540, May 18. G. KRÄNZLEIN. Dye of the formula



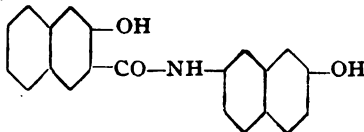
a violet powder sol. in H₂O to a violet soln., dyeing wool in an acid bath violet fast to alkalis and only slightly altered after chroming; made by boiling 1-amino-2-ethoxy-4-bromo- (or chloro)anthraquinone with NaOAc and *p*-toluidine and sulfonating with fuming H₂SO₄.

U. S., 1,139,603, May 18. H. P. VEST. "Wax" for waterproofing thread, composed of gasoline 62.5%, rosin 31.25% and pine tar 6.25%.

U. S., 1,140,296, May 18. M. A. ADAM and W. J. FERNIE. Retting flax straw by passing H₂O at a temp. of about 37° downward through straw placed vertically, for about 8 hrs. and then lowering the temp. of the H₂O to 20-5° for the remainder of the time required to complete the retting.

U. S., 1,140,745, May 25. B. JÄCKEL. Sulfur dyes obtained by heating ethylaniline 17.6 and benzidine 27 parts, with S 80 parts, extg. with alkali and pptg. with HCl. The dye is a yellow powder, insol. in H₂O, sol. in concd. H₂SO₄ with a yellowish brown color and produces greenish yellow effects on unmordanted cotton. Ethyl- α - and β -naphthylamine, ethylxylidine, ethyltoluidine, and ethylbenzidine yield similar dyes.

U. S., 1,140,747, May 25. M. KAHN and A. OSSENBECK. 2,3-Naphthoic acid derivative of the formula



a grayish yellow powder sol. in hot Na_2CO_3 soln., giving a fast scarlet-red color on unmordanted cotton when developed with diazotized *p*-nitroaniline.

Brit., 745, Jan. 10, 1914. M. A. ADAM, W. J. FERNIE and FIBER CORPORATION. Bacterial fermentation in the retting of flax, etc., is accelerated by carrying out the operation in 2 stages, the 1st at a temp. of about 37° , occupying from 8 to 24 hrs., and the remainder at a temp. of from 20 to 25° , which is not substantially higher than that which prevails under normal conditions when retting in running streams. The whole operation takes about 2.5 days and is carried out in an app. such as described in 11,384, 1912 (C. A. 8, 2124).

Brit., 802, Jan. 12, 1914. J. L. JARDINE and T. A. NELSON. Preparing vegetable textile fibers for bleaching by treating the material in a digester with a soln. of $\text{Mg}(\text{HSO}_3)_2$ or NaHSO_3 and completely removing from the liquid in the digester the gases liberated in the course of cooking. Bisulfites of other bases which have sol. sulfites may be used. The digestion is carried out in a closed vessel with an acid-proof lining, under pressure, the heating being preferably by means of coils or a jacket, or by the application of direct steam. The treatment removes the lignified encrustations as well as the pectose and gummy ingredients, without materially affecting the fiber, even jute and hemp only requiring 1 treatment to render them easily bleachable. The proportions of the base and available or free SO_2 depend upon the duration and the temp. of the cooking, the chem. characteristics of the fiber treated, and also its physical condition. It is essential to provide for the free escape of the liberated SO_2 . Examples are given for the treatment of jute, as raw fiber or Hessian cloth, and also of woven hemp.

Ger., 278,509, May 10, 1913. CASSELLA & Co. Mfg. basic dyes by treating the dye of 269,802 (C. A. 8, 2260) with alkalis, reducing in acid soln. the resulting leuco compds., and allowing the resulting reaction liquids to stand for a long time, or heating them.

Ger., 278,613, Nov. 11, 1913. J. R. GRIGY A.-G. Mfg. mordanting monoazo dyes by heating the azo dyes, from diazotized *o*-chloro-*m*-aminobenzoic acid and salicylic acid, *o*-, *m*-, or *p*-cresotinic acid, with alk. agents, to a high temp.

Ger., 278,871, 278,872, Jan. 8, 10, 1913. CHEM. FABRIK GRIESHEIM-ELEKTRON. Yellow cotton dyes. See Brit., 17,878, 1913 (C. A. 8, 2625).

Ger., 280,713, Aug. 16, 1913. W. FRAENKEL. Isolating the selenium dye corresponding to methylene blue by allowing H_2Se or like compd. yielding Se, to act upon *p*-phenylenediamine or the like, and oxidizing the resulting compd., then shaking the resulting reaction mixt. with phenol. The resulting soln. is shaken with aq. HCl and a H_2O -insol. solvent for the phenol, such as ether, CCl_4 , or the like, whereupon the dye goes into soln. as the chloride.

Ger., 280,839, Jan. 30, 1913. M. KARDOS. Mfg. anthracene derivatives by treating aceanthrenequinone or its halogen substitution products with NH_2OH or substances splitting off NH_2OH . Cf. C. A. 8, 3242.

Ger., 281,010, July 1, 1913. AKT.-GES. FÜR ANILIN-FABRIKATION. Mfg. amino-anthraquinone derivatives by acting with phosgene on 3-aminobenzoyl-*o*-benzoic acid, its homologs or substitution products, and treating the resulting urea, with heating, with concd. or fuming H_2SO_4 .

26. PAINTS, VARNISHES AND RESINS.

A. H. SARIN.

Miscellaneous paints used in machine shops. E. H. FISH. *Am. Machin.* 42, 941(1915).—A review.
C. G. F.

Paints to prevent electrolysis in concrete structures. H. A. GARDNER. *J. Ind. Eng. Chem.* 7, 504-10(1915); *J. Frank. Inst.* 179, 313-36(1915).—Results with 27 paints are given. G. concludes that the vehicle should contain boiled or bodied products which dry to fairly satd. films, oils which dry by semi-polymerization rather than oxidation and which give a flat surface. Pigments should be coarse, inert and nonconductors of electricity. They should be either basic or of the chromate type. The painted metal should be "sanded."

ISADOR MILLER.

Softening and saponification of white pigment paints. ANON. *Oil, Paint and Drug Rep.* 87, 17-8(1915).—Report of a meeting to discuss possible causes of recent paint failures in Perma. No satisfactory explanation was offered. E. W. BOUGHTON.

Government red lead specifications. ANON. *Oil, Paint and Drug Rep.* 87, 17(1915).—New Navy Dept. specifications. *Composition:* The dry pigment shall be of high-grade quality, free from all adulterants and shall contain not less than 94% true red lead (Pb_3O_4), the remainder to be practically pure lead monoxide (PbO). *Impurities:* It shall not contain more than 0.1% of metallic lead, 0.1% of alkalis, figured as Na_2O and 0.05% of other impurities which include all other substances than oxides of Pb. *Fineness:* To be of such fineness that not more than 0.5% remains after washing with water through No. 21 silk bolting cloth sieve. It shall be of good bright color and equal to standard sample in freedom from vitrified particles and in other respects.

E. W. BOUGHTON.

Study of vapors from drying paint films. H. H. KING. *J. Ind. Eng. Chem.* 7, 502-4(1915).—Films of white lead and linseed oil, ZnO and linseed oil, and a mixt. of these two pigments were studied. CO is one of the products given off in the drying of paint films.

ISADOR MILLER.

Is the old name "boiled ('gekochte') linseed oil" permissible for the commercial resinat oil of today? C. NIEGERMANN. *Farben-Ztg.* 20, 765-6, 795-6(1915).—N. reviews the controversy on this subject, and disagrees with the statements of Mühle (cf. *C. A.* 8, 2496) and Fahrion (cf. *C. A.* 8, 3243).

E. W. BOUGHTON.

Field gray. F. ZIMMER. *Farben-Ztg.* 20, 767(1915).—By "field gray" is meant the color prepared for military purposes which renders objects more invisible to the enemy. Discussion on the prepn. and use of color paints for the color coats of such shade and on the prepn. and use of the varnishes and lacquers for finishing coats is given.

E. W. BOUGHTON.

Bleaching and thickening of linseed oil. VON KREYBIG. *Farben-Ztg.* 20, 742-3(1915).—A description of the process (Ger. patent 274,973) in which air is blown through the oil in a steam heated kettle, a catalyzer consisting of oxides of metals of the Fe group deposited on pumice stone being used. The resulting changes in the constants of oils are given.

E. W. BOUGHTON.

Paints for limestone and cement. ANON. *Farben-Ztg.* 20, 712-4(1915).—A general discussion of the characteristics required for a satisfactory pigment for lime and cement.

E. W. BOUGHTON.

Substitutes for turpentine oil. ANON. *Farben-Ztg.* 20, 715-6(1915).—The oils from coal tar are being used as a substitute for turpentine oil, due to the cutting off by the war of the petroleum supply. $MeOH$ has also been used as solvent. E. W. B.

A modern white lead works. ANON. *Drugs, Oils and Paints* 30, 412-3(1915).

E. W. B.

White lead in oil as sold in small packages. Inland Rev. Dept., Ottawa, Canada. *Bull.* 300(1915).—Report of exam. of 104 samples collected throughout Canada. Many samples contained barytes and a few small amts. of ZnS .

E. W. B.

Counting particles in paint pigments (KÜHN) 7.

SMITH, J. C.: *The Manufacture of Paint*. 2nd ed. New York: D. Van Nostrand Co. 288 pp. \$3.50.

UNDERWOOD, N. AND SULLIVAN, T. V.: *The Chemistry and Technology of Printing Inks*. New York: D. Van Nostrand Co. 145 pp. \$3.00.

U. S., 1,139,470, May 18. J. W. AYLSWORTH. Coating wood with phenolic condensation products. The wood is dried for several hrs. at 105° or a higher temp. and then coated with a phenolic varnish containing ingredients in proportions to form a final infusible condensation product. The varnish is applied at a temp. somewhat less than that of the wood and the coated material is then baked at a temp. lower than that used for drying until the coating is rendered insol. and infusible.

U. S., 1,140,354, May 25. R. B. LLOPART. Crude zinc sulfate in aq. soln. is treated with BaO₃ or PbO₃, air bubbles and steam to purify it and render it suitable for use in making lithopone of permanent color.

U. S., 1,140,449, May 25. C. ELLIS. Paint- and varnish-remover formed of C₂H₅ 15 gals., acetone 10 gals., paraffin 4 lbs., oleic acid 8 oz. and 26° NH₄OH 2 qts.

Brit., 547, Jan. 8, 1914. A. S. QUICK. The residue sep'd. during the purification process of making soapmaker's spent lyes suitable for the prepn. of glycerol is used as a base or body for printing-inks or paints. The residue is neutralized, if acid, and is mixed with pigment or color, and with oil, varnish, etc. If the residue is of insufficient body, it is mixed with BaSO₄ or CaSO₄, kaolin, kieselguhr, chalk, or the like.

Brit., 591, Jan. 8, 1914. WICKTÜLER-KÜPPER-BRAUEREI AKT.-GES. The lacquer on the inside of metal vessels such as beer casks is burnt on by supplying hot compressed air. Cf. C. A. 8, 2466, 3355, 3356.

Brit., 1,016, Jan. 14, 1914. L. PETERSEN-HVIID. A casein product, which, when dry, is easily powdered and readily sol. in alkalis, is obtained by mixing wet curd or milk with infusorial earth, and drying; the product is intended for use as a binding medium for colors. Cf. C. A. 9, 1134.

Ger., 280,595, Jan. 25, 1913. BADISCHE. Mfg. resin-like products by treating compds. of the type of the benzylhalides of the general formula R.CH₂.X (R = an aromatic residue, X = halogen) with metal halides in the absence of diluents. Cf. C. A. 9, 1399.

Ger., 280,648, Aug. 21, 1913. H. KÜHL. Mfg. soluble condensation products by heating casein and cresol, with HCHO, in the autoclave, at 3-5 atm. pressure. Resinous products result which have a wide tech. application. Casein and cresol form a comp'd. sol. in an excess of cresol. This soln. is heated with 40-50% by wt. of a 40% HCHO soln. in the autoclave, especially with the addition of small amts. of potash, under a steam pressure of 3-5 atm., according as varnish products or tough resin products are to be obtained. To prep. the soln. of casein-cresol in cresol, the granular crude casein is left to soften with twice its wt. of crude cresol poured over it. The uniformly softened product is employed directly, or after being mixed with a suitable amt. of cresol, according as a product rich in casein is desired, or otherwise. The granular crude casein may be left in linoleic acid for 24 hrs., heated for a short time, cooled and poured, and then allowed to soften with cresol. The product is gelatinous. If finely pulverized crude casein is used as the initial material, preliminary softening or soln. is unnecessary. The casein acts, in the 1st place, as contact and condensation agent, and in the 2nd place as a filler, which yields alc.-sol. products. E. g., granular crude casein 250 g. is

softened in 500 g. cresol to a uniform mass, then worked up with 400 g. HCHO to a homogeneous mixt., and this is heated in the autoclave up to 3' atm. This pressure is maintained for about 10 min., the heating is discontinued, and the mass is allowed to cool to the temp. of the normal pressure. The product may be worked up at once with alc. to a varnish.

Ger., 281,265, Apr. 22, 1913. ZAPON-LACK-GES. M. B. H. Mfg. varnishes from cellulose derivatives by dissolving cellulose derivs. in MeOH, acetone oil, ketones, or the like, after 1st adding polymerization products of cumarone or indene or both these, dissolved in C_6H_6 , alc., or like solvent. The so-called cumarone resin, obtained in the purification of benzene hydrocarbons and consisting in the main of a mixt. of polymerization products of cumarone and of indene, is preferred. The resulting varnish is oily, lustrous, dries uniformly, is very elastic, and is stable in air and light. The amyl preps., heretofore used, are unnecessary. E. g., cumarone resin 10 g. is dissolved in 50 g. C_6H_6 and added to a liquid consisting of a soln. of 30 g. collodion in 5 g. acetone oil, 100 g. alc., and 100 g. ketones. The resulting mass is dild. with 300 g. alc., 300 g. benzene, and 100 g. MeOH, or 10 g. cumarone resin is dissolved in a mixt. of 25 g. fusel oil and 25 g. tetrachloroethane. This soln. is added to a mixt. of 600 g. acetone and 300 g. MeOH, and then 40 g. acetylcellulose are dissolved in this liquid.

Ger., 281,373, Nov. 26, 1912. CHEM. FABRIK GRISBACH-ELEKTRO. In mfg. zapon varnishes or similar solns. of nitrocellulose, celluloid, or other cellulose esters, amyl acetate may be replaced by the much cheaper ethylidene compds. of aliphatic acids. The cellulose esters are simply dissolved in the ethylidene esters. The products are neutral, colorless, and almost odorless. The solvent evaps. rapidly, leaving the ester as an elastic adherent coat. E. g., nitrocellulose 4 is dissolved in ethylidene acetate 100 parts. The resulting soln. is ready for use as a varnish. Or, nitrocellulose 1 and camphor 1 are dissolved in ethylidene diacetate 50 parts. The soln. may be used as zapon varnish. The ethylidene esters of the aliphatic acids are made in the known manner from AcH and acid anhydrides. They may also be obtained from C_2H_2 and the corresponding acids.

27. FATS, FATTY OILS AND SOAPS.

E. SCHERUBEL.

Fat analysis and fat chemistry in 1914. W. FAHRION. *Z. angew. Chem.* 28, I, 161-70, 183-92(1915). E. H.

Proposed uniformity in methods of fat analysis. W. FAHRION. *Collegium* 1914, 599; *J. Am. Leather Chem. Assoc.* 10, 7-18(1915).—Report of a collaborative study by the Internatl. Assoc. of Leather Trade Chemists. Materials studied: German cod-liver oil, Newfoundland cod oil, whale oil, herring oil, Spanish sardine oil, Japanese train oil, linseed oil, neatsfoot oil, and sod oil (degras). *Acid value*: The differences are very considerable. The titrations may be carried out in the cold by using instead of alc. a mixt. of alc. and petroleum ether or alc. and ether. It is concluded that no important purpose is subserved by an attempt to make comparative exams. of the acid value of marine oils, since their content of free fatty acids rises on standing. It is recommended to use at least 5 g. of substance, or in the case of high acid values even more, and that the alkali be 0.2 or 0.5 *N*. If 0.1 *N* alkali is used, and the acid value is high, the alc. of the soln. is seriously dild. by the titration. The H_2O must not exceed 50% on account of the danger of dissociation of the soaps. *Saponification value*: The usual method was prescribed with a statement by each observer of the concn. of alkali and acid used and time of boiling in sapon. The agreement is not close enough,

probably due in part to the ease with which marine oils change in comp. It is recommended that both in the case of linseed oil and of the marine oils the following points be observed: at least 3 g. of oil should be taken; the alkali should contain as little H_2O as possible, at most under 10% (it is best to dissolve the KOH directly in 96% alc., or a 2 *N* alc. soln. containing 10 or 15% of H_2O may be dild. with 3 or 4 times its vol. of 96% or of abs. alc.); 2 hrs. or even $\frac{1}{2}$ hr. is much too long to boil true oils or fats (when sapon. is complete the fat goes into clear transparent soln., and if the soln. is then boiled about 5 min., there will be no unsaponified fat remaining); in titrating back the H_2O content of the soln. must not exceed 50%. *Iodine value:* The differences among the Hübl values are very great (up to 26), but the results by the Wijs process are very concordant. It is recommended to abandon the Hübl method and use the Wijs. The values by the Hanus method fell between those given by the other 2 methods. *Unsaponifiable:* The Hömig-Spitz method was indicated. The agreement among the collaborators leaves much to be desired. The differences are doubtless due to the variations in the method made by the collaborators. F. washes the soln. of soap in petroleum ether with 50% alc. to avoid any dissociation. Unsaponifiable matter from fish oils should not be dried above 100°. One collaborator used the Bömer method (without purifying the unsapon.) obtaining in most cases higher results. F. doubts if the Bömer method, even with the purification of the unsaponifiable, would give results higher than the Hömig-Spitz method. The latter is the most convenient. *Degras analysis:* Five collaborators reported the following detns.: H_2O , ash, unsaponifiable, fatty acids, hydroxy acids, H_2O -sol. hydroxy acids, acid no., sapon. no., no. by Hübl and Wijs. Methods used are mainly those of F. (cf. *C. A.* 5, 2578). Results show good concordance. The method for detg. H_2O by mixing 5 g. with 5 g. of glass and heating to const. wt. in water-oven required 47 hours. Methods for H_2O using alc. or acetone and evapg. required about 19 hrs. F.'s method (boiling H_2O off directly) may be executed in 15 min.

F. W. SMITHER.

Constituents of animal fats. J. KLIMONT and K. MAYER. *Monatsh.* 36, 281-8 (1915); cf. *C. A.* 9, 727.—The isolation of margaric acid from horse fat led K. and M. to suspect that the eutectic mixt. of palmitic and stearic acids obtained from goose fat might contain margaric acid. This mixt. has been sepd. into margaric acid, m. 57.5-58°, and palmitic acid, m. 60-61°. By the elaidin test oleic acid was shown to be present. A fraction, m. 60.5°, was obtained by repeatedly crystg. from Et_2O ; it may be dipalmitomargarin.

C. J. WHEAT.

Analysis of Turkey red oils. W. HERBIG. *Seifensieder-Ztg.* 42, 164-5, 186-7 (1915); cf. *C. A.* 8, 2809.—H. has sought to det. whether or not the neutral fat in sulfonated oils consists of pure glycerides and to this end com. products were analyzed for glycerol and neutral fat. It was concluded that besides glycerides there are "glycerol-free" substances present. The ordinary method for the detn. of SO_2 in these products is not applicable in the newer preps. of this kind. In these cases benzene or xylene should be used instead of ether for dissolving the oil prior to shaking out the SO_2 with NaCl soln.

E. SCHERUBEL.

Constitution of soap solutions. H. PICK. *Seifenfabr.* 35, 255-7, 279-81, 301-3, 323-5 (1915).—The cond. of the K salts of individual fatty acids containing 6 to 18 C atoms was detd. The solns. were prepd. by dissolving the fatty acid in KOH in Ag flasks without access of CO_2 from the air. The detns. were made at 90° and the sp. gr. of the solns. detd. with a pycnometer. A table is given showing the cond. of K palmitate, also other tables by other authors. A 0.5 *N* solution of K palmitate at 90° is clear, a *N* soln. coagulates between 60 to 70°, while 0.01 and 0.02 *N* solns. are weakly opalescent and give a small ppt. Normal K stearate at 90° is clear and colorless but 0.05 *N* is turbid and gives a ppt. equal to $\frac{1}{2}$ of total vol. K myristate

and laurate form clear solns. with some pptn. The caprate, caprylate and caproate all give small ppts. As regards washing, the palmitate and myristate of K make ideal soaps for the hands; the stearate is less satisfactory. The Na salts are not usable. K caproate in concd. soln. is a good soap but the caprylate is better; the caprate is the only one of the series which gives a typical lather. The conds. of the K and Na salts are similar. There are 22 tables showing conds. and hydrolysis of various fatty acid salts with comments for each. E. S.

Transparent glycerol soaps without castor oil. ANON. *Seifensieder-Ztg.* 42, 185-6(1915).—Three formulas are given as follows: (1) 38 kg. tallow, 10 kg. olive oil, 10 kg. coconut oil, 31 kg. NaOH (37°), 3 kg. KOH (37°), 14 kg. H₂O, 33 kg. glycerol (28°) and 26 kg. alc. The fat is heated to 80° and the glycerol, KOH, NaOH and 1/2 the water added in order given. The alc. is added after sapon. is completed. (2) 40 kg. tallow, 5 kg. peanut oil, 45 kg. coconut, 40 kg. NaOH (38°), 9 kg. sugar dissolved in 14 kg. water, 40 kg. alc. (3) In Germany where no neutral fat may be used, a first class transparent soap cannot be made, but a transparent war soap is made from 36 kg. coconut oil fatty acids, 35 kg. peanut oil fatty acids, 28 kg. tallow fatty acids, 50 kg. NaOH (38°), 8 kg. KOH (38°), 30 kg. sugar in 40 kg. water, 8 kg. Na₂CO₃, 2 kg. KNO₃, 10 kg. of filler made from 80 kg. water, 20 kg. sugar, 11 kg. K₂CO₃ and 11 kg. salt. E. SCHERUBEL.

Use of sugar in soap manufacture. F. GOLDSCHMIDT. *Seifenfabr.* 35, 348-9 (1915).—Breymann in an article in the *Berliner Tageblatt* calls attention to the use of sugar in soap which has been recently patented. Besides its use as a filler it can be used as a substitute for fat, for it combines with alkali and the resulting compd. has deterative properties. It is said that the color of colored goods is not affected by alk. soap in the presence of this sugar compd. and also that such soap is well adapted for use with sea water. E. SCHERUBEL.

Soft soaps. L. B. *Seifensieder-Ztg.* 42, 163-4(1915).—As a substitute for potato flour, which was extensively used as a filler for this class of soap, moss is now being used. It is prepd. as follows: 1000 kg. H₂O, 60 kg. moss, 30 kg. KOH (50°) and 55 kg. K₂CO₃ are boiled for 2 hrs., and the soln. filtered and added to the soap. E. SCHERUBEL.

Colgates shaving soap. J. DAVIDSOHN. *Seifenfabr.* 35, 321-3(1915).—The analysis is as follows: H₂O 6.40, combined K₂O 9.39, combined Na₂O 3.27, fatty anhydrides 78.36, glycerol 3.70, soap 91.02%, R. M. no. of fatty acids 0.6, I no. 7.5, neutn. no. 206, m. p. of fatty acids 53°. From this it follows that the fat base of this soap is stearic acid. E. SCHERUBEL.

Oil from Manihot seeds (FRANK) 30. Oil from nuts of *Canarium polyphyllum* (WAGNER) 12. Fats (MAIN) 18.

HOLDE, D.: *The Examination of Hydrocarbon Oils and of Saponifiable Fats and Waxes.* Trans. from 4th German ed. by E. Mueller. New York: Wiley. 484 pp. \$5.00.

LEWKOWITSCH, J.: *Chemical Technology and Analysis of Oils, Fats, and Waxes.* 5th ed. Vol. III. London: Macmillan & Co. 483 pp. 20s.

U. S., 1,139,592, May 18. A. J. SPIELER. A catalyzer for hydrogenating oils or fats is made by heating a mixt. of H₂O, gelatinous hydrated alumina or silica, and a Ni compd., e. g., formate or carbonate, readily decomposable on heating to 235-50° for a sufficient time to decompose the Ni compd. and drive off the H₂O.

U. S., 1,140,808, May 25. A. W. FRENCH. Apparatus for cooking cottonseed-meal before expressing the oil. Cf. C. A. 9, 390.

Brit., 1,410, Jan. 19, 1914. A. H. CHARLTON. In impregnating or saturating oils or fats with gases, e. g., hydrogenating oils, a rotary drum is used, without stuffing boxes, and heated by a jacket to which steam, which may be satd., is supplied through a passage in 1 trunnion, passing out through the other trunnion.

28. SUGAR, STARCH AND GUMS.

A. HUGH BRYAN.

Progress of beet-sugar manufacture in 1914. EDMUND O. VON LIFFMANN. *Chem. Ztg.* 39, 85-7(1915). J. H. MOORE.

The (French) sugar industry and the war of 1914. GEORGES DUREAU. *Bull. soc. d'encour. ind. nat.* 122, 290-306(1915). E. J. C.

The purity of the sirup adhering to raw sugar. A. HERZFELD. *Z. Ver. Zucker-ind.* 65, 1-10(1915).—Fifty-eight samples of raw sugar were tested for crystal content by H.'s method (cf. C. A. 6, 1548) and the purity of the sirup calcd. from these results. In 41 out of the 58 cases the actual factory rendement was greater than the crystal content, the difference ranging from +2.88% to -1.5%. The purity of the adhering sirup ranged from 76.5 to 53.7. The highest was from a factory using the Steffens process and contained raffinose; the latter figure was of questionable accuracy. Excluding these, the range is 75.1 to 58.1, av. 66.8. There was no relation between purity and rendement, or between purity and difference between rendement and crystal yield, or between purity and H₂O in the sugar. The sugars showing the greatest difference between rendement and crystal content gave the best appearing crystals. Sugars with higher content of CaO in the washed crystals gave relatively low purity of the sirup, and *vice versa*. This may be due to cooking from lower grade sirups and finishing in crystallizers. The lowest CaO (0.002%) gave the highest purity (74.7) except purities, possibly accounted for by raffinose. The highest CaO did not give the lowest purity, but the lowest purities were found among the higher CaO values. The av. CaO was 0.020%.

W. L. BADGER.

The effect of lead tannate clarification on the polarimetric determination of sugar, dextrin and starch. J. GROSSFELD. *Z. Nahr.-Genussm.* 29, 51-6(1915).—G. made a study of various clarifiers in an attempt to find one that would yield, for polarization, solns. which were not cloudy or dark colored. He found that a mixt. of equal amts. of 10% com. tannin soln. and Pb acetate gave good results. A blank detn. on the tannin soln. using equal quantities of it and Pb acetate and excess of K₂SO₄ soln. gave no rotation on polarizing. Detns. on known amts. of sucrose, invert sugar and lactose, using from 2 cc. to 20 cc. each of the tannin and Pb acetate solns. gave good results. In the case of starch sugar and glucose good results were obtained using 2 cc. of each of the tannin and Pb solns. Dextrin gave low results. Larger quantities of the clarifier cause low results for glucose and dextrin, but using small quantities of the clarifier, such as 0.1 cc., the results were good. The following directions are given for the polarimetric detn. of sugars in foods: Dissolve 10 g. in a little H₂O and transfer to a 100 cc. flask with an equal quantity of H₂O so that the vol. of liquid is 50-60 cc.; then add 2 cc. each of the tannin and Pb solns. (in the case of fresh fruit or beets use 5-10 cc., for honey use 1 cc.). After each addition shake hard. Then make up to mark with satd. K₂SO₄, adding it slowly with const. shaking. Let stand for a few min., filter through a dry paper, and polarize. If the filtrate is colored or cloudy place 50 cc. in a 55 cc. flask and add 2.5 cc. each of the tannin and Pb solns., shake, filter and polarize in a 220 mm. tube.

Sols. containing coal tar colors (such as fluorescein, eosin, Congo red, fuchsin) and caramel were decolorized by the use of the clarifier. *Conclusions:* The tannin-Pb acetate clarification is very successful for clarifying sugar and dextrin sols. The polarization value of sugar sols. shows no loss through this clarification. While dextrin is somewhat absorbed the error is very slight if small quantities of clarifier are used. Starch cannot be detd. this way because of its absorption in the ppt. Colored sols. can be practically decolorized.

H. L. LOURIE.

Notes on clarification. W. E. CROSS. *Revista industrial y agricola de Tucuman*, Sept.-Oct. (1914); *Louisiana Planter* 54, 286.—Of the many modern methods of clarification all are modifications of the carbonation or the sulfitation processes. The sulfitation process is efficient and inexpensive, but less thorough than carbonation. The best practice is to sulfur heavily and then to lime back to 0.8-1.0 cc. acidity. It is important to have the clarified juice entirely free from suspended matter, and this is better accomplished by filtration than by settling. After sepn. of suspended matter the acidity may be increased by the addition of SO_2 , H_3PO_4 or acid Na phosphate. A. GROSS.

The decomposition of reducing sugars. A. SCHWEIZER AND G. LOOS. *Arch. Suikerind.* 22, 1855-9(1914).—The effect of the absorption of atm. O by alk. sugar sols. was studied. A soln. containing a mixt. of sucrose and glucose was treated with 3% its wt. of $\text{Ca}(\text{OH})_2$ soln. (20° Bé.) and kept at a temp. of 28° for 3 hrs. in one expt.; in another, air free from CO_2 was passed into the soln. for 3 hrs. The 2 sols. were then treated with CO_2 until weakly alk. to phenolph., heated to 55° and filtered. An exam. of the filtrates showed that glucose decompn. had taken place in both cases but less color had been produced in the soln. through which air had been passed. E. H.

Experiments on the eradication of the beet nematode, Heterodera schachtii. H. C. MÜLLER AND E. MOLS. *Z. Ver. Zuckerind.* 64, 959-1050(1914).— NaNO_3 and $(\text{NH}_4)_2\text{SO}_4$ alone or combined, did no good and possibly increased the infection. K_2CO_3 , and especially Na_2CO_3 , greatly increased the infection. The continued use of NaNO_3 as a fertilizer is held to be partly responsible for the spread of the disease. S or NaCl were of no value in lowering the infection. Sugars (applied with the idea of increasing bacterial action in the soil) gave no positive results but indicated possibilities. 0.5% H_2SO_4 or 1% KOH did no good. The earth which clung to the beets when pulled was found to be badly infected, especially with cysts which developed the second season. Mixing this earth with 25% CaO killed all the active nematodes but did not affect the cysts. The removal of beets from the field with the earth adhering, and then the thorough sterilization of this earth, is strongly recommended. CS_2 , HCHO, and allyl alc. were all effective. To thoroughly disinfect one pot, 200 cc. CS_2 , 15 cc. 40% HCHO dild. to a 2% soln., or 10 cc. allyl alc., pure or dil., were sufficient. Planting onions between beet rows, or treating the soil with onion juice, had no effect, in spite of the expected action of the allyl thiocyanate. Peat meal increased the beet yield but did not affect the nematodes. Beet leaves increased the infection very greatly. Shallow plowing causes the nematodes to concentrate in the surface layer, and to attack the young beets very rapidly. Thinning then removes a large number of nematodes, and this is strongly recommended. Kuhn's method of planting a "collecting" crop and pulling when badly infected was modified by killing the collecting crop with FeSO_4 , and in this form was found to be very efficient. The necessity for using the microscope to det. when to kill the collecting crop is a disadvantage, but if 3 weeks in warm weather or 4 in cold weather are allowed from the time of sprouting, nearly the same results will be obtained as with the microscope. Submerging the soil for 1 year did not decrease the infection. Expts. were begun to select beets that seemed to be resistant in badly infected plots, but no results have yet been obtained. The greatest number of nematodes were found in the first 20 cm. from the surface; at a depth of 40 to 60 cm. the soil

was practically free from infection. The infection traveled, under most favorable conditions, 56 cm. in 3 months. This was reduced to 5 to 10 cm. by CaO . Larvae buried as deep as 50 cm. easily reached the surface in one season. W. L. B.

Kauri gum. JAS. B. AITKEN. *Pharm. J.* 94, 550(1915).—A descriptive account of the occurrence, mode of collection and com. grades of the gum. S. WALDBOTT.

Use of raw sugar in distilleries (WINDISCH) 16. Working up sugar beets into alcohol (BERLACH) 16. Yield of alcohol of refined and of raw sugar (FOTI) 16.

U. S., 1,139,620, May 18. H. WULKAN. Producing concentrated solutions of glucose by treating starch with dil. H_2SO_4 or HCl to form a dil. inversion soln. and reacting on fresh starch with this soln. The process is repeated until the desired concn. is obtained and the concd. soln. is then neutralized with borax.

U. S., 1,139,621, May 18. H. WULKAN. Moistening dextrin while agitating it in a double-walled vessel maintained at about $40\text{--}50^\circ$ by circulation of air through the jacket of the vessel. The air after passing through the cooling jacket is mixed with steam and the dextrin moistened with this mixt.

U. S., 1,140,353, May 25. G. H. BENJAMIN. Preserving cane, sorghum or beet-root by cutting into particles about 0.5 in. in thickness, mixing with sufficient Ca phosphate to neutralize the normal acidity of the juices and with enough diatomaceous earth to absorb any free juices, treating with dry heated air to remove some of the excess H_2O if necessary and pressing the material into masses of the size desired for packaging.

Brit., 530, Jan. 8, 1914. C. C. MOORE. Recovering starch from succulent starchy vegetable materials, such as starchy tubers and roots, *e. g.*, potatoes, cassava, sweet potatoes, artichokes, yams, etc., and starchy fruits, such as bananas, bread-fruit, etc., by drying or desiccating, usually after a suitable preliminary comminution or subdivision, then sufficiently grinding, dry, and finally treating the material by wet methods to obtain starch milk and to recover the starch. After the dry grinding, the material may be ground wet, mainly to free the loosened starch from the ruptured fibers. The starch milk obtained from the dry-ground fine material is treated as usual on starch tables or in starch centrifugals. As an example, materials such as cassava, etc., in their natural moist state, are coarsely ground, grated, chipped, sliced, or otherwise comminuted to small quickly drying particles. These particles are then dried as usual, as by means of rotary drums, belt driers, kilns, etc., sun-drying being unsuitable, until they are brittle or frangible. A temp. of 120°F . or less is suitable for the drying, but the temp. may sometimes be as high as 140°F .; in the earlier stages, hotter air can be used, vaporization keeping the material cooler. The dry fine-grinding can be done with any suitable mill or grinding app., as a buhr stone grinder, suitably to a fineness, with cassava, of 80 mesh, or better, 100 mesh. In prepg. the starch milk, wet grinding is preferable, but, after sufficiently fine dry grinding, simple stirring or agitating may be substituted. Where the material is not very finely dry-ground, it is often desirable to steep in addition to the wet grinding or agitation; fermentation may occur. When the fine dry-ground material is treated with H_2O and the resulting magma screened to give starch milk, the swollen fragments of fiber and non-starchy tissue are retained by the screen. From the resulting milk, starch is recovered in any convenient way. With dry, very fine material, the amt. of H_2O necessary to wash the starch from the fibrous matter in obtaining the milk is much diminished and, correspondingly, the concn. of the waste effluent from the starch tables is much increased, rendering easier its concn. for human or animal food. A short steep, preliminary to

making the milk, is sometimes desirable, particularly with potatoes; the steep liquor may be drawn off, and concd., or may pass into the H_2O for making the milk. The concd. product represents a concd. nitrogenous material, useful as a cattle food or as a raw material for making human food. The steep liquor, or effluent from the tables, or both together, may be evapd. down directly, or be strained, filtered, or filter-pressed to recover insol. materials, the clear liquor concd. to a sirup, the insol. matters added, and the whole dried. While the drying must not be at so high a temp. that the starch would be hydrolyzed, it should be as rapid as possible to inhibit enzyme action; various compds., for instance 0.20–0.25 % of $NaHSO_3$, relative to the cassava or potatoes, may be added for the same purpose, the yield and color of the starch obtained being improved. Thus, comminuted cassava tubers or potatoes, emerging from the chopping, grating, slicing, or like machine, are sprinkled with Na or Ca bisulfite, and may then be dried suitably. In this case drying is readily effected in the sun, or by air of normal temp., without fear of souring, blackening, etc. The dried material, particularly in the presence of bisulfite, may be stored indefinitely or shipped any distance. In the subsequent treatment with H_2O , a little SO_2 or bisulfite may be added. In the case of making starch from succulent vegetable materials, such as potatoes, cassava, etc., by ordinary methods, it often happens that, after the usual wet grinding, only about $\frac{1}{2}$ of the starch is recovered on the tables, the rest remaining on the sieves. The present process may be applied to these residues—by drying them to a brittle hardness, fine grinding, forming starch milk and recovering the starch on the tables.

Brit., 1,576, Jan. 20, 1914. M. WEINRICH. Purifying cane sugar or sirup by mixing it with lime and introducing into H_2O or juice simultaneously with CO_2 or flue gases, and neutralizing with H_3PO_4 , H_2SO_4 , or other acid. In treating raw sugar, the sugar may be made into a magma with H_2O in a mixer having toothed disks upon 2 shafts and scrapers or distance-pieces, and lime (preferably caustic, although slaked lime or milk of lime may be used) is fed in by a vibrating screen. The magma overflows by a pipe into 1 of a number of defecators containing H_2O , and the stirrers are at once started and CO_2 , etc., is introduced through pipes. An acid is added to complete the neutralization, or nearly so, and the soln. is heated by a coil and filtered. The raw sugar may be washed first, and the resulting sugar and sirup can be simultaneously treated. At the plantation factory, the 2nd and 3rd products are made into a magma with the raw cold juice and lime, and run into juice in the defecators, and the green sirup is limed and also run into juice. Cf. C. A. 8, 1028, 1029.

Ger., 281,056, Oct. 17, 1913. Addition to 276,489 (C. A. 9, 730). AKT.-GEM. FÜR ANILIN-FABRIKATION. In obtaining betaine hydrochloride from molasses, molasses slops, or other runnings from the beet-sugar manuf., the initial material is 1st acidified with HCl and dehydrated *in vacuo* at not over 60° , whereupon the betaine-HCl crystallizes out.

29. LEATHER AND GLUE.

LLOYD BALDERSTON.

U. S., 1,140,174, May 18. L. LILIENFELD. "Artificial leather" is made by coating paper or cloth with alternating layers of celluloid soln. mixed with *o*-tricresyl phosphate and a mixt. of viscose with the condensation product formed from Chinese wood oil 100 and *o*-toluidine 200 parts by the action of heat and $ZnCl_2$, emulsified with Na sulforicinoleate. Cf. C. A. 8, 1886.

Brit., 714, Jan. 10, 1914. D. B. MACDONALD. Treating leather splits and belly and shoulder portions, to render them solid, flexible, non-hygroscopic, waterproof,

and capable of holding stitches, by applying, on one or both surfaces, a soln. of celluloid, pyroxylin, cellulose acetate, or other ester or product of cellulose, such as viscose. Whole leather is preferably treated by drumming, soaking, or dipping, and cut-out parts, such as soles, may be brushed with the soln. With viscose, a complete satn. is necessary, whether the leather be whole or cut. Whole leather sheets or cut-out pieces are preferably levelled by rolling before being treated. Aniline dyes or stains may be added for application to boot soles, edges, or heels, the soln. being used on boots and shoes after they have been scoured, and the usual bottom dressing being omitted. Weltered insoles are treated on the flesh side and channelled edges, the need for a canvas backing to hold the stitching being thereby eliminated. Specified solns. contain in stated parts: (1) celluloid, pyroxylin, cellulose acetate or other ester, acetone, acetone oils or other ketone, benzene, petroleum benzine, wood naphtha or alc., amyl acetate, amyl alc., ethyl acetate, terpenes or oil of camphor, and glacial acetic acid; (2) celluloid, ethyl and methyl alc., light ketone and oil of camphor, this soln. being particularly suitable for boot-sole edges, bottoms, or heels; (3) pyroxylin, castor oil, ethyl alc., light ketone, benzene, and amyl acetate, this soln. giving a very flexible coating; (4) pyroxylin, camphor, and naphthalene; (5) a soln. of viscose in H_2O , this being non-inflammable. Wax may be added to facilitate edge-burnishing, and castor oil or resins or oleoresins, such as Canada balsam, may be added to the celluloid to confer flexibility.

Fr., 466,790, Mar. 12, 1913. J. BOILEY. In a quick tanning process, after deliming and before treatment with tanning agents, the skins are softened by means of alum or Al acetate (free from H_2SO_4 , Fe, and combustible matter) for 24-48 hrs.

Fr., 468,287, Feb. 10, 1914. O. LINDNER. In mfg. artificial sole leather, fiber felt, before pressing, is impregnated with K silicate and pumice, dried and pressed through calenders, softened with alc. and glycerol, again calendered, and impregnated with stearin and resin.

Ger., 276,286, May 31, 1913. A. VAN OORLAER. App. for dehairing animal skins.

Ger., 280,195, Oct. 17, 1912. M. KIND. Cooling gelatin and like materials by means of a current of filtered, cooled air which is recooled and returned to the process.

Ger., 280,233, Jan. 27, 1912. BADISCHE. Tanning animal skins by treating them with H_2O -sol. compds. which are obtained from $HCHO$ or substances generating $HCHO$ or reacting as $HCHO$, and aromatic hydroxy compds., alone or in admixt. with other tanning or non-tanning substances. By hydroxy compds. are to be understood those which contain 1 OH group per nucleus and in addition 1 or more other salt-forming acid groups. E. g., a moderately acid, concd. soln. of the Na salt of sulfonated methylene-*p*-hydroxybenzoic acid is dild. with H_2O until the soln. is about 5%. This liquor is used for tanning. The Na salt of the sulfonated methylene-*p*-hydroxybenzoic acid is obtained by dissolving 100 parts of methylene-*p*-hydroxybenzoic acid (obtained by acting with 1 mol. $HCHO$ on 2 mols. *p*-hydroxybenzoic acid, dissolved in conc. H_2SO_4) in 300 parts of conc. H_2SO_4 , and heating the liquid until a test remains clear upon dilg. with H_2O . The liquid is then cooled, poured upon ice, and pptd. with NaCl soln. Cf. C. A. 9, 393.

Ger., 281,351, Dec. 10, 1912. M. PAULS. Mfg. a leather substitute for shoe soles, wheel tires, and the like, by treating and satg. pressed or woven materials of any kind, with vegetable oil, especially thickened linseed oil, to which fat-containing dyes are added, and adding to the mass finely divided Fe, brass, Cu, Al, or the like metals. The product can be cut with a knife or stamped to form any desired shape.

30. RUBBER AND ALLIED SUBSTANCES.

R. T. STOKES.

The valuation of plantation rubber. J. M. VAN RESANDT. *India Rubber J.* 49, 700(1915).—R. advises standardization and the establishment of a central rubber station.
EDWARD J. KELLEY.

Hypothesis on the process of vulcanization. ANON. *Caoutchouc et gutta-percha* 12, 8601-2(1915).—In the vulcanized product the S exists in the colloidal state. When rubber is heated with S the resins and proteins react with it producing H_2S and SO_2 . Likewise metallic oxides, such as PbO_2 , ZnO_2 , etc., when heated with S in the presence of air, produce SO_2 and the corresponding metallic sulfides. At the proper temp. the following reaction takes place: $SO_2 + 2H_2S = 2H_2O + 3S$, colloidal S thus being produced. In the case of cold vulcanization by means of S_2Cl_2 , the latter compd. contains the colloidal S necessary; but since this colloidal S can not diffuse through the mass as in hot vulcanization, the product is vulcanized only on the surface.

E. J. K.

Straight test pieces and ring test pieces for the mechanical testing of rubber. ANON. *Caoutchouc et gutta-percha* 12, 8603-4(1915).—A comparison of the 2 forms of test pieces. The ring test piece did not give an exact idea of the strength of rubber, but was preferred to the straight or rod test piece.

E. J. KELLEY.

Work of the Central Rubber Station for the (German) colonies. F. FRANK AND E. MARCKWALD. *Chem. Ztg.* 38, Rep. 587(1914).—The nitrogenous substance in the latex is a typical albuminoid with all the characteristic reactions. Research on the extn. of oil from Manihot seeds showed the seeds to be composed of about 55% husk and 45% kernel. The latter contained 55% of oil, which appeared to be free from obnoxious bitter principles, with properties resembling those of sweet oil.

E. J. K.

Castle rubber from India. ANON. *Bull. Imp. Inst.* 13, 17-8(1915).—A new source of rubber of somewhat inferior quality. Analyses are given.

L. G. C.

Rubber from Dominica. ANON. *Bull. Imp. Inst.* 13, 18-20(1915).—Physical properties and chem. comp. of various kinds of rubber grown in Dominica are given.

L. G. C.

Coconut water as a coagulating agent for latex. W. A. LEONARD. Colombo, Ceylon. *India Rubber Rev.* 15, 11(1915).—One or 2 ounces of coconut water which has been allowed to ferment for 4 or 5 days will coagulate 1 pint of pure latex. It is said to produce a better rubber than that obtained by the present method of using crude $AcOH$, especially as to color; and a cleaner rubber than that obtained by the cocco-fermentation acid treatment.

S. LEVY.

Electrical coagulation. ANON. *India Rubber J.* 49, 218(1915).—The latex is well sieved and poured into oblong tanks, after which the electrodes (consisting of rods contained in porous pots), which are fastened in a lid, are placed in the vessels and the current passed. Coagulation takes place at the positive pole, which becomes covered with a solid layer of rubber, while the negative pole remains clean. After one-half hour the current is reversed. The whole process is completed in 1 hr.

E. J. K.

The "Derry" smoking process. ANON. *India Rubber J.* 49, 631-2(1915).—The process consists of coagulation by sepn. of the H_2O from the caoutchouc in the latex by heat and smoke in concentric layers between films of smoke on a travelling belt. Every particle is exposed to the action of smoke and polymerized.

E. J. K.

Tapping and the storage of plant food in *Hevea brasiliensis*. L. E. CAMPBELL. *India Rubber J.* 49, 735-6(1915).—The effects of tapping on the trees were almost purely

local, especially in a horizontal direction. C. concludes that by changing the tapping from one part of the tree to another at intervals, the resting period of each area is nearly as effective as if the whole tree were allowed to rest.

E. J. K.

A new disease in Malaya. F. T. BROOKS. *India Rubber J.* 49, 736(1915).—The bark on one side of the rubber tree dies, and the wood beneath it becomes brown in color. In advanced cases the disease spreads up the trunk to a height of 2 or 3 feet. It is due to a fungus growth, probably one of the *Xylariaceae*.

E. J. K.

Testing of rubber gloves for insulating power. ANON. *India Rubber World* 51, 123(1914).—The usual practice in testing gloves is to fill them with H_2O and immerse them in a can of H_2O . Electrodes are immersed in the H_2O in the glove and the H_2O in the can, and the current applied gradually and uniformly to from 3,000 to 10,000 v., depending upon the kind and quality of glove and the service for which it is intended. The test-voltages employed vary from $1\frac{1}{4}$ to 2 times the voltage of the circuit upon which the gloves are to be used, and are applied from 1 to 5 min. An ammeter is connected in the test circuit and all gloves are rejected whose insulation resistance is so weak that the current flowing through the glove exceeds 10 milliamp. at 10,000 v. An illustration is given showing the glove testing equipment of the Elec. Testing Lab., New York.

S. LEVY.

Diffusion of carbon dioxide through rubber (RODT) 2.

Brit., 418, Jan. 7, 1914. T. H. CRUSE and J. H. BRISCOM. A puncture-sealing composition, to be inserted in the inner tubes of tires, consists of white dextrin, washing-soda, and H_2O . The dextrin and soda are mixed dry, and warm H_2O is added, the proportions varying from 1 oz. dextrin and 1 dram soda to 6 oz. dextrin and 6 drams soda, to half a pt. of H_2O .

Brit., 528, Jan. 8, 1914. K. TARASSOV. Phenol-formaldehyde condensation products are obtained by the action of $HCHO$ or its polymers, etc., on mixts. of phenol or its homologs with sulfonated fats or fatty oils, aromatic sulfo fatty acids, or the sulfonic acids obtained by sulfonation of naphtha, petroleum distillates, or other hydrocarbon oil. According to the conditions of the reaction, sol. resinous substances or hard insol. products may be obtained. The sulfonated compd. employed enters into the comp. of the product, increasing its elasticity, and also acts as a catalyst in the reaction, so that other catalysts may be dispensed with. According to examples, sulfonated castor oil, the aromatic sulfo fatty acids obtained according to 4,741, 1898, from naphthalene and oleic acid, a mixt. of sulfonated castor oil, sunflower-seed oil, or rapeseed oil, and sulfonated vaseline oil, are used. Instead of $HCHO$, paraformaldehyde, trioxymethylene, hexamethylenetetramine, or other substance having active CH_2 groups, may be used. The liquid, resinous, or rubber-like intermediate condensation product may be mixed with sand, sawdust, asbestos, fibers of cellular bodies, etc., before the final product is obtained. Cf. C. A. 9, 980.

Brit., 1,199, Jan. 16, 1914. W. G. GASS. Machine for washing, macerating, or creping rubber, etc.

Brit., 1,200, Jan. 16, 1914. W. G. GASS. App. for washing rubber, particularly scrap rubber mixed with bark, sand, etc.

Brit., 1,111, Jan. 15, 1914. P. SCHIDROWITZ and H. A. GOLDSBROUGH. Porous or spongy rubber is made directly from rubber latex by coagulating the latex under conditions which yield a porous or spongy coagulum, and by fixing the pores so produced by vulcanization. The vulcanizing agent may be added prior to, during, or after coagulation, and vulcanization may be carried out in the wet state; the coagulant may

be such that the heat of vulcanization may bring about the coagulation, so that the sponginess is produced during vulcanization. The coagulum need not be purified. Coagulation may be effected by means of a coagulant, by heat, or by the use of a rubber solvent or ppt. Examples of coagulants are: HOAc, organic acids which are comparatively insol. in cold H_2O or latex but which dissolve on heating, acid salts for hevea latex, CS_2 , C_6H_6 , acetone, alc., and salicylic acid. There may be added, before, during, or after coagulation, substances which generate gases when heated or by chem. action, such as carbonates or sulfides or other suitable S compds., or NH_3 . Vulcanization may be effected by S as such or in soln., or by compds. which liberate S. Fibrous substances, fillers, etc., may also be added. Washing-gloves, etc., may be made by dipping a suitably shaped article, which may be made of fabric such as Turkish towelling, into the latex. The invention is applicable also to the manuf. of upholstery, flooring, golf balls, rowing-pads, etc.

Fr., addition 18,428, Nov. 10, 1913, to 456,598. BAYER & Co. Ebonite-like products, substitutes for rubber, are obtained by vulcanizing the Kondakov polymerization product of β,γ -dimethylbutadiene in the presence of piperidine, pyrrolidine, β,β -dimethyl- Δ -methyltrimethyleimine or dimethylamine.

Ger., 279,649, Nov. 16, 1913. F. KEMPTER. Mixing machine for rubber.

Ger., 280,848, Nov. 13, 1913. Addition to 259,253 (C. A. 7, 3242). H. COLLOSEUS. Separating caoutchouc, gutta-percha, or balata from saps yielding these gums. Instead of the alkali specified in the principal process, any substance may be worked up with the sap which reacts with the alk. earth, earth, or heavy metals salts with the formation of H_2O -insol. compds. Also, the order in which the additions are made may be varied at will. If the additions are of a neutral character, the addition of a small amt. of alkali is imperative. Good results are secured by adding water-glass, borax, Na_3PO_4 , and an alk. earth, earth, or heavy metal salt, to the sap, in any order. Furthermore, by the double decompn. of Na_2SO_4 with alk. earth salts, coagulation of the sap may be effected readily. The same result is attained by conducting CO_2 through the sap to which alk. earth salts have been added. At the time of coagulation, emulsifying agents, such as soap, albumin, or the like, may be added. Also, the serum which seps. from the coagulated caoutchouc possesses strong coagulating properties, and may therefore be employed for that purpose. E. g., 1 kg. kickxia sap is mixed with 85 cc. of a 25% $CaCl_2$ soln. The sap is then neutralized, and 60 cc. of a 10% alkali soln. are added with constant stirring.

Ger., 280,959, Mar. 21, 1912. BAYER & Co. Mfg. caoutchouc by subjecting isoprene to the action of metals of the alkali or alk. earth group in such manner that the metals come more or less completely into contact with the vapor of the hydrocarbon. E. g., a Na or K wire is introduced into the vapor of isoprene boiling under a reflux condenser. After several days all the isoprene has disappeared from the flask. It is found as caoutchouc around the alkali metal wire. If the alkali metal is immersed in the boiling isoprene, the polymerization requires from 3 to 4 times as long. Ca or Ca-Na may be employed instead of K or Na.

CHEMICAL ABSTRACTS

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I. APPARATUS.

L. C. JONES.

Gas washing apparatus with enclosed filter. E. R. WEAVER AND J. D. EDWARDS. *J. Ind. Eng. Chem.* 7, 534-5(1915).—Three forms of gas-washing app. for analytical purposes are described with cuts. ISADOR MILLER.

Pipetting with the suction pump. FERDINAND PILZ. *Z. landw. Versw.* 18, 29-31 (1915).—The Mohr valve (of metal or glass) is bored as shown. A small metal tube (not shown) is inserted through the hole in the rubber tube *B* into the hole in the valve *A*, to prevent slipping. The hole at *a* being closed with the forefinger, a pressure of the other fingers permits the suction to act.

L. J. GILLESPIE.

Gas burner with screw. ANON. *Chem. Ztg.* 39, 352(1915).—The burner is screwed into the gas pipe, instead of rubber tubing being used.

J. H. MOORE.

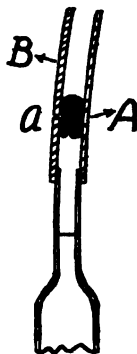
Combustion boat. ANON. *Chem. Ztg.* 39, 370(1915).—The boat is covered for about $\frac{2}{3}$ of its length at one end to prevent the substance spitting up on the combustion tube. A hole on top of the covered end permits circulation of air.

J. H. MOORE.

Vacuum-tight lead seals for leading-in wires in vitreous silica and other glasses. HENRY J. S. SAND. Nottingham. *Proc. Phys. Soc. London* 26, 127-30(1914).—Pb free from oxide when allowed

to solidify in contact with glass forms a vacuum-tight joint, and on account of the firmness of the contact and plasticity of Pb these joints can stand temp. changes. The following procedure is recommended for quartz glass: A short piece of Mo wire is mounted in the sealing off tube, one end extending into the vacuum chamber for use as an elec. terminal, the other end projecting into an enlargement of the tube which is to be filled with Pb. A second chamber above contains the piece of Pb. The air is blown out with H, the tube then exhausted to 1 or 2 mm. and then sealed at the top. The quartz is then softened and pinched onto the Mo wire. After this the Pb is melted and allowed to filter from any oxide through the capillary to the chamber below. Before it solidifies the tube at the top is broken, allowing atmospheric pressure to force the Pb well against the surface of the glass. The tube is then cut at a suitable place and a tinned leading-in wire introduced. These seals have been used very successfully for X-ray tubes, Hg lamps, etc. PAUL D. FOOTE.

A new two-circle goniometer, its use and accessories. F. STÖBER. *Gent. Z. Kryst. Min.* 54, 442-57(1915).—A vertical ring 23 cm. in diam. is screwed to a cast iron foot. A graduated circle turns within the ring about a horizontal axis. Upon this a smaller graduated circle is so set up that its axis of rotation is at right angles to that of the first. The collimator and telescope can both be turned about a vertical axis. The app. can be used for one circle or two circle goniometric, spectrometric, or total reflectometric measurements; for measuring optical axial angles; for detg. op-



tical orientation of biaxial crystals; for measuring extinction angles; and to cut oriented faces. Methods of adjustment are given in detail.

A. WANDTKE.

Model for the illustration of Röntgen ray interference phenomena. F. VON HAUER. Freiburg. *Z. Kryst. Min.* 54, 458-60(1915).—The model is made up of 2 intersecting circles upon which are mounted conal envelopes that touch at a single point. The axes of the cones correspond to the atomic rows upon which the parallel Röntgen rays, whose primary ray lies in the conal envelope, fall. The directions of intersection of both envelopes, where the interference maxima are especially strong, correspond to the primary and bent rays. The latter makes the same angle with the crystallographic network plane drawn through the atomic rows as does the primary ray and consequently appears as though reflected upon this plane. If a photographic plate is considered to be placed at right angles to the primary ray, a black point must result for this ray as well as for the bent ray.

A. WANDTKE.

A home-made centrifugal pump. MAX ORTLI. *Z. physik. chem. Unterr.* 28, 95(1915).—A solid wooden wheel is attached to the end of a shaft that may be revolved rapidly. A glass tube a little longer than the radius of the wheel is bent at right angles near one end, the other end being drawn to a small nozzle, and attached to the plane face of the wheel so that the shorter end coincides with the axis of the wheel. A rubber hose on this end leads to a vessel containing H_2O which is pumped out when the tube is filled and the wheel revolved.

J. H. MOORE.

Viscosimeter for lubricants. H. K. VON VLOTEN. Amsterdam. *Chem. Weekblad* 12, 429-30(1915).—A metal strip is coated on both sides with the lubricant, and placed between 2 cylinders, held against it by weights. Known wts. are hung on the strip, and from the relation between the various wts. at equil. the viscosity of the lubricant is detd.

G. W. MOREY.

A new device for sterilization. ERNST DEUSSEN. *Pharm. Zig.* 60, 180(1915).—The app., a one-piece affair designed for sterilizing glass containers, consists essentially of a straight glass tube (7 cm. inner diam.) 22 cm. in length, in about the middle of which is blown a small spray trap. The slightly longer upper limb at a point just above the trap is blown into a shallow glass plate on which is placed in inverted position the object to be sterilized. The plate in turn carries an exit tube pointing downward. The app. is attached by means of a rubber stopper to the neck of a round bottom liter flask, in which H_2O is boiled.

W. O. E.

Heat transmission capacity of a silica dish (LEWIS) 2. Cooling curve apparatus (JÄNECKE) 20.

U. S., 1,135,997, Apr. 20. J. V. N. DORR. **Apparatus for separating finely divided solids from liquids.** Correction to wording of title (cf. C. A. 9, 1455).

U. S., 1,141,182, June 1. G. L. FREETO. **Acetylene generator.** Cf. C. A. 9, 4.

U. S., 1,141,213, June 1. G. A. SCHÜTZ and A. F. SCHÜTZ. **Rotary filter.**

U. S., 1,141,266, June 1. F. RASCHIG. **Absorption and reaction tower for effecting gas reactions, making aqueous hydrochloric acid, washing gas, etc.** The tower is filled with small cylinders of inert material, arranged promiscuously. Catalytic action of gases may be effected by forming the cylinders of asbestos or other inert carrier treated with a catalyst.

U. S., 1,141,543, June 1. J. W. HAYS. **Apparatus for collecting samples of gas continuously over long periods of time.**

U. S., 1,141,881, June 1. T. OLSEN. **Apparatus for testing the hardness of materials.**

U. S., 1,142,133, June 8. K. W. ZIMMERSCHIED. Thermoelectric pyrometer.

U. S., 1,142,206, June 8. F. C. SCHRAMM. Acetylene generator.

Brit., 2,143, Jan. 27, 1914. K. F. HILLESHEIMER. In an air-washing apparatus particularly applicable for treating the air used in processes of flour-milling, the air is given a rotary motion before entering a washing-chamber, in which it passes in opposite directions through 2 coaxial cylindrical H₂O screens at different heights.

Brit., 2,368, Jan. 29, 1914. R. T. GLAUSER. Chemical vessels. See Ger., 268,296 (C. A. 8, 1362).

Brit., 2,866, Feb. 4, 1914. GIBBONS BROS. and R. MASTERS. An annealing furnace of the kind comprizing a retort with water-sealed ends, through which the goods are passed by an endless conveyer, is heated by the combustion of producer gas with heated air in a chamber communicating with transverse flues around the retort.

Ger., 280,420, Jan. 7, 1914. E. WEGMANN. App. for conveying and compressing gas with the aid of a liquid jet used for the operation of a blade wheel.

Ger., 280,435, Feb. 14, 1914. SCHOTT & GEN. Thermometer with Hg container of quartz and capillary tube of glass.

Ger., 280,568, Aug. 5, 1913. SIEMENS & HALSKE AKT.-GES. Optical pyrometer wherein the intensity of radiation of an incandescent body, the temp. of which is to be detd., is compared with that of an incandescent lamp of const. candle power. Cf. C. A. 9, 1139.

Ger., 281,416, Oct. 27, 1912. E. HATSCHER. Constructional details of a melting furnace with a preliminary melting furnace.

Ger., 281,518, Mar. 2, 1913. A. NEUMANN. Counter-current app. for mfg. and separating liquid air.

2. GENERAL AND PHYSICAL CHEMISTRY.

WILLIAM D. HARKINS.

Assistants: E. B. MILLARD and A. B. CARTER.

Frank Baker. W. RINTOUL. *J. Chem. Soc.* 107, 578-9(1915).—An obituary.
L. G. C.

C. R. Crymble. A. W. S. *J. Chem. Soc.* 107, 579-81(1915).—An obituary.
L. G. C.

Wilhelm Hittorf. J. W. *J. Chem. Soc.* 107, 582-6(1915).—An obituary.
L. G. C.

Chemihydrometry. B. F. GROAT. *Science* 41, 864(1915).—This name is suggested for the method of measuring by chemical means the flow of rivers, discharge of turbines and capacities of reservoirs. There are some objections to the name and G. asks that others be submitted.
E. H.

The coëxistence of phases which are subjected to different pressures. P. NIGGLI. Zurich. *Z. anorg. Chem.* 91, 107-33(1915).—A derivation by means of the thermodynamic potential of equations representing the conditions under which different phases can coëxist when subjected to different pressures. In the case of equil. between liquid-liquid, the osmotic pressure, in the case gas-liquid, capillary processes, and in the case of a stationary pressure gradient in a liquid or gaseous system, forces such as gravitation, are to be considered. When the phases concerned are liquid-solid the cases of (1) uniform hydrostatic pressure, (2) non-uniform hydrostatic pressure, (3) non-uniform pressure are to be distinguished. Case (1) leads to the Clausius-Clapeyron

equation; case (2) to a general equation, of which the familiar equation representing the change of m. p. of a solid subjected to uniform differential pressure is a special case, and which is extended to soln. and fusion processes in binary systems; case (3) to a still more general equation of which the preceding are special cases. The application to geologic processes is discussed.

GEORGE W. MOREY.

Monovariant systems of moderately soluble hydrolyzable salts and the method of physico-chemical analysis. E. I. SHEPITAL'SKII. *J. Russ. Phys. Chem. Soc.* 46, 641-81 (1914).—An extensive mathematical treatment of the application of the principles established in a previous investigation (cf. *C. A.* 8, 3144) to the exam. of equil. systems of salt solns. in presence of foreign acids. The application consists in a chem. analysis of several monovariant systems of solns. of the same salt at the same temp., but in presence of different amts. of the foreign acid. Since the conc. of the undissociated mols. of the acid of the salts with which the soln. is satd. at a given temp. is a const. quantity, independent of the presence of other substances in the soln., and since the "stability product" is also const. under these conditions, one can, by examining a sufficient number of such systems, in most cases obtain such a number of algebraic equations as will make possible the finding of all the unknowns. The main condition for the applicability of these principles is that the hydrolyzable salt be only moderately sol., so that, while its soln. will contain enough material for analysis, it will not become so conc. as to make the laws of equil. inapplicable. The method is illustrated with numerous details which cannot be abstracted and with a lengthy discussion of Sherill's work (*C. A.* 2, 930), some of whose assumptions are considered arbitrary. A more thorough criticism of this work is promised for the near future.

H. M. GORDIN.

Atomistics of chemical reactions in anisotropic substances. G. TAMMANN. Göttingen. *Z. anorg. Chem.* 91, 263-76(1915).—The atomistics of reactions taking place in isotropic and anisotropic substances are discussed, the latter by means of equations, developed on thermodynamic grounds, representing the relation between concn. and the temp. of the beginning and of the end of the transition $\alpha B \rightleftharpoons \beta B$ in the binary system AB, in which mixed crystals are formed. The course of the transition curve of AgI in the binary system AgI-AgBr was detd. by observing the temp. at which the solid solns. of various concns. became cloudy; addition of about 10% AgBr lowers the transition temp. from 141.5° to 115°, after which the further addition of AgBr has but little effect. "Tempering" the mixts. at higher temp. for some time had an appreciable effect on the transition phenomena, probably due to a more uniform mixing of the components.

GEORGE W. MOREY.

The sensitiveness of a chemical reaction. A. G. BARLADREAN. *Schweiz. Apoth. Ztg.* 53, 257-60, 273-6(1915).—The sensitiveness of a chem. reaction (cf. Gorski, *C. A.* 7, 2882-3) has a definite value only under well-defined conditions, e. g., pptn. of BaSO₄ in excess of BaCl₂ or H₂SO₄, NH₄Cl or NaCl. Cu ion in a conc. of 1:1,000,000,000 is detected by its toxic action on *Spirogyra* when 5-10 threads are used and the vol. is not less than 1 liter (*C. A.* 8, 989). When the vol. is only 100-500 cc., the Cu conc. remaining the same, the cells will not die. They will survive also when 50-100 threads are placed in a larger vol., e. g., 1 liter or more. But the sensitive *Spirogyra* test fails completely, even with large amts. of Cu ions present, when the water contains Ca salts.

S. WALDBOTT.

Conjugated reactions, or oxidation-reduction reactions from the electronic point of view. G. DAIN. *J. Russ. Phys. Chem. Soc.* 46, 845-63(1914).—A detailed presentation of the view that all oxidation-reduction reactions consist in a transfer of negative electrons from 1 element to another, and the application of this view to the balancing of chem. equations. Such reactions are called "conjugated," and the distinction between valence and value is made clear, valence having the meaning usually

given to this term, while value may be positive or negative according to the nature and number of elec. charges. The direction of the passage of electrons from one element to another follows the periodic system, going from the 1st to the 7th group. In the subgroups the direction is from the higher to the lower at. wts. for the 1st subgroups, and in the opposite direction for the 2nd subgroups. In diatomic elements the 2 atoms have different charges, while in monoatomic, *e. g.*, Hg, the number of positive and negative electrons is the same. Numerous details are given, but there is little new in them.

H. M. GORDIN.

Oxidation of alcohols in the presence of ferrous oxide and ferrous salts. A. G. DOROSHEVSKII AND A. YA. BARDT. *J. Russ. Phys. Chem. Soc.* 46, 754-85 (1914).—The authors intend to exam. the action of charcoal (wood) on solns. of alc. The influence of temp., diln., nature of the charcoal, the relation between the amts. of alc. and charcoal and the extent of oxidation will be examd. later. The present work concerns chiefly the mechanism of the oxidation. The numerous expts. resulted in the following conclusions: The difference in the oxidizing power of different varieties of charcoal is partly due to a difference in the amts. of adsorbed O they contain. Hence as an oxidizing agent charcoal may be "killed" by repeated heating to 280-300° *in vacuo* and cooling in an atm. of CO₂ obtained by calcining MgCO₃ (the CO₂ from CaCO₃ + HCl always contains air). That the adsorbed O is, however, not the only active agent in charcoal is shown by the fact that some samples of charcoal are perfectly passive even though they have been exposed for a long time to the air, and that pure charcoal from sugar is also inactive. Further exam. showed that just as the decolorizing properties of charcoal depend upon the presence of certain salts (Classner-Suida, *Ann.* 357, 95), and its ability to catalytically decomp. alcs. depends upon its containing Si compds. (Senderens, *C. A.* 1, 1386), its oxidizing effect is closely connected with the presence of ferrous salts (FeCl₂, FeSO₄, FeC₂O₄, etc.). Hence, charcoal may be "killed" not only by removing its adsorbed O as above, but also by oxidizing its ferrous to ferric salts; this is proved by expts. On the other hand, "dead" charcoal may be "resuscitated" by again impregnating it with O and reducing the ferric to ferrous salts, both of these purposes being accomplished by the established custom of calcining exhausted charcoal (causing a reduction by the C) and allowing it to cool in the air (to readorb O). MeOH, EtOH, PrOH, BuOH and *iso*-BuOH are readily oxidized by KMnO₄ or H₂O₂ in the presence of ferrous salts. The oxidation product of EtOH in case KMnO₄ + FeSO₄ are used is almost exclusively MeCHO, while KMnO₄ + FeC₂O₄ yield MeCHO + AcOH. In both cases the reaction is so regular that its progress may be followed quant. H₂O₂ + FeSO₄ also yield MeCHO + AcOH, the former predominating, while H₂O₂ + FeC₂O₄ give the same products, but the AcOH predominates. The reaction with H₂O₂, however, is not so regular as that with KMnO₄. The oxidation of EtOH by H₂O₂ + FeCl₂ may be shown as a lecture expt. either by adding to the alc. (50%) a soln. of fuchsin-H₂SO₄, or by observing the evoln. of bubbles of O. Since charcoal oxidizes alcs. only in presence of O and Fe salts, its action must be merely catalytic, and the oxidation a joint reaction, both the alc. and the FeO being oxidized. It also follows that the oxidizing properties of a charcoal may be enhanced by the addition of ferrous salts. Owing to the nature of adsorption and the liberation of FeO by the (slight) alkalinity of C, the FeO ought to conc. on the surface of the charcoal particles. On the other hand, from a mixt. of H₂O and alc. the latter is adsorbed in greater quantity than the former. Since the seat of adsorption as well as that of oxidation is thus on the surface (or in the pores) of the charcoal, there must be a close connection between its adsorbing and oxidizing powers; this is corroborated by expts. Thus animal charcoal is both a better adsorber and a better oxidizing agent than wood charcoal. Dil. alc. is more easily oxidized than concd. Several tables and curves illustrate the expts. H. M. GORDIN,

Acceleration of the oxidation of aluminium by means of mercury. J. F. MC-CLENDON. Univ. Minn. *Biochem. Bull.* 4, 96(1915).—Al will burn rapidly in dry air (humidity 10% at 20°) if a trace of Hg is driven into it by an elec. spark. The white oxide is formed so rapidly that it appears to grow "out of the metal as plants grow out of the ground, attaining the height of a mm. in a few min." Part of the liberated energy is expended in lifting the wt. of the oxide against gravity. A. P. L.

Catalytic influence of kaolin on the combination of oxygen and hydrogen. J. JOANNIS. *Compt. rend.* 158, 501-4(1914); cf. *C. A.* 8, 3277.—A measured vol. of H and O in the proper proportions to form H₂O was passed over a layer of kaolin at a definite temp., and the amt. of H₂O formed in each expt. was detd. From the results obtained it was shown that H and O unite in the presence of kaolin at a temp. at which no combination takes place in a plain glass tube. Combination began at 230° in the presence of kaolin. The amt. of water formed was proportional to the time of contact between the kaolin and the gaseous mixt., and the activity of the kaolin was influenced by the temp. to which it had been heated previous to the expts. Heating to a high temp. decreased its activity as a catalyzer. E. B. MILLARD.

J. Liebig's idea of osmotic pressure. I. P. OSIPOV. *J. Russ. Phys. Chem. Soc.* 47, 26-9(1915).—J. Liebig should be given the credit for having first described the phenomenon of osmotic pressure, though he did not use this term (31st letter, *Chemische Briefe*). H. M. GORDIN.

A kinetic interpretation of osmotic pressure. P. EHRENFEST. *Verslag Akad. Wetenschappen* 23, 1264-8(1915); *Proc. Akad. Wetenschappen* 17, 1241-5(1915).—A general equation for osmotic pressure is developed by the aid of the kinetic theory. G. W. MOREY.

Spontaneous crystallizability. PAUL OTHEMER. Göttingen. *Z. anorg. Chem.* 91, 209-47(1915).—Crystallization is considered as made up of 2 processes, not wholly independent, viz., (1) a change in the internal energy of the molecules, which causes them to become anisotropic and (2) an arranging of the anisotropic mols. in a crystal structure. Both can be developed as probability functions, and exptl. detns. of the number of crystal nuclei formed show variations similar to those of a probability curve. To det. whether or not anisotropic mols. existed at temps. above the m. p., small amts. of various substances, e. g., piperonal, were heated at various temps. above the m. p., then cooled and subjected each to the same treatment, and the number of cryst. nuclei detd.; if more nuclei were formed after heating at a temp. slightly above the m. p. than at a temp. much above the m. p. it would indicate that anisotropic mols. persist, their number decreasing with increasing temp. Expts. confirmed this view, the number of nuclei formed decreasing rapidly with increasing temp. Certain substances show an abnormally high entropy change on fusion, which is assumed to be due to formation of new mol. species of high entropy content. If these new mols. do not tend to become anisotropic, such melts on undercooling should show an abnormal increase of the spontaneous crystallizability with the duration of the undercooling. Expts. with various fatty acids, which show an abnormal entropy change on fusion, confirmed this conclusion. Several triglycerides which are known to exist in stable and unstable forms were studied; the fact that the m. p. of the unstable form can be realized is "explained" by stating that the spontaneous crystallizability (measured by the number of crystal nuclei) of the unstable form is much greater than that of the stable form, that the crystallizability of the stable when formed from the unstable form is very small, and that the linear vol. of crystn. of the unstable form is greater than that of the stable form. Metals were found to increase the number of crystal nuclei formed, due to some substance of unknown nature given off by the metal. G. W. MOREY.

A chemical explanation of the irregular crystal water content of $3\text{CdSO}_4 \cdot 8\text{H}_2\text{O}$. C. BLOMBERG. Amsterdam. *Z. anorg. Chem.* 91, 248-50(1915).—The fact that 8 H_2O are combined with 3 CdSO_4 indicates the formation of complex ions in H_2O soln., i. e., $3\text{CdSO}_4 \rightleftharpoons [\text{Cd}_3\text{SO}_4]^{++} + [\text{Cd}(\text{SO}_4)_2]^{--}$. Other cases of irregular crystal H_2O content may be explained in a similar manner. G. W. MORREY.

The metastability of metals in consequence of allotropy and its significance for chemistry, physics and technics. IV. E. COHEN. *Verslag Akad. Wetenschappen* 23, 1220-4(1915); cf. *C. A.* 8, 1223, 2295; 9, 987.—It follows from the fact that ordinary pure metals are metastable systems composed of more than one mol. species, that thermal const. detd. without regard to the mol. state of the substance will be indefinite and discordant. Heats of reaction will be different for various modifications, e. g., in the case of Cd the difference between the heat of soln. of electrolytic (γ) Cd and ordinary Cd may be as much as 4.3%. Similarly, the latent heat of fusion exptly. detd. will differ according to whether the final state corresponds to one or another modification, e. g., the latent heat of fusion of Cd as given in the literature is 13.7 cal., while the heat of transition γ - α Cd at ordinary temp. is 6.6 cal. The wide discrepancies in the latent heats of fusion as given in the literature may be caused by uncertainties as to the mol. species to which the exptl. data apply. GEORGE W. MORREY.

The allotropy of bismuth. II. E. COHEN. Utrecht. *Verslag. Akad. Wetenschappen Amsterdam* 23, 1224-6(1915); *Proc. Acad. Wetenschappen* 17, 1236-8(1915).—Measurements with a dilatometer on Bi indicated that the pure metal exists in 3 allotropic forms, instead of 2 as previously believed (*C. A.* 8, 305). G. W. M.

The temperature coefficients of surface tension in binary mixtures. M. PADOA AND A. MATTEUCCI. Univ. Bologna. *Atti accad. Lincei* 23, II, 590-5(1914); cf. P. and Tabellini, *C. A.* 8, 2092.—In the preceding paper results were given tending to show by means of the surface tension the degree of association between solvent and solute. In continuing these expts. it seemed useful to study the behavior of (1) mixts. of 2 non-associated solvents; (2) mixts. of an associated and a non-associated solvent; (3) solns. of solids in non-associated solvents. The surface tension was measured by the drop method. Normal solns. of toluene in C_6H_6 and C_6H_6 in toluene show a normal temp. coeff. for surface tension and, therefore, show no association. Cyclohexanone in C_6H_6 shows a feeble association which is at a max. in 2 *N* solns. of cyclohexanone in C_6H_6 . A *N* soln. of naphthalene in C_6H_6 is likewise feebly associated. In mixts. of C_6H_6 and PhOH there is in general a stronger association than in the component liquids. With mixts. nearly monomol. the temp. coeff. is at a max., i. e., the association is at its minimum. E. J. WITZEMANN.

Heat of formation of vanadium pentoxide and the vanadium chlorides. OTTO RUFF AND LOTHAR FRIEDRICH. Danzig. *Z. anorg. Chem.* 89, 279-306(1914).— VCl_4 is easily prepd., but slowly decomp. at ordinary temp. into $\text{Cl} + \text{VCl}_3$; the latter compd. also decomp. with formation of $\text{VCl}_3 + \text{VCl}_4$. The equil. pressure of Cl in the system $\text{VCl}_4 + \text{VCl}_3 + \text{VCl}_2 + \text{Cl}$ could not be detd. directly, so the heats of formation of the various compds. were detd. in order to calc. approx. the equil. pressure; sp. heats were not detd. V burned in O in a Berthelot bomb does not give complete combustion; the heat of formation of V_2O_5 was calcd. from detns. of the heat the reactions $\text{S} + \text{Na}_2\text{O}_2 + \text{O}$; $\text{S} + \text{Na}_2\text{O}_2 + \text{O} + \text{V}_2\text{O}_5$; $\text{Na}_2\text{O}_2 + \text{V} + \text{O}$; the heat of formation of V_2O_5 from the heat the reaction $\text{S} + \text{Na}_2\text{O}_2 + \text{O} + \text{V}_2\text{O}_5$, in conjunction with the above detns. The heats of formation of VCl_4 and VOCl_3 were detd. from the heat of reaction with alkali and H_2O_2 ; the heat of soln. of 1 mol. V_2O_5 in a soln. of 22.75 $\text{NaOH} + 8\text{H}_2\text{O}_2 + 177\text{H}_2\text{O}$ is 46.1 cal. The above method could not be used with VCl_4 due to a too slow rate of soln., and did not give good results; better results

were obtained by combustion in O and detn. of the amt. of Cl, V_2O_5 and $VOCl_3$ formed; with VCl_3 C was added to promote combustion. The heats of formation (from the elements) per mol. obtained are: V_2O_5 , 302 ± 10 cal.; V_2O_6 , 437 ± 7 ; $VOCl_3$, 200 ± 4 ; VCl_3 , 147 ± 4 ; VCl_2 , 187 ± 8 ; VCl_4 , 165 ± 4 cal. VCl_4 is endothermic in regard to $VCl_3 + Cl$; at room temp. the reaction is $VCl_4 \text{ equil.} = VO_2 \text{ solid} + Cl_2 + 44$ cal.; VCl_4 becomes stable at about 630° .

GEORGE W. MOREY.

Influence of colloidal sulfur on the freezing point of aqueous solutions of some electrolytes. M. RAFFO AND G. ROSSI. Univ. Bologna. *Gazz. chim. ital.* 45, I, 119-22(1915).—It has been shown (C. A. 7, 437) that colloidal S affects the elec. cond. of the crystalloids, H_2SO_4 and Na_2SO_4 , which are always present in solns. of colloidal S. These crystalloids are called "crystalloids of formation." If additional H_2SO_4 or Na_2SO_4 is added to the colloidal soln. the cond. of the added portion is not affected (*Ibid* 44, I, 76; cf. C. A. 8, 1367). Paterno and Cingolani (*Ibid* 44, I, 37; cf. C. A. 8, 1691) found that colloidal S does not affect the electrolytic dissociation of added salts as detd. by the f. p. method and concluded that it does not affect the f. p. R. and R. repeated their own expts. using the f. p. method. The f. p. of a dialyzed colloidal S soln. which still contained a determinable amt. of H_2SO_4 and Na_2SO_4 was detd. The same soln. was exposed to the light to ppt. the S and the f. p. again detd. To some of the same soln. solns. of $LiCl$, Li_2SO_4 , Na_2SO_4 and H_2SO_4 were added and the f. p. detd.; these solns. were then exposed to the light to coagulate the S and the f. p. again detd. The rise in f. p. produced by the addition of colloidal S is the same in all cases. When the S had been removed the f. ps. were 0.11° lower in all cases. The expts. show that the colloidal S particle influences the crystalloids of formation, Na_2SO_4 and H_2SO_4 , in such a way as to make the f. p. higher than that of the same mixt. of crystalloids in the absence of S, but has no influence on the f. p. of crystalloid solns. added, even if these are H_2SO_4 or Na_2SO_4 . This confirms the earlier deductions from the elec. cond. of similar solns. under the same conditions and shows again that the crystalloids of formation in the presence of colloidal S are not able to conduct electricity or to lower the f. p. to the same extent as the same solns. free from colloidal S particles.

E. J. WITZEMANN.

Behavior of colloids toward pure and mixed liquids. I. Systems: caoutchouc-benzene-alcohol and caoutchouc-benzene-acetone. W. A. CASPARI. London. *J. Chem. Soc.* 107, 162-71(1915); cf. C. A. 8, 1214.—Caoutchouc was selected as a colloid which could form 2 phases in stable equil. such that the whole system could be represented by isothermals expressing all possible equilibria between the substances involved. It was found to ppt. reversibly from solns., and to be subject to little internal change when in contact with solvents, except for deviscification and the corresponding change in solubility, which took place slowly and to only a small extent when fresh sound material was used. The sol. constituents of India rubber mixed in all proportions with solvents such as C_6H_6 , giving a highly viscous soln. at high concns. They are wholly insol. in such precipitants as acetone and EtOH, and the solubility of these liquids in caoutchouc was wholly negligible. Solns. of caoutchouc of known conc. were titrated with alc. until sepn. into 2 phases just set in. Each limiting triad obtained represented a point on the binodal curve. In other expts. an excess of alc. was added, giving rise to 2 fluid layers with most of the caoutchouc in the lower one. Caoutchouc was insol. in mixts. of 43 vols. of alc. to 100 C_6H_6 and in 80 vols. or more of acetone to 100 of C_6H_6 . Diagrams are given showing the equil. in each mixt. The point of transition from sol to gel was about at 1 vol. of caoutchouc to 6 of C_6H_6 .

E. B. MILLARD.

Colloidal metal solutions in the dark field. P. POORH. *Mikrokosmos* 1914-15, 227, 251-3.—Directions are given for the preparation of colloidal Au, colloidal Pt, Lea's Ag and colloidal As_2S_3 . The methods given are primarily intended for the layman. A bibliography is appended.

C. A. NOWAK.

Emulsions and emulsification. F. G. DONNAN. *Engineering* 99, 551-2(1915).

—A general lecture with expts. When oil was allowed to flow from a pipet bent upward and under water, the oil rose to the surface in drops. If alkali was added to the water, the oil then rose in a fine stream, no longer in drops. E. B. MILLARD.

Capillary pressure in gas bubbles. ERWIN SCHRÖDINGER. Vienna. *Ann. Physik* 46, 413-8(1914); *Chem. Zentr.* 1915, I, 724-5.—In the approximation formula for the pressure at which an air bubble escapes from a capillary tube of given radius into a liquid, the second term has been corrected, and some consequences of the theory have been detd. E. B. MILLARD.

Hydration problem. II. A new method for the determination of the electrolytic transportation of water. HEINRICH REMY. Freiburg. *Z. physik. Chem.* 89, 529-69 (1915); cf. *C. A.* 9, 1569.—Since the ions are hydrated in aq. soln., it follows that on conducting an elec. current through the soln. a transportation of H_2O must take place in the direction of the anode or the cathode, according as the anion or the cation is the more strongly hydrated. As the detn. of the magnitude of this electrolytic transportation of H_2O is of great importance for the hydrate problem, a new method by which it may be detd. has been worked out. In this method the middle point of the electrolyte is fixed, and the volume change, which occurs at the electrodes on the passage of the current, is measured. The H_2O transported by electroendosmosis must be taken into consideration in this method. The values that have been obtained in this investigation for the transportation of H_2O cannot be explained on the assumption of electroendosmosis alone, but only when, in addition, it is assumed that H_2O is transported by the H_2O -enveloped ions. The H_2O transportation of a number of salts at different concns. has been detd. from the exptl. values, on the assumption that the sp. electroendosmosis is approx. independent of the concn. of the salt soln. The results obtained are in good agreement with those obtained by Washburn. From the values obtained for the transportation of H_2O , the true transport numbers for the different salts have been calcd. on the assumption that the exptl. transport numbers in gelatin do not deviate to any great extent from those which hold for aq. solns. By means of these true transport numbers, the hydration of a number of ions in 0.5 *N* soln. has been calcd. The results of this investigation furnish new evidence for the real existence of the hydration of ions. H. JERMAIN CREIGHTON.

The resistance of electrolytes. S. W. J. SMITH AND H. MOSS. Imperial Coll. Sci. *Proc. Phys. Soc. London* 25, 133-45(1913).—Expts. on KCl solns. showed that the resistance of the electrolyte was const. to 0.05% for currents of any frequency up to 2300 cycles. PAUL D. FOOTE.

Note on attainment of a steady state when heat diffuses along a moving cylinder. MISS A. SOMMERS. *Proc. Phys. Soc. London* 25, 74-6(1913).—Math. treatment of the problem of a column of Hg moving with uniform speed between two fixed temp. sources. An analogous problem would be the diffusion of a salt in soln. up a tube. PAUL D. FOOTE.

Heat transmission capacity of a silica dish. W. K. LEWIS. *J. Ind. Eng. Chem.* 7, 410-4(1915).—The heat transmission capacity consists of a conduction term proportional to temp. difference and a radiation term proportional to the difference of the 4th powers of the temp. The coefficients of these terms have been detd. and suggestions are made as to their application to problems in design and furnace construction. More work is to be done. I. MILLER.

The estimation of high temperatures by the method of color identity. CLIFFORD C. PATTERSON AND B. P. DUDDING. Nat. Phys. Lab. *Proc. Phys. Soc. London* 27, 230-62(1915).—Using a Lummer Brodhun photometer the light from incandescent

lamps is compared with that from a black body, by a color match instead of an intensity match. If the light from a non-black body is gray in the visible spectrum, *i. e.*, the radiation at any wave length is a const. factor of that from a black body at the same true temp., this method will give the true temp. of the non-black material in contrast to the apparent temp. obtained with an optical pyrometer. Measurements made upon W, C and Pt indicate that these materials are approx. gray in the visible spectrum. Values of the m. p. of Pt obtained by color matches of Pt against C and W lamps standardized for color gave 1750 and 1773° (in fairly good agreement with the latest accepted detns. of 1755 $\pm$ 5 by Waidner and Burgess and by Kanolt.—ABSTR.).

PAUL D. FOOTE.

The ratio γ of the two principal specific heats of gaseous mixtures. Applications. A. LEDUC. *Compt. rend.* 160, 338-41(1915). O. A. RANDOLPH.

Theory of the process of fusion. S. RATNOWSKY. *Verh. deut. physik. Ges.* 16, 1033-42(1914). E. B. MILLARD.

Adsorption from the point of view of the third law of thermodynamics. M. POLANYI. *Verh. deut. physik. Ges.* 16, 1012-6(1914). E. B. MILLARD.

Electrolytic processes at diaphragms. II. The dependence of the magnitude and direction of the concentration changes and the water movement upon the hydrogen ion concentration. A. BETHE AND T. TOROPOFF. *Kiel. Z. physik. Chem.* 89, 597-637(1915); cf. C. A. 9, 992.—On the passage of an elec. current through an electrolyte, in which is placed a porous diaphragm (gelatin, white of egg, agar-agar, pig's bladder, collodium, wood, charcoal, gypsum) there occur at both sides of the diaphragm opposed concn. changes of all ions, and a displacement of the H₂O takes place. With all the above-mentioned materials, the magnitude of the concn. change and of the H₂O movement is dependent upon the H-ion concn. of the initial soln. With collodium, wood and charcoal there occurs only a change of magnitudes; the direction of the concn. change and of the H₂O movement always remains the same, the increase taking place on the negative side of the diaphragm and the H₂O moving with the positive current. With all the other materials investigated the direction changes. With high H concn., the concn. of all the ions increases on the positive side of the membrane and decreases on the negative side, and the H₂O moves with the negative current; on the other hand, the reverse occurs with low H concn. The position of the indifferent point varies with the nature of the ions present. Polyvalent anions displace it towards the acid side, while polyvalent cations displace it towards the alkali side. In general, however, it lies to the acid side of the neutral point. With increase in the neutral salt concn. of the initial soln. (NaCl) the concn. change (referred to the same quantities of elec.) becomes smaller, and the indifferent point (isoelectric point) is displaced towards the acid side. The magnitude of the concn. change increases with increase in the thickness of the diaphragm. Organic dyes have been found in these expts. to behave in the same way as true electrolytes. In order to explain the foregoing effects, it is supposed that the anions or cations enter the pores of the diaphragm and there experience a diminution of their mobility. The H₂O moves in the sense of the charge of the free mobile ions. The hydration of the ions plays a part in the movement of the H₂O, and in consequence of this the indifferent point of the H₂O movement does not coincide exactly with the isoelectric point. Equations have been developed to express the relation between direction and magnitude of the concn. change. Qualitatively, complete agreement has been found between the theoretical and exptl. results. If an electrolyte soln. is pressed through a diaphragm, it has been found that there occur opposed concn. changes of the ions on both sides of the diaphragm.

H. JERMAIN CREIGHTON.

Method of measuring the Thomson effect. H. REDMAYNE NETTLETON. Birkbeck College. *Proc. Phys. Soc. London* 25, 44-64(1913).—A method is derived math.

for measuring the Thomson effect by the temp. distribution in a conductor carrying an elec. current while the conductor moves uniformly through two fixed temp. sources. Using Hg, the "sp. ht. of electricity," σ , was observed to be -1.52×10^{-6} cal. per degree, per coulomb at 61° .
PAUL D. FOOTE.

An improved Joule radiometer and its applications. F. W. JORDAN. Chelsea, S. W. *Proc. Phys. Soc. London* 25, 66-73(1913).—Certain improvements of the instrument are discussed and a method is suggested for measuring the Thomson effect.

PAUL D. FOOTE.

The electron theory of the optical properties of metals. I. G. H. LIVENES. Univ. Sheffield. *Phil. Mag.* 20, 655-72(1915).—A detailed analysis of the motion of the electrons in the metal along lines suggested by Thomson and Lorentz permits the formulation of a complete theory for the action of the most rapidly alternating fields in the metal. This theory is perfectly consistent with the special deductions given by Lorentz in the particular case of steady fields, and in this respect shows distinct advantage over the form of theory proposed by H. A. Wilson.

A. T. CAMERON.

A bolometric method of determining the efficiencies of radiating bodies. WM. A. BONE, H. L. CALLENDAR AND H. JAMES YATES. *J. Gas Lighting* 130, 72-4(1915).—The radiation falls from the fire upon one of two coils of platinum wire wound on a thin piece of mica for firmness and coated for constancy to an even surface with hard black enamel, the two coils being mounted back to back on either side of a circular gun-metal box, provided with water circulation and suitable covers for the coils, so that either coil can be exposed to radiation or screened. If one of the coils is exposed to radiation, a galvanometer shows a deflection proportional to the increase in resistance due to heating, and this serves as a measure of the intensity of the incident radiation. The const. of the bolometer can be readily detd. by comparison with a radio-balance. In obtaining the distribution factor, it appears from theory and observation that the sum of 4 readings taken at 60° along the equator and meridian of the radiation hemisphere of the gas fire together with the central reading, multiplied by $2\pi D/3$ gives as good an approximation to the total radiation as can be obtained by taking 81 readings. To keep const. the zero of the indicator, the temp. of the receiver must be maintained const. The value of this method for general work is increased by the fact that the instrument is of small size, light and without personal factor; the sensitiveness is variable over a wide range by varying the electric current employed for measuring the resistance; the readings are easily recorded automatically.

B. W. GRIMES.

Method of measuring the pressure of light by means of thin metal foil. GILBERT D. WEST. *Proc. Phys. Soc. London* 25, 324-30(1913).—The pressure of the radiation emitted by a C filament lamp at a distance of a few cm. is sufficient to cause a microscopically measurable deflection of the end of a suspended strip of Au or Al foil. The pressure observations agreed to 10% with the energy content per cc. as measured by the initial rate of rise of temp. of a Cu plate exposed to the radiation. P. D. F.

Absorption spectra and chemical constitution. F. GOUDRIAAN. Delft. *Chem. Weekblad* 12, 418-29(1915).—An address.

G. W. M.

Ultraviolet excitation of the D line of sodium. R. J. STRUTT. Imp. Coll., South Kensington. *Nature* 95, 285-6(1915).—The secondary radiation of D light as emitted when Na vapor at a moderate temp. is illuminated by D light has been investigated in the case of the first ultraviolet line of the series which is situated at wave length 3303. It has been found that stimulation by this line likewise gives rise to D light. The chief essential in obtaining this result is a source giving a sharp line of great intensity at λ 3303. This was found in a Na vapor lamp in quartz analogous to the Hg lamps in general use. The visible light from such a lamp was filtered out by means

of a screen consisting of Co-blue uvioi glass, combined with nitrosodimethylaniline. The light which came through was photographed with a quartz spectrograph and was found to consist of λ 3303 exclusively. This radiation was concentrated by means of a quartz lens on a quartz bulb containing some Na. The bulb was made nearly red-hot with a Bunsen burner which was then extinguished. A patch of luminosity could be seen on the wall of the bulb when the ultraviolet beam fell upon it. As the bulb cooled and the vapor pressure of the Na diminished, this patch of light gradually expanded and filled the entire bulb; it then faded away and had disappeared when the bulb was cold in exactly the same way as is seen when D light is excited by the incidence of D light.

W. H. ROSS.

Ultraviolet excitation of the D line of sodium. R. J. STRUTT. *Nature* 95, 370 (1915).—Further investigations along the line referred to in the preceding abstr. has shown that stimulation of Na vapor by one member only of the ultraviolet doublet at wave length 3303 results in an emission of both components of the D line in about equal intensity, and not of the corresponding member only of the D line as might have been expected.

W. H. ROSS.

The widening of spectrum lines. LORD RAYLEIGH. *Phil. Mag.* 29, 274-84 (1915).—The causes which interfere with the abs. homogeneity of spectrum lines are (1) the translatory motion of the radiating particles in the line of sight, operating in accordance with Doppler's principle, (2) a possible effect of the rotation of the particles, (3) disturbance depending on collision with other particles either of the same or of another kind, (4) gradual dying down of the luminous vibrations as energy is radiated away, (5) complications arising from the multiplicity of sources in the line of sight (this cause of widening cannot act alone, but merely aggravates the effect of the other causes). The first cause is the more important in many cases, especially when vapors in a highly rarefied condition are excited electrically. The paper consists of a mathematical discussion of the bases for this list of causes. Exptl. evidence is quoted to show that the light of a powerful Na flame is due much more to the widening of the spectrum lines than to an increased brightness of their central parts.

A. T. C.

Effect of pressure upon arc spectra. V. Nickel, λ 3450 to λ 5500. W. G. DUFFIELD. *Trans. Roy. Soc. London (A)* 215, 205-52 (1915); cf. *C. A.* 2, 363; 5, 238. —The app. has been described in previous papers. The arc was formed of rods enclosed in a steel cylinder. The second-order spectrum was used, the dispersion being 1.3 Å. per mm. Increase of pressure was obtained by admitting air to the cylinder. This increased the intensity of the arc, but photometric measurements could not be made on account of its unsteadiness. Photographs were taken at 10 to 100 atms. for λ λ 3450 to 4050, at 10 pressures between 10 and 200 atms. for λ λ 4050 to 4600, 10 to 100 atms. for λ λ 4600 to 5120 and at 10, 20 and 75 atms. for λ λ 5120 to 5500. Some of the exposures are the resultant of a large number of short-lived arcs, as the arc had to be re-struck frequently. Some of the lines broaden nearly symmetrically, but most lines broaden unsymmetrically. A few lines showed strong reversal, others only a weak tendency to reverse under pressure. The spectrum did not become continuous with great pressure as in the case of Ag. Details of the expts. are shown in many tables and full-size reproductions of the photographs. An account of the rate of displacement with wave length, of the relation between displacement and pressure, of the influence of the density of the material and of the intensity of the spectrum lines upon the displacement and of the resolution of the Ni spectrum into groups of lines has also been given.

E. B. MILLARD.

Rotation dispersion of homologous series. AUG. HAGENBACH. *Basel. Z. physik. Chem.* 89, 570-96 (1915).—If α represents the rotation for different wave lengths λ , then the rotation dispersion of a substance may be expressed by the function φ ,

so that $\alpha = \phi(\lambda)$; while the dispersion for homologs of the substance may be expressed by the equation $\alpha = C\phi(\lambda)$, where C , the sp. factor, has a different value for different substances, but for a particular substance is const. for all values of λ ; that is, the sp. factors are the sole characteristics whereby the dispersions of the different members of a homologous series are differentiated, and, therefore, C depends on the chem. constitution of the individual member of the series. By calcg. the difference between two α , $\alpha_A - \alpha_C$, for the different members of a series, values are obtained for α_0 which all belong to one and the same wave length λ_0 . By means of this wave length the different homologous series may be differentiated from one another. The function ϕ in the above equation has not yet been accurately ascertained. It has been shown that $\alpha = A + B\nu^2$, and that $\alpha = A\nu^2 + B\nu^4$, where $\nu = 1/\lambda$. Where the first of these equations holds, straight lines which start from a point on the abscissa are obtained, when α is plotted as a function of ν^2 . The relation $C = \alpha'/\alpha = A'/A = B'/B$ has been confirmed. In conclusion, it is pointed out that the expression derived for the rotation dispersion for the members of homologous series is analogous to the Ramsay and Young rule for the b. p. of members of homologous series. H. J. C.

Density of liquid hydrogen, index of refraction and dispersion of liquid hydrogen and liquid nitrogen. HERBERT AUGUSTIN. Leipzig. *Ann. Physik* 46, 419-45(1915).—The displacement method has been so refined that an accuracy of 0.8-0.9% could be attained. The mean value at 745.52 mm. and -252.83° was $d = 0.07105$ for liquid H, in agreement with the value 0.07093 of Onnes and Crommelin (*C. A.* 8, 2096). Wiedemann's total reflection method has been used for detg. n over the range $\lambda = 656.3 \mu$ to $\lambda = 404.7 \mu$, with an accuracy of about 0.2% for $(n - 1)$. A double-walled vacuum flask with sealed-in plane windows was used for these expts. and those on liquid N. The data were used to calc. the Wiener formula number (*Ber. K. Säch. Ges. Wiss., Math.-phys. Kl.* 62, 256), from which it appeared that the H mol. was spherical and the N mol. nearly so. A rigorous theoretical proof has not been attempted. E. B. MILLARD.

Radiation of artificial light as compared to daylight. H. STRACHE. *Z. Ver. Gas. Wasserfach.* 55, 121-9, 141-5(1915).—Lecture. E. B. MILLARD.

Photoelectricity. J. A. FLEMING. *Engineering* 99, 521-2(1915).—Lecture. E. B. MILLARD.

Photoelectric constant and atomic heat. T. C. SUTTON. Univ. Melbourne. *Phil. Mag.* 29, 734-6(1915).—The product of the at. heat and the photo-elec. const. for a large number of metals is a number close to 35.5. It is suggested that both phenomena are due to the ultimate discontinuity of energy as postulated in the quantum theory. When a limited number of quanta are absorbed by a mol., the various properties of the molecule are not necessarily affected to the same extent; some quanta may function in one way, some in another. For any particular metal the proportion that affects the at. heat is related to that which affects the photo-elec. const. If the nature of the metal is changed this relation is one of inverse proportion. The results suggest that the divergences of the values of the photo-elec. const. from the value of one quantum, 6.6×10^{-27} , are due to the work done in changing the amplitude of swing of the newly charged atoms left within the metal. A. T. CAMERON.

Kinetics of photochemical reactions. D. BERTHELOT. *Compt. rend.* 160, 519-22 (1915); cf. *C. A.* 5, 2460.—From the equations $1/2mv^2 = sT$ and $v = (2sT/m)^{1/2}$, B. calcs. that the entropy of a single atom (the quantum of entropy) is 2×10^{-18} c. g. s. units and that the speed of a H mol. at 0° is 185000 cm. per sec., that of O_2 is 46000 cm. per sec., and that of Hg atoms is 18500 cm. per sec. Under the influence of violet light $\lambda = 0.4 \mu$, $N = 7.5 \times 10^{14}$, electrons are projected with a velocity of 1070 km.

per sec., and under light of 0.2μ wave length the speed is 1510 km. per sec. Other calcns. are also given.

E. B. MILLARD.

Production of rare gases in vacuum tubes. R. H. GODDARD. *Science* 41, 682-4 (1915).—Discharges in vacuum tubes give rise to Ne and He, which are not accompanied by A, showing that the gases are not due to leaks in the app. To show that the gases are occluded in the electrodes, an app. similar to that of Winchester (*C. A.* 8, 2520) has been designed in which the Al electrodes can be cleaned mechanically on all sides while in the vacuum tube. By cleaning them in O, it should be possible to demonstrate the formation of He and Ne from O if it exists.

E. B. MILLARD.

The spectrum from mercury vapor in an electric field. C. D. CHILD. *Colgate Univ. Phys. Rev.* 4, 387-90(1915).—C. places a wire gauze, which fills the cross section, in the condensing tube of a Hg arc. The arc is placed in series with a dynamo and a resistance. The potential of the gauze can be varied by moving a contact along the resistance. When the potential of the gauze is about 10 v. above that of the middle of the arc, it is found that the luminosity is diminished, or entirely destroyed if the amt. of vapor is not too large. A further increase of the potential of the gauze increases the luminosity, and the color changes from a reddish to a greenish tint. While this change is taking place, but with a field too weak to increase the intensity, the yellow lines and the greenish blue line are not so bright as the green while the others of that series are distinctly brighter. With a stronger field all of the lines become brighter but the change in the green and the violet is greater than in the yellow. This may be explained by assuming that certain lines are produced by the union of electrons with positive ions which lack one electron, while other lines are produced by the combination of electrons with positive ions lacking more than one electron.

O. A. R.

Thermal conductivity of refractories (DOUGILL) 19. Multiple-crystallization (BEUTELL) 8. Solubility of nitrophenolates in mixtures of water and alcohol (FISHER) 10. Absorption experiments with radioelements (HOROVITZ) 3.

BAERWIND, E.: *Ueber die thermoelektrischen Eigenschaften des Silicums.* Oldenburg: G. Stalling's Verlag. 44 ss. 2.50 M.

COUPIN, H.: *Lectures scientifiques sur la chimie. Chimie minérale et organique.* Paris: A. Colin. 3 fr.

JONES, H. C., et al.: *The Absorption Spectra of Solutions as Studied by Means of the Radiomicrometer.* Washington: Carnegie Institute. 202 pp. \$1.75.

SAINT-CLAIRE-DEVILLE, et al.: *Fusion du platine et dissociation.* Paris: A. Colin. 1.20 fr.

SCHWARZE, W.: *Vorschule der Chemie.* Leipzig: L. Voss. 176 ss. 3 M.

3. RADIOACTIVITY.

WILLIAM H. ROSS.

Lead and the end product of thorium. II. A. HOLMES AND R. W. LAWSON. *Phil. Mag.* 29, 673-88(1915).—In addition to the material given in previous publications (*C. A.* 8, 1912; 9, 266, 1147), the paper contains a discussion of the ages of minerals as corrected by at. wt. detns. of the Pb contained. The evidence of at. wt. detns. of Pb extd. from radioactive minerals points to the stability of Ra G, and the instability of Th E.

A. T. CAMERON.

The absorption of homogeneous beta rays. R. W. VARDER. Univ. Manchester. *Phil. Mag.* 29, 725-33(1915).—Expts. were made to investigate as accurately as possible the form of the ionization absorption curve when very homogeneous β -rays pass through a standard substance like Al, and also to test whether there is any simple relation connecting the absorption with either the velocity or energy of the β -particle. A pencil of homogeneous rays was obtained from the magnetically deflected rays from Ra Em. The curve of β -ray absorption for Al shows, after a small thickness of matter has been traversed, an approx. linear relation. The results for other material such as paper, Sn, Pt, do not show this linear relationship which is shown to be due to a chance balancing of the opposing effects of scattering and diminution of velocity. If there were no scattering nor straggling the curve should be similar in shape to a Bragg α -ray curve.

A. T. CAMERON.

The absorption in lead of the gamma rays emitted by radium B and radium C. H. RICHARDSON. School of Technology, Manchester. *Proc. Roy. Soc. London (A)* 91, 396-404(1915).—A detn. and analysis were made of the absorption curves in Pb of the radiations emitted by Ra B and Ra C. In addition to the penetrating type of radiation for which $\mu = 0.5$ (cm.⁻¹) in Pb, Ra C has been found to emit soft types for which $\mu = 46$, $\mu = 6.0$ and $\mu = 1.5$, and which are practically absorbed by 1.5 cm. of Pb. The analysis of the Ra B absorption curve shows that in addition to the radiation $\mu = 40$ in Al, the rays emitted consist of 3 types for which $\mu = 46$, $\mu = 6.0$ and $\mu = 1.5$ for Pb. The close similarity of this latter radiation with that of the soft portion emitted by Ra C, already observed by Rutherford and Andrade (*C. A.* 8, 3754), has been established. The absorption of the radiations in different elements has been examd., and the bearing of the results discussed. No evidence of anomalous absorption has been found in the case of the penetrating radiations.

W. H. ROSS.

Absorption experiments with radioelements. KARL HOROVITZ AND FRITZ PANETH. Vienna. *Z. physik. Chem.* 89, 513-28(1915).—Expts. have been carried out to ascertain the adsorption of radioelements by difficultly sol. salts and oxides. It has been found, as a rule, that the adsorption of each radioelement by a substance is good, when the analogous compd. is difficultly sol. in the solvent employed. By analogous compd. is meant the compd. of the radioelement with the electronegative constituent of the adsorbent. The action of the adsorbent is most powerful when an acid with the same anion is employed as solvent. This phenomenon probably is due to the diminution of the solubility of the adsorbent and the analogous compd. of the radioelement. Just as H₂SO₄ increases the adsorption by sulfates, and HCl the adsorption by chlorides, HNO₃ appears to favor the adsorption by oxides. Small differences in the prepn. of the adsorbent often appreciably change the character of the adsorption. This may be due to the differences in the surfaces of the two prepn., or to the chem. compn. of the surfaces. By means of the results obtained in this investigation, it is possible to explain the often unexpected, sharply defined chem. behavior of the radioelements in pptn. reactions.

H. JERMAIN CREIGHTON.

Model for illustrating Röntgen ray interference phenomena (HAUER) 1.

KAILAN, A.: Ueber die chemischen Wirkungen der durchdringenden Radiumstrahlung. Wien: A. Hölder. 29 ss. 85 Pf.

U. S., 1,142,153, June 8. E. EBLER. Obtaining radioactive compounds from solutions by adsorption. A soln. containing Ba and Ra chlorides is treated with pptd. hydrated MnO₂ and the solid products, after sepn. of the soln., are treated with hot

HCl to dissolve the adsorbed radioactive substances. HCl gas, or HNO_3 , ppts. a concd. Ra compd. from this soln., and the process may be repeated to effect further concn.

U. S., 1,142,154, June 8. E. EBLER. Radioactive ores or other mixts., containing Ra, Meso-Th, Th, etc., are mixed with CaC_2 and Ca hydride and the mixt. is ignited to prepare the material for extn. and concn. with HCl as in the preceding pat.

Brit., 2,629, Jan. 31, 1914. J. LANDIN. Rendering water and other liquids radioactive by treating them with a radioactive prepn. in which the radioactive salt, etc., either a solid or in soln., is enclosed within a non-porous organic liquid or solid medium which is capable of transmitting the emanations, but which is itself not affected by the liquid to be rendered radioactive so that the active salt, etc., is protected against its action. Thus, a solid Ra salt may be well stirred with paraffin oil, gasoline, or CS_2 , and the mixt. introduced into a porous clay or kieselguhr cylinder, which is placed in the liquid to be treated; or the solid Ra salt may be incorporated in a covering of solid paraffin, or wax, and the porous cylinder dispensed with. When a soln. of a Ra salt is used, this may be enclosed in a hollow body of paraffin, or it may be emulsified with melted paraffin. The process is applicable to the treatment of milk, beer, juices and oils, in addition to H_2O .

Ger., 279,029, Apr. 18, 1914. VEIHA-WERKE, VEREINIGTE ELEKTROTECHNISCHE INSTITUT FRANKFURT-ASCHAFFENBURG M. B. H. and F. DESSAUER. Röntgen screen consisting of transparent or translucent material with fluorescing bodies distributed in the mass.

Ger., 279,956, Nov. 30, 1913. KUNHEIM & Co. A Ra-Th prepn. suitable for use in obtaining thorium-X solution. Instead of the NH_4OH used heretofore for the pptn., pure H_2O_2 is used to sep. the Ra and Th from purified neutral solns. which have been obtained by pptg. the crude solns. of matured Meso-Th preps., or mother liquors from the recovery of Meso-Th, with $\text{Ba}(\text{OH})_2$, and extg. with concd. H_2SO_4 . The solns. must still contain small amts. of the rare earths. By the addition of H_2O_2 , all the Ra and Th, together with the small amts. of rare earths present, are sepd. as perhydroxide in the form of a ppt. which may be filtered and extd. The Th-X formed is readily and completely dissolved out from the perhydroxide ppt. by means of dil. NaCl soln. Preferably, the app. specified in 247,491 is used.

Ger., 280,694, Jan. 10, 1914. H. STERN. Obtaining radioactive constituents from liquids containing them by means of natural or artificial zeolites, or the like, with which the Ra compds. enter into double decompn. The reacting mass is formed as a filter through which the radioactive liquids are conducted. The alkali zeolites are preferred. The filter material, containing the Ra in chem. combination, may in certain circumstances be employed directly. However, from this material, by the use of suitable acids or salt solns., the radioactive substance can be dissolved out in concd. form, e. g., when zeolites have been used, by means of HCl or NaCl soln. In the latter case the zeolite is regenerated and returned to the process. From the concd. Ra soln. the radioactive substance can be isolated, as by pptn. as the sulfate. While in contact with the zeolites, the waters may be treated by the addition of alk. earth hydroxides, whereby the sepn. of the radioactive substances can be accomplished more readily and quickly.

Ger., 280,709, May 22, 1913. R. FÜRSTENAU. Device for measuring Röntgen rays wherein the rays act upon a cell of Se or other photoelectric material which acts as 1 branch of a Wheatstone bridge. The other branches are so constituted that, when the cell is not illuminated, an elec. current flows through the bridge meter, the direction of which is opposite to that of the current flowing through the meter when the cell is illuminated. Cf. C. A. 8, 2111.

Ger., 280,835, Sept. 26, 1913. REINIGER, GEBBERT & SCHALL AKT.-GES. Production of Röntgen rays of varying hardness, periodically.

Ger., 280,836, Nov. 2, 1913. REINIGER, GEBBERT & SCHALL AKT.-GES. Cooling Röntgen tube electrodes with the use of volatile cooling agent.

Ger., 280,837, Feb. 3, 1914. REINIGER, GEBBERT & SCHALL AKT.-GES. Cooling device for Röntgen tubes, wherein liquid or gaseous cooling agent flows to and from the electrode to be cooled. Cf. C. A. 9, 1156.

4. ELECTROCHEMISTRY.

COLIN G. FINK.

Passage of electricity through metals. J. J. THOMSON. *Electrician* 75, 274 (1915).—An address. C. G. F.

Improved laboratory furnace. C. M. JOHNSON. *Iron Trade Rev.* 56, 613-4 (1915); illus.—For 220 v. 85-90 ft. of 20-gage (mm. diam.) nichrome wire is encased in alundum cement and surrounded by a split infusorial earth muffle. The cost is about \$10. H. V. MAIN.

Electric steel in Germany and Austria. ANON. *Met. Chem. Eng.* 13, 398(1915).—Germany produced 89,336 tons and Austria 19,844 tons during 1914. W. H. B.

Sublimation and distillation of aluminium nitride. F. FICHTER AND G. OESTERHELD. Basel. *Z. Elektrochem.* 21, 50-4(1915); cf. C. A. 7, 2905, 3282.—The app. has been described previously (C. A. 7, 2727). AlN begins to sublime in a W tube at about 14 mm. pressure of N at $1870^{\circ} \pm 20^{\circ}$, and sublimes completely at $1890^{\circ} \pm 20^{\circ}$. The evapn. was accompanied by a partial dissociation into the elements; and some Al was found with the sublimed AlN in the cooler parts of the tube. In a 2 mm. H vacuum the dissociation was complete. No results could be obtained with a W tube at high temp., on account of the action of W with N. Expts. in graphite and C tubes with N at atm. pressure showed sublimation without the formation of metal, but the sublimate was contaminated with C particles and carbide. Al_4C_3 dissociates partly when heated to 2000°, leaving a graphitic residue in the vacuum tube. Fine gray AlN could be prepd. by using Al electrodes for an arc in an atm. of N, and freeing the powder from metal by distn. in dil. H at 1840° . The results are not completely in harmony with those of J. Wolf (C. A. 8, 626, 1915, 2853). E. B. MILLARD.

The corona produced by continuous potentials. L. W. CHUBB, *et al.* *Proc. Am. Inst. Elec. Eng.* 34, 1323-8(1915).—Discussion of Farwell's paper (C. A. 9, 1425). C. G. F.

An improved diaphragm material electro-filtros. C. J. THATCHER. *Met. Chem. Eng.* 13, 336-8(1915).—Electro-filtros consists of finely pulverized SiO_2 , cemented together by a fused silicious bonding material. It resists action of weak alkalis, neutral solns. and strong and dil. acids. Tests show unusual impermeability and low resistance. It is manufactured by General Filtration Co., Rochester, N. Y.

W. H. BOYNTON.

Storage battery voltage regulation. C. S. REDDING. *Elec. World* 65, 1134(1915).—A sensitive detector (regulating element) actuates a double relay which operates a series rheostat in the main battery current. Directly across the battery and control rheostat is connected a regulating element. The cell is so connected that e. m. f. opposes that across a resistor equal to that of a Weston standard cell. When e. m. f. across the battery changes, the drop across the resistor changes with a resulting flow of energy through the galvanometer, causing a deflection. This actuates the restoring

mechanism, causing the circuit to be closed, as the relay operates the motor and changes the position of the contact on the control rheostat. The time the relay remains closed depends upon the amt. the arm is displaced, which depends upon the galvanic deflection. The app. operates on potentiometer or Wheatstone bridge circuits.

W. H. BOYNTON.

Charging small storage batteries. G. E. MILES. *Power* 41, 757(1915).—The battery is in series with the generator-field with a rheostat regulating the current through the battery. The battery should be disconnected before shutting down the charging machine to prevent discharge through the exciter-armature and polarity reversal. The only wasted energy is that taken by the rheostat and it depends upon the ratio of the current required for charging to that passing through the exciter-circuit.

W. H. BOYNTON.

Lead poisoning in the manufacture of storage batteries. A. HAMILTON. U. S. Bur. Labor Statistics, *Bull.* 165, 38 pp. (11 plates).—Processes in the making of storage batteries, hygienic conditions, wages, and Pb poisoning in the industry are discussed. The British regulations and the general provisions of the French law governing the manuf. of elec. accumulators are given. *Summary:* In the prepn. of the Pb plates and grids the workmen are exposed to the danger of Pb poisoning through Pb and Pb oxide dust and through fumes from melted Pb. In making and applying the paste the danger of poisoning is still greater. These dangers can be obviated by installing hoods and exhausts to carry off fumes and dust, by substituting machine for hand work, by providing ample washing facilities for the workmen, and insisting on strict cleanliness on their part, by providing a sep. lunch room as the only place where food may be kept and eaten, and by keeping the premises where the work is carried on clean and free from dust. Thorough medical supervision should be compulsory to detect and eliminate those who are oversusceptible to Pb, to discover cases in early stages, educate workmen, etc. The rate of Pb poisoning in the largest German factory in 1912 was 0.97 per 100 employed; in Great Britain for all factories in 1912 the rate was 3 per 100. In the U. S. the 5 largest factories were employing (1913) about 915 men in work which exposed them to Pb; rate of poisoning = 17.9 per 100. The largest proportion of Pb poisoning occurred among the men handling Pb oxides, lowest among those handling metallic Pb only. Most of the employees are of foreign birth, speak no English, and are ignorant of the dangers of the work or do not know how to protect themselves against it. The difference between the U. S. rate of poisoning and the British and German rates is attributed to the better standards of sanitation and management in the 2 European countries. The 3 states in which the 5 largest U. S. factories are situated have already passed laws which provide safeguards for the men engaged in Pb industries; if strictly enforced, our percentage of Pb poisoning is bound to fall.

F. W. SMITHER.

Preventing corrosion from electrolytic action. ANON. *Power* 41, 740(1915).—As a means of preventing electrolytic corrosion of boilers and similar vessels, the Cumberland Eng. Co., London, Eng., has developed the following app.: Insulated bolts connected to the boiler shell form the anode, while the shell itself is the cathode. A low tension current, from 6 to 10 v., regulated by fixed resistances, is used. H_2O is dissociated, a H_2 film forming over the immersed portion of the shell, thus protecting it; the acid radicals pass to the Fe anodes, which become reduced and must be renewed from time to time.

I. C. MATTHEWS.

Electrolytic insulation of aluminium wire. C. E. SKINNER AND L. W. CHUBB. *Trans. Am. Electrochem. Soc.* 26, 137-47(1914); *Met. Chem. Eng.* 12, 712-3(1914); *Elec. World* 64, 766(1914).—A smooth, iridescent or abrasive and white coating of Al_2O_3 is deposited upon Al wire by passing Al wire first as cathode through a tank con-

taining either a soln. of borax, NH_4 borate, or Na silicate, then through another tank in which the wire is made anode. Two wires so treated, when twisted together, will stand a pressure of from 200 to 500 v. before short circuiting through the film. It is recommended that a high c. d. be used and the voltage brought up quickly. The film coating varies from 0.0001 to 0.0004 in. in thickness, and will stand sharp bends without serious deterioration. Drawings of the app. used are given; it consists of a simple series of tanks and means for passing the wire through them on rolls and reels. Square wires are likely to be defective when so treated, owing to the sharp corners.

W. E. RUDER.

Recent incandescent lamp developments. E. J. DAILEY, JR. *Elec. J.* 13, 251 (1915). C. G. F.

Incandescent versus arc lamps. H. E. CLIFFORD. *Elec. World* 65, 1594(1915). C. G. F.

Dielectric properties of various insulating materials. II, III. K. W. WAGNER. *Elektrotechn. Z.* 36, 135-7, 163-5(1915).—A continuation of the previous papers on an extended investigation of dielectric properties. In these 2 parts W. deals with gutta-percha, balata, certain artificial substitutes for gutta-percha, rubber, hard rubber, ceresin, paraffin, fiber and paper. The latter is tested in the undried, dried, and impregnated state. The charging and discharging current as functions of the time were detd. Investigations were also carried out at different temps. Numerous curves and tables are given.

W. E. RUDER.

A comparison of different methods of testing electrical porcelain. A. CHERNYSHOFF AND C. A. BUTMAN. *Elec. J.* 13, 282(1915).—A review. C. G. F.

Frictional electricity on insulators and metals. MORRIS JONES. *Electrician* 75, 283.—A large number of expts. are described. C. G. F.

Skin effect in bimetallic wires. JOHN M. MILLER. *Elec. World* 65, 1612(1915).—M. describes a method of computing the effective resistance and inductance of bimetallic wires over a considerable range of frequencies. A bimetallic wire is a conductor with a circular core of one conducting material surrounded by a concentric cylindrical shell of another material, e. g., a steel core and a copper shell. C. G. F.

Sparking plug insulators 19. Thermal conductivity of refractories (DOUGILL) 19. Effect of boron on electrolytic iron melted *in vacuo* (YENSEN) 9.

U. S., 1,141,117, June 1. H. T. JOHNSON. Material for battery carbons is made from petroleum coke by burning a portion of the coke in a furnace with a forced draft of air and agitating the highly heated mass until it is thoroughly calcined and impurities are removed so as to produce a C of max. cond.

U. S., 1,141,118, June 1. H. T. JOHNSON. Furnace for purifying petroleum coke to prepare it for making battery carbons.

U. S., 1,141,251, June 1. J. O. LUTHY. Secondary-battery electrode having a grid filled with active material and covered with an open-work screen carrying a porous coating of pulverized pumice and Na silicate.

U. S., 1,141,402, June 1. R. D. MERSHON. Electrolytic condenser or rectifier with Al electrodes coated with an electrolytically formed film produced in a boiling soln. of borax and immersed in an electrolyte formed from an acidulated borax or phosphate soln.

U. S., 1,141,526, June 1. R. N. CHAMBERLAIN. Storage battery (structural features).

U. S., 1,141,530, June 1. A. V. DISMORE. Increasing the malleability, ductility and strength of iron or steel. See Brit., 4,292, 1913 (C. A. 8, 2654).

U. S., 1,142,172, June 8. R. JACOBY. Tungsten incandescent lamp filaments of uneven cross-section are rendered of uniform section by treatment with H and O or HNO₃ while electrically heated to attack the larger portions of the filaments more strongly than the smaller, because of the difference in the temp. to which they are heated.

U. S., 1,142,220, June 8. E. ACKER. Electrolyte for the production of sodium, consisting chiefly of NaCN. Cyanides of K, Li, Ca, Ba or Sr, or mixts. of cyanides with cyanamides may be used to produce the metals electrolytically with anodes containing Pb, at a temp. of 750°.

Ger., 280,525, Nov. 24, 1912. J. P. A. LARSON and G. K. LAUR. Electrodeposition of zinc, cobalt, and other values from the waste liquors of Cu extn., while at the same time rendering the liquors harmless.

Ger., 280,604, Sept. 19, 1913. ALLGEMEINE ELEKTRIZITÄTS-GESELLSCHAFT. An electric resistance for the automatic regulation of elec. circuits contains, as a necessary constituent, a body of B or other substance of high negative temp. coefficient. A heating element is arranged parallel to this body. Both bodies can form a composite filament with a core of C, W, Ta, or the like, and a shell of B.

Ger., 280,742, Dec. 3, 1913. E. ACHENBACH. Thickening alkali lyes, especially for the production of a base for alk. dry cells and accumulators. When the alkali lyes are thickened with starch, bran, and the like, organic acids, such as (HOCO)₂, are always formed to some extent, so that the resulting mass is not suited as an electrolyte for galvanic elements. To overcome this difficulty, metal oxide is added, in addition to the bran or the like, such oxide combining with the organic acid to form a compd. which does not act on Zn. E. g., MgO is added with the bran and the mixt. is heated.

Ger., 280,908, May 29, 1913. Addition to 279,911 (C. A. 9, 1157). E. ACHENBACH. In a process of thickening the electrolyte for alkaline elements, instead of MgO, as specified in the principal patent, marble lime is added to the alkali lye in which it dissolves completely, forming an alk. paste with alkali lye.

Ger., 280,909, Nov. 29, 1913. Addition to 279,911 (C. A. 9, 1157). E. ACHENBACH. Thickening the electrolyte for alkaline elements. According to the principal patent, MgO is added to an alkali lye, and upon heating the mixt. a thick paste is formed. By this process, a freshly pptd. metal hydroxide is also added to the mixt., such hydroxide not forming a compd. with the alkali lye, even when heated. Fe or Ni hydroxide is suitable.

Ger., 281,041, Feb. 28, 1913. GEBR. SIEMENS & CO. Construction of resistance bodies, especially for compression resistances, which are C-coated where arcs may form.

Ger., 281,511, Sept. 12, 1913. S. LASZCZYNSKI. Double pole electrode of molten iron oxide, especially for the production of chlorate, with a suitable electrolytic app.

6. INORGANIC CHEMISTRY.

H. I. SCHLESINGER.

Silver fluorides. A. GUNTZ AND A. A. GUNTZ, JR. *Ann. chim.* 2, 101-32(1915).—A more detailed account of work already published (see C. A. 8, 2124). W. H. S.

Calcium amalgams. L. CAMBI AND G. SPERONI. Milan. *Atti accad. Lincei* 23, II, 599-605(1914).—The literature on amalgams is reviewed carefully. In the system Ca-Hg it was shown by thermal analysis that the compd. CaHg₂ occurs up to 33 atoms

% Ca. CaHg_4 melts with decompn. at 266° . At higher temps. there is probably a primary sepn. of CaHg_3 . Mixts. containing more than 14 at. % Ca do not melt completely at ordinary pressure and b. 377° . Thermal analysis, however, does not give any evidence for the existence of compds. with a higher Hg content, such as have been frequently reported. Similar results were obtained for the systems Na-Hg and K-Hg.

E. J. WITZEMANN.

Mercurial compounds of aliphatic amines. M. RAFFO AND A. SCARELLA. Univ. Bologna. *Gas. chim. ital.* 45, I, 123-7(1915).—The prepn. of a number of aliphatic amines analogous to mercuriammonium salts by reactions similar to those by which the corresponding ammonium salts are obtained is described. The structure of the resulting compds. is interpreted according to the Rammelsberg-Pesci formulation. A soln. of $\text{Hg}(\text{NO}_3)_2$ treated with agitation with a slight excess of a MeNH_2 soln. gave a white ppt. which after warming on the H_2O bath settled as a white microcryst. powder. The *mercurimethylammonium nitrate*, MeNHg.HNO_3 , thus obtained is insol. in H_2O and ordinary solvents; heated dry it deflagrates without melting. *Mercuriethylammonium nitrate*, EtNHg.HNO_3 , was similarly obtained as small rhombic laminas; its properties are also similar. Adding gradually EtOH soln. of amylamine to a concd. $\text{Hg}(\text{NO}_3)_2$ soln. with const. agitation and keeping the soln. acid gives a white microcryst. ppt. of *mercuriamylammonium nitrate* with *amylamine nitrate*, $\text{C}_5\text{H}_{11}\text{NHg.HNO}_3$, $\text{C}_5\text{H}_{11}\text{NH}_2$, HNO_3 , insol. in H_2O and ordinary solvents. This product washed with a 2% NaHCO_3 soln. and then with H_2O and finally EtOH , eliminated amylamine nitrate and the HNO_3 besides and left only *mercuriamylamine*, $\text{Hg:NC}_5\text{H}_{11}$, white powder, insol. in H_2O and solvents. MeNH_2 in conc. soln. added slowly to a soln. of HgCl_2 slightly acid with HCl ppts. *mercurimethylammonium chloride*, MeNHg.HCl , white, microcryst. ppt., insol. in H_2O , EtOH and Et_4O .

E. J. WITZEMANN.

Action of carbon dioxide on inorganic sulfides. N. COSTRANU. *Ann. chim.* 2, 189-210(1915); cf. C. A. 8, 636.—Sulfides decomposable by H_2O such as those of Si and B and sulfides insol. in H_2O such as ZnS and Cu_2S act as reducing agents when heated in an atm. of CO_2 , CO being formed. S is set free and the sulfide converted to oxide. Other insol. sulfides when heated in CO_2 suffer no change but act as if heated in a vacuum. Sometimes the sulfide is changed from the amorphous to the cryst. state at suitable temps. The alkali sulfides, heated in CO_2 , are changed to carbonates, CO , COS , and free S being produced. The free S reacts with some of the carbonate, alkali pentasulfide and sulfate being formed and CO_2 regenerated.

W. H. S.

The noble metals in litharge. J. LÖRBY. *Chem. Ztg.* 39, 287(1915).—The author obtained weighable amts. of Au and Ag from 1200 g. of "C. P." PbO furnished him by a Frankfurt firm.

H. L. OLIN.

Critical examination of tungstic and tungsto-chromic compounds. V. K. KANCHEV. *J. Russ. Phys. Chem. Soc.* 46, 729-42(1914).—Knorre's method for detg. W (Ber. 38, 783(1905)) is tedious. A quick volumetric method, exact to within 0.1%, is proposed, based upon the hydrolysis of benzidine salts, making it possible to titrate their acid as if it were free. The method is as follows: To the warm soln. of the W salt add an excess of a soln. of the colorless HCl salt of benzidine, collect the ppt. produced on a filter and wash with a little H_2O . Transfer the ppt., together with the filter, to an Erlenmeyer flask, add H_2O and after warming the mixt. to 60° , titrate the acid with 0.1 N NaOH , using phenolphthalein as indicator and increasing the heat to 100° at the end of the titration. With the aid of this method several salts described in the literature were examd. The results may be summed up as follows: Lefort's Na di- and tritungstates, $\text{Na}_2\text{O} \cdot 2\text{WO}_3 \cdot 6\text{H}_2\text{O}$ and $\text{Na}_2\text{O} \cdot 3\text{WO}_3 \cdot 4\text{H}_2\text{O}$ (*Ann. chim. phys.* [5] 9, 93) and Ca and Ba ditungstates, $\text{CaO} \cdot 2\text{WO}_3 \cdot 3\text{H}_2\text{O}$ and $\text{BaO} \cdot 2\text{WO}_3 \cdot \text{H}_2\text{O}$ (*l. c.* 15, 325) do not exist, the compds. obtained by strictly following L.'s directions being either

identical with or mixts. of other known salts. Pure chromotungstates (e. g., $\text{Cr}_2\text{O}_3 \cdot 7\text{WO}_3 \cdot 9\text{H}_2\text{O}$) are obtainable only by using the violet modifications of the salts of trivalent Cr, the compds. resulting when the green modifications are used always containing more or less basic salts. This is due to the difference in comp. of the ions of the 2 varieties of Cr salts, the violet modifications giving simple Cr ions, while the green give complex ions (Whitney, *Z. physik. Chem.* 20, 41). L.'s salts, $\text{Cr}_2\text{O}_3 \cdot 3\text{WO}_3 \cdot 3\text{H}_2\text{O}$, $\text{Cr}_2\text{O}_3 \cdot 4\text{WO}_3 \cdot 6\text{H}_2\text{O}$ and $\text{Cr}_2\text{O}_3 \cdot 5\text{WO}_3 \cdot 5\text{H}_2\text{O}$, do not exist, the first being $\text{Cr}_2\text{O}_3 \cdot 7\text{WO}_3 \cdot 16\text{H}_2\text{O}$, while the other 2 are indefinite mixts., colored green by contamination with the green modification of Cr salts. In warm solns. containing paratungstates and salts of trivalent Cr all of the paratungstic acid cannot be set free by the addition of a mineral acid, and therefore cannot be quantitatively detd. by means of benzidine salts, because in such solns. the W is in the form of complex W-Cr acids. These will be reported upon in the near future.

H. M. GORDIN.

Hydrates of uranyl nitrate. DE FORCRAND. *Ann. chim.* 3, 5-48(1915).—From the results of previous investigators (cf. *C. A.* 4, 887; 5, 2374; 6, 3374, 3376), F. concludes that a marked similarity exists between the nitrates of UO_2 and Cu and that the formation of H_2UO_4 and loss of HNO_3 upon heating the 3- or 2-hydrate is analogous to the formation of basic Cu nitrate; $(\text{NO}_3)_2\text{UO}_2 + n\text{UO}_2(\text{OH})_2$ and $(\text{NO}_3)_2\text{Cu} + 3\text{Cu}(\text{OH})_2$. The reactions during dehydration might be considered as (A) the simple dehydration which according to the data of Marketo absorbs 29.9 cal., and (B) more complicated and including (A), which might be formulated: $\text{N}_2\text{O}_8\text{UO}_2 \cdot 2\text{H}_2\text{O}$ solid = $\text{N}_2\text{O}_8\text{UO}_2$ solid + $2\text{H}_2\text{O}$ gas — 29.9 cal.; $\text{N}_2\text{O}_8\text{UO}_2$ solid = N_2O_8 gas + UO_2 solid = x ; N_2O_8 gas + H_2O gas = $2\text{NO}_2\text{H}$ + 10.8 cal.; UO_2 solid + H_2O gas = UO_2H_2 solid = y ; H_2UO_4 solid + $\text{N}_2\text{O}_8\text{UO}_2$ solid = basic nitrate = q . The thermochem. data are lacking but by analogy with Cu should approximate $x = -32.6$; $y = +17$; $q = +4.03$. The necessary data were detd. exptly. and found: for (A), —33.27; x , —30.6; y , +14.62; q , +4.03 cal. The sum of the partial heats of (B) is —1.15 cal., insignificant in comparison with (A) (—33.27). It follows that the temp. limits t_a and t_b of the 2 reactions lie so near each other that practically it is impossible to produce (A) without (B) also taking place. The following exptl. results and data are presented: (1) dehydration of 6-hydrate at room temp. and atm. pressure over H_2SO_4 gives 2-hydrate only after 30 days; the 3-hydrate (approx.) after 3 days but no abs. sepn. of the 2 phases; marked retardation of rate of dehydration near the 3-hydrate. (2) Same *in vacuo* (4–5 mm.), 3.454 mols. H_2O removed in 1 day; 4 mols. after 9 days. (3) Dehydration of 2-hydrate in current of CO_2 , (a) at 160° , dehydration complete after 3–4 hrs.; much loss of HNO_3 ; (b) at 125 – 130° , approx. 1 mol. H_2O lost after 4–5 hrs. if HNO_3 loss detd. and corrected for; const. wt. after 55–60 hrs.; product = $\text{N}_2\text{O}_8\text{UO}_2 + \frac{1}{11} \text{H}_2\text{UO}_4$; (c) at 98 – 99° , 1 mol. H_2O removed after 150 hrs.; residue then $\text{N}_2\text{O}_8\text{UO}_2 \cdot \text{H}_2\text{O} + \frac{1}{16} \text{H}_2\text{UO}_4$. This expt. fixed the location of t_a and t_b and served to isolate the previously unknown *monohydrate*. (4) Dehydration of the 2-hydrate in a current of CO_2 charged with HNO_3 vapors (a) at 165° , after 15 hrs., $\text{N}_2\text{O}_8\text{UO}_2 + \frac{1}{28} \text{H}_2\text{UO}_4$; (b) at 155° , after 30 hrs., $\text{N}_2\text{O}_8\text{UO}_2 + \frac{1}{31} \text{H}_2\text{UO}_4$. By this method a practically pure anhydrous salt should be obtained at 125° . The thermochem. data were obtained by dissolving the various hydrates thus prepd., of which the actual comp. was 5.975 H_2O , 2.85–2.90 H_2O , 2-hydrate pure, 1-hydrate with $\frac{1}{16} \text{H}_2\text{UO}_4$ and anhydrous salt with $\frac{1}{28} \text{H}_2\text{UO}_4$, the necessary corrections for comp. being made. Heats of soln.: 6-hydrate, —5.45 cal.; 3-hydrate, +1.35; 2-hydrate, +5.05; 1-hydrate, +11.87; 0-hydrate, +19.00. Effluorescence pressure = 1 atm. at: 1-hydrate, 292° ; 2-hydrate, 281° ; 3-hydrate, 176° ; 6-hydrate, 128° . Heat of soln., of UO_2 (prepd. at 290 – 300°) 19.803 cal.; of $\text{UO}_2 \cdot \text{H}_2\text{O}$, 14.846; of $\text{UO}_2 \cdot 2\text{H}_2\text{O}$, 12.375; for heats of hydration, 1st mol. H_2O , 4.957 cal., for 2nd mol. 2.471 cal. Heat of formation of $\text{UO}_2(\text{NO}_3)_2$ solid = 67.25; dissolved = 86.25,

as compared with nitrates of Cu, 71.49 and 81.96, Ni, 100.12 and 111.94; Mn, 133.77 and 146.7. An explanation is appended of the fact noted by Mailhe that addition of the blue hydrate of Peligot, $\text{CuO} \cdot \text{H}_2\text{O}$, to a not too concd. soln. of $\text{UO}_2(\text{NO}_3)_2$ causes CuO to displace UO_2 , the latter pptg. out. $\text{UO}_2 \cdot \text{H}_2\text{O}$ and $\text{CuO} \cdot \text{H}_2\text{O}$ dissolved in HNO_3 liberate nearly the same heats, 14.84 and 14.72. Both dissolve in solns. of their nitrates to form basic salts. When $\text{CuO} \cdot \text{H}_2\text{O}$ is added to a soln. of $\text{UO}_2(\text{NO}_3)_2$, HNO_3 is partitioned between the 2 bases; then $\text{UO}_2 \cdot \text{H}_2\text{O}$ solid + H_2O liquid = $\text{UO}_2 \cdot 2\text{H}_2\text{O}$ solid + 2.471 cal. $\text{CuO} \cdot \text{H}_2\text{O}$ has a small heat of form, and forms no 2-hydrate. A. R. M.

Reaction between ferrous oxide and carbon and between carbon monoxide and iron. V. FALCKE. *Z. Elektrochem.* 21, 37-50(1915).—The author has studied these reactions at temps. ranging from 600° upward, and has examd. the gaseous products obtained when the reaction mixts. were dissolved in HCl . Three varieties of graphite and 5 of amorphous C were used. After thorough purification these were analyzed and their ds. detd. The app. was one used in previous work (*Ber.* 46, 743-50(1913); cf. *C. A.* 7, 2525). The solid mixts. were introduced in the form of compressed pellets. Below 650° the highly purified varieties of C do not react with FeO and above this temp. the several varieties of C do not behave alike and may be classed in 3 groups. Sugar charcoal and that obtained by the action of CO on Na are quite inactive up to 800° . C obtained by burning C_2H_2 in Cl and that from petroleum reacted with vigor at 650° . It is not known whether the difference in behavior is a property of the different modifications or the result of catalytic action. The graphites reacted vigorously also. The products of the reaction of C and FeO contained pure Fe , and no hydrocarbons resulted from soln. in HCl . When Fe was permitted to absorb a large quantity of CO and the equil. pressure set up at 600° , the product of the reaction which took place yielded large amts. of satd. hydrocarbons, chiefly ethane, when treated with HCl . No solid C remained. On the contrary when Fe was heated in a stream of CO or allowed to absorb CO in large amts., and then heated in a vacuum, the product treated with HCl gave no hydrocarbons and a residue of C resulted. W. H. S.

Catalytic action of colloidal metals of the platinum group. XI. Reduction of molybdic acid. C. PAAL AND H. BÜTTNER. *Univ. Leipzig. Ber.* 48, 220-3(1915); cf. *C. A.* 1, 2851; 2, 2932, 2933; 3, 2158, 2159, 2455; 4, 314; 7, 2569.—In a previous article (cf. *C. A.* 8, 3275) it is stated that solns. of $(\text{NH}_4)_4\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}$ are reduced by H in presence of colloidal Pd to $\text{Mo}(\text{OH})_4$. The same catalyst in a more active condition has been used in the present work. The reduction is complete at ordinary temps., but at 50 - 60° H is absorbed anew particularly under slight pressure, and then insol. $\text{Mo}(\text{OH})_3$ is formed as a black sludge. W. H. S.

Etherates of aluminium iodide (DOMANITZKII) 10. Molecular combinations of amines (KOCHUBER) 10.

MOISSAN, H.: *Le fluor.* Paris: A. Colin. 1.20 fr.

7. ANALYTICAL CHEMISTRY.

H. G. R. ARDAGH.

Application of spectrography to analytical and industrial chemistry. S. J. LEWIS. *Analyst* 40, 188-9(1915).—L. gives a general discussion of the subject and recommends increased use of the spectrograph in analysis and chem. industry. P. B. D.

The volume of liquids titrated at different temperatures. H. PELLET. *Ann. chim. anal.* 20, 97-9(1915).—Discussion of a paper by Debrun (cf. *C. A.* 9, 1442).

P. calls attention to the necessity, for accurate work, of noting temps. at which solns. are prepd. and at which subsequent work is done and of making corrections for the temp. differences. It is pointed out that the coeff. of expansion of ordinary acid and alkali volumetric solns. and of 10, 12, and 15% sucrose solns. between 4° and 35° is nearly the same as that of H₂O. P. gives a portion of a table used by him and his colleagues for the past 20 yrs. in sugar work, showing excellent concordance with that of D., which is considered as the more exact.

F. W. SMITHER.

Precipitation of zinc and manganese with ammonium sulfide. F. SEELIGMANN. *Z. anal. Chem.* 54, 104 (1915).—To ppt. Mn with (NH₄)₂S in the presence of NH₄ salts, add a few drops of H₂O₂ to the soln. before adding the excess of NH₄OH and proceed as outlined in the former paper (cf. C. A. 9, 40). The detn. of Zn is not affected by NH₄ salts.

H. L. OLIN.

The estimation of niobium (columbium) in presence of tantalum, and some reactions of tantalum compounds. ARTHUR G. LEVY. *Analyst* 40, 204-18 (1915).—The volumetric method described for the estn. of Nb in the presence of Ta is based on the fluoride method of Osborne (*Am. J. Sci.* [3] 30, 328 (1885)), but reduction only goes as far as an oxide, Nb₁₀O₁₇, with a 0.1 N KMnO₄ equiv. of 0.00834 g. per cc. A series of detns. were made using known wts. of Nb₂O₅ or mixts. of Nb₂O₅ and Ta₂O₅, the conditions of operation being varied. The most satisfactory results were obtained by the following method: Dissolve the sample in 3-5 cc. HF in a 25 cc. Pt crucible and evap. nearly to dryness on a water bath or hot plate. Then transfer the material to a 500 cc. conical flask provided with a 2-holed rubber stopper carrying an inlet tube for H and an ordinary thistle funnel terminating at such a height that it was above the liquid at the end of the titration, i. e., above the 400 cc. level. The transfer is accomplished by the use of 40 cc. concd. HCl and 20 cc. water. Then add 10 g. Zn, and when the reaction slackens, generally in about 10 min., gently warm the flask on a hot plate. As soon as all the Zn is dissolved (in about 30 min.) dil. the contents of the flask with a cold, air-free soln. of 270 cc. water, 10 cc. concd. H₂SO₄, and 20 cc. of a cold satd. soln. of Na phosphate. Run in 0.1 N KMnO₄ at such a rate that single drops can just be distinguished, until the soln. became almost colorless. From this point on add the KMnO₄, cautiously, washing the successive drops down the funnel until the pink color persists 2 min. Both reduction and titration are made in an atm. of H. For further details of operation the original paper must be consulted. L. has previously shown that oxides of Nb and Ta both separately and when mixed are readily sol. in HF (48%), even after strong ignition. He has further detd. that large losses of Ta are caused by (a) dissolving Ta oxide in HF and igniting the residue obtained on evapn. to dryness; (b) igniting TaK₂F₇ with excess of KF at red heat; and (c) igniting mixts. of Ta oxide and NH₄F.

P. B. DUNBAR.

A method of assaying copper. A. FRASER. *J. Soc. Chem. Ind.* 34, 462-4 (1915).—The following reagents are required: (A) Standard Na₂S₂O₃ soln. (1 cc. = 10 mg. Cu); (B) soln. of I in KI (10 cc. = 1 cc. Na₂S₂O₃ soln.); (C) starch soln., acidified with AcOH just before using; (D) soln. of AcONa (1-5) made just acid with AcOH; (E) soln. of NaF made by shaking 45 g. of the salt with 1 l. H₂O, allowing to settle and drawing off the clear soln. Weigh 0.5-1.0 g. of sample into a porcelain dish (diam. = about 14 cm.) and treat with 5 cc. HCl and 15-20 cc. of a mixt. of HNO₃ and H₂SO₄ (12-1). Allow to stand overnight and then evap. to dryness. Heat until nearly all the H₂SO₄ is driven off, cool, add 5-6 drops of dil. H₂SO₄ (1-1) and 20-30 cc. H₂O and warm until all CuSO₄ is in soln. Allow to cool and add 10-20 cc. AcONa soln. followed by 20-50 cc. of NaF soln. The NaF soln. is added until the red color of the acetate of Fe disappears and then 10-15 cc. more are added. Add 3-5 g. of KI crystals and titrate the liberated I with Na₂S₂O₃ soln., using starch indicator. The Na₂S₂O₃ soln. is run in

while the contents of the dish are being mixed, and after a slight excess has been added the excess is titrated back with I soln. With ores containing only 1-2% Cu the reaction with KI is very slow and the blue starch-iodide color keeps on returning. $\text{Na}_2\text{S}_2\text{O}_3$ soln. must be added, however, till the liquid remains permanently decolorized. With sulfide ores containing much Sb or As, a variation in the method is necessary. With such ores, after treatment with the mixed acids, evapg., drying and driving off residual S, treat the residue a second time with the mixed acids, evap. and dry again. Then, after dissolving in H_2O and before adding the acetate, add a soln. of KMnO_4 , drop by drop, till a last drop permanently changes the green color of the liquid to a gray-violet. If the oxidation with HNO_3 has been complete, 1 drop of KMnO_4 is sufficient (1 cc. $\text{KMnO}_4 = 0.5$ cc. $\text{Na}_2\text{S}_2\text{O}_3$). Next, proceed as above, deducting 0.02 cc. from the reading on the $\text{Na}_2\text{S}_2\text{O}_3$ buret, or just destroy the violet color with FeSO_4 soln. and make no deduction. A more rapid modification of the method is as follows: Treat sample with the 3 acids, boil down over a flame, cool, dissolve in H_2O , pour into a dish, using the acetate and fluoride solns. to rinse the flask and titrate as usual. A rapid method for detg. Cu and Fe in the same sample is given. E. W. BOUGHTON.

The determination of zinc as zinc ammonium phosphate and its application in separations. P. ARTMANN. *Z. anal. Chem.* 54, 89-102(1915).—The solubility of ZnNH_4PO_4 in pure H_2O at 10.5° is 0.0145 g. per l., equiv. to 0.0053 g. Zn. To det. Zn by the application of the iodometric method for NH_3 (cf. C. A. 1, 537), dissolve the ppt. of ZnNH_4PO_4 (corrected for known vol. of wash H_2O) in hot dil. H_2SO_4 , cool, add NaOH in excess until the ppt. is redissolved, add 0.5 N NaOBr in excess and det. the excess iodometrically. To sep. and det. Zn in Zn-Cu solns. add ammon. tartrate and $(\text{NH}_4)_2\text{PO}_4$ and ppt. ZnNH_4PO_4 . Wash the ppt. with 1% $(\text{NH}_4)_2\text{PO}_4$ soln. until free from Cu and dissolve in dil. HCl. Add 10 cc. ammon. tartrate and 100 cc. H_2O , heat to boiling, add 10-15 cc. NH_4OH , and 10 cc. $(\text{NH}_4)_2\text{PO}_4$ soln. Add dil. HCl until faintly ammoniacal, boil off remaining NH_3 and allow ppt. to settle warm.

H. L. OLIN.

The separation of magnesium from lithium by means of ammonium carbonate in alcoholic solution. J. G. DINWIDDIE. *Am. J. Sci.* 39, 662-4(1915).—The EtOH soln. of $(\text{NH}_4)_2\text{CO}_3$ was made by mixing 1500 cc. of the satd. aq. soln. of $(\text{NH}_4)_2\text{CO}_3$ with 360 cc. of concd. NH_4OH and 1900 cc. of 93% EtOH, settling out the pptd. $(\text{NH}_4)_2\text{CO}_3$, and filtering the clear soln. The solns. used for analysis contained 0.2-0.3 g. of MgO and 0.08-0.35 g. of Li. To 15-20 cc. of the soln. containing Mg and Li, 25 cc. of 93% EtOH was added and 50 cc. of the pptg. mixt. The mixt. was stirred vigorously for 1 min. and set aside for 5 hrs. or more. The supernatant liquid was decanted upon a Gooch crucible, the ppt. was stirred with more of the pptg. mixt. and allowed to settle, and the liquid again decanted upon the Gooch crucible and washed with the pptg. mixt. In some cases the ppt. was dissolved in HCl and repptd., washed, ignited and weighed. By one pptn. 0.2 g. MgO was satisfactorily sepd. from 0.08 g. of Li, but with larger amts. of Li the pptd. NH_4MgPO_4 was contaminated with Li. Two pptns., however, yielded a very fair sepn. 0.2730 g. of MgO was found in a mixt. containing 0.2718 g. MgO and 0.347 g. Li as LiCl .

E. W. BOUGHTON.

Rapid analysis of bearing metals and high copper content alloys. C. G. LUTTS. *Met. Chem. Eng.* 13, 346-7(1915).—The method of Demorest (cf. C. A. 8, 36) is inadequate for some alloys containing much Cu. L.'s modification is as follows: Treat 1 g. of drillings with 50 cc. HNO_3 (d. 1.2) and after dissolving in the cold for a few min. place beaker on the hot plate and evap. to 10 cc. Dil. with H_2O and boil for about 1 min. Decant and filter, washing by decantation once with HNO_3 , and finally wash with hot H_2O . To filter paper and ppt. in a beaker add 40 cc. conc. H_2SO_4 and 15 cc. H_2O . Warm and add KClO_3 repeatedly until all C is oxidized. To the clear soln. add 0.5 g.

S and boil for 30 min. Cool, remove ball of S and dil. soln. with 3 times its vol. of H_2O . Any Pb that was carried down with Sb and Sn by treatment with HNO_3 will occur as $PbSO_4$ at this point and should be filtered off and weighed. Heat filtrate to 60° and add standard $KMnO_4$ soln. till a deep pink color is obtained. Stir and titrate back with standard $FeSO_4$ soln. The Fe factor of the $KMnO_4 \times 1.076$ gives the factor for Sb but this should be checked by standardizing the soln. against pure Sb. *Tin*: After titrating pour soln. into a large flask, add $\frac{1}{2}$ its vol. of conc. HCl (d. 1.20) and place on hot plate. If the alloy does not contain 15% or more of Sb add enough soln. of $Sb_2(SO_4)_3$ to bring total Sb to that amt. Heat to boiling and add Fe wire at intervals so as to evolve a rapid stream of H. The flask should have a loosely fitting stopper. After 45 min., cool and filter through asbestos. Titrate immediately with 0.1 N I soln., using starch indicator. One cc. 0.1 N I soln. = 0.00595 g. Sn, and is standardized against pure Sn dissolved in H_2SO_4 and reduced as above. *Lead*: Evap. soln. of Pb, Cu, etc., obtained above with conc. H_2SO_4 and det. Pb as $PbSO_4$. *Copper*: Pass H_2S through filtrate from $PbSO_4$. If alloy is high in Cu (about 75%) dissolve CuS in HNO_3 and evap. with H_2SO_4 . Dil., add NH_4OH till soln. is neutral, add 4 cc. HNO_3 (d. 1.42) and electrolyze at 3 v. and 0.3–0.5 amp., using rotating anode if possible. If Cu content is low a separate analysis is necessary. Dissolve 1 g. alloy in 40 cc. conc. H_2SO_4 , boil 1 min. and cool. Dil. with 2 vols. of H_2O , let settle and filter off $PbSO_4$, which can be weighed if a check detn. on Pb is desired. Heat filtrate to 60° and titrate for Sb with $KMnO_4$ and $FeSO_4$ as above. To soln. add 3 g. tartaric acid, make slightly alk. with NH_4OH and add 3 cc. conc. H_2SO_4 . Heat to boiling, add 2 g. $Na_2S_2O_3$ and then 1 g. $KCNS$ dissolved in H_2O . Warm for 15 min., filter on a Gooch crucible and wash with hot H_2O . Dry at 110° and multiply wt. of $CuCNS$ by 0.5226 to calc. % of Cu. *Iron*: If present, det. at this point by pptn. with NH_4OH with subsequent titration or weighing. *Zinc*: If present, boil off H_2S from filtrate from CuS , make soln. slightly acid, add 3–5 g. of $AcONa$ and an excess of $NaNH_2HPO_4$ soln. Let settle, filter, ignite and weigh Zn as pyrophosphate. Demiorest's method for metals containing only Sn, Sb and Pb is given.

E. W. BOUGHTON.

The determination of ammonia by the boric acid method. FERDINAND PILZ. *Z. landw. Versw.* 18, 55–7 (1915).—In the method of Winkler (cf. *C. A.* 9, 899), the condenser must be kept cool. The expense is greater than in the usual method and there are no compensating advantages.

L. J. GILLESPIE.

Detection of sodium hydrogen carbonate in sodium carbonate. HASLAM. *Boll. chim. farm.* 53, 271–2 (1914).—Small amts. of $NaHCO_3$ in Na_2CO_3 may readily be detected as follows: Dissolve a portion in boiled, distd. H_2O , add an excess of $CaCl_2$, filter after 4–5 min. and add several drops of NH_4OH to the filtrate. A ppt. of $CaCO_3$ is produced if an appreciable amt. of $NaHCO_3$ was present. If the amt. of $NaHCO_3$ present was very small, the ppt. does not appear for some 10 min. It is possible by this test to detect 1 part $NaHCO_3$ in 1000.

H. S. PAINE.

The volumetric determination of polythionic acids by potassium iodate. G. S. JAMIESON. *Am. J. Sci.* 39, 639–42 (1915).— H_2SO_3 can be detd. by titrating with a soln. of KIO_3 in the presence of 15–20% actual HCl and a small vol. of an immiscible solvent such as $CHCl_3$, according to the general method of Andrews (cf. *C. A.* 8, 3279). Expts. showed that $H_2S_2O_3$ and $H_2S_4O_6$ can be detd. in the same manner, while $H_2S_5O_6$, on account of its stability cannot be detd. by this method. $H_2S_5O_6$ reacts so slowly with KIO_3 in the presence of HCl that it is possible to titrate and det. the amt. of $H_2S_5O_6$ in the presence of large amts. of $H_2S_2O_3$.

E. W. BOUGHTON.

A method of estimating small amounts of carbon dioxide in the presence of sulfides. H. W. JONES. *The Rubber Industry* 1914, 191–2.—The CO_2 evolved by treating the sepd. mineral matter with HCl is absorbed in a soln. made by mixing 30 g. $BaCl_2$ in

180 cc. H_2O with 36 cc. NH_4OH and water sufficient to make 300 cc. The CO_2 is detd. by dissolving the filtered and washed BaCO_3 in HCl and detg. the Ba as sulfate.

W. F. ZIMMERLI.

The detection of phenol-formaldehyde condensation products. F. STEINITZER. *Kunststoffe* 5, 109-11 (1915).—A review of the tests given in the literature. F. W. S.

Estimation of methyl alcohol in presence of ethyl alcohol. G. C. JONES. *Analyst* 40, 218-22 (1915).—J. has studied the modification of Denigès' method by Simmonds (C. A. 6, 970) and emphasizes the importance of adhering rigidly to the definite conditions laid down. He recommends the use of a Schiff's reagent made by dissolving 0.2 g. of magenta base in 10 cc. freshly prepd., cold, satd., aq. soln. of SO_2 , and after 24 hrs. dilg. with 200 cc. water. The final color intensity may be increased by adding 5 cc. instead of 2.5 cc. of KMnO_4 soln. In this case the use of 1.0 cc. $\text{H}_2\text{C}_2\text{O}_4$ soln. is required.

P. B. DUNBAR.

The detection of methyl alcohol by the Denigès' reaction, and its determination in aqueous solution. T. VON FELLEBERG. *Mitt. Lebensm. Hyg.* 6, 1-24 (1915); cf. C. A. 4, 1443, 1725.—F. discusses the reaction in detail and outlines the following method for the estn. of MeOH in solns.: From a dil. soln. distil off 60%. If volatile acids or bases are present, add NaOH or H_2SO_4 ; in the presence of aldehydes, terpenes, or other unsatd. compds. add NaOH and AgNO_3 . To det. MeOH combined with pectin, distil off volatile compds., sapon. with NaOH and distil the MeOH from acid soln. The following solns. are necessary: (1) $\text{C}_2\text{H}_5\text{HSO}_4$: 21 cc. 95% EtOH in H_2O and 40 cc. H_2SO_4 (d. 1.84), made up to 200 cc.; (2) KMnO_4 soln.: 50 g. per l.; (3) $\text{H}_2\text{C}_2\text{O}_4$: satd. soln.; (4) H_2SO_4 (d. 1.84); (5) fuchsin bisulfite: 5 g. fuchsin, 12 g. Na_2S , and 100 cc. N H_2SO_4 per l.; (6) MeOH: 1% soln., 12.67 cc. (10 g.) per l. To 3 cc. of the distillate add 1 cc. soln. (1) and 1 cc. soln. (2) and shake for 2 min. Treat in the same way 2 standard MeOH solns., 0.5 cc. 1% MeOH and 2.5 cc. H_2O , and 1 cc. 1% MeOH and 2 cc. H_2O . To each of the three add 1 cc. soln. (3), then 1 cc. soln. (4) and finally 5 cc. soln. (5) and mix. Let stand 1 hr. and est. colorimetrically, using the known solns. as standards.

H. L. OLIN.

Reactions of vanillin. E. P. HAUSSLER. *Z. anal. Chem.* 54, 104 (1915); cf. C. A. 8, 2662; 9, 921.—Merck's pepsin gave with the biuret test a weak but distinct violet color. With vanillin and dil. EtOH it formed yellow rings which, on the addition of 10% HCl , turned violet-brown and finally reddish brown. Without the addition of vanillin, the pepsin gave a brown color only. Whether the positive factor in the vanillin HCl reaction was the pepsin itself or an enzyme occurring in a protein mixed with it, was not detd.

H. L. OLIN.

Determination of tungsten (KANCHEV) 6. Assay of platinum ore (KENNEDY) 8.

BECKMANN, E.: Verfahren zur Prüfung der Luft auf Gehalt an brennbaren Stoffen. Berlin: G. Reimer. 50 Pf.

KRUG, C.: Lötrohrprobierkunde. Berlin: J. Springer. 3 M.

8. MINERALOGICAL AND GEOLOGICAL CHEMISTRY.

EDGAR T. WHERRY.

A lecture experiment to illustrate multiple crystallization. A. BEUTELL. *Breslau. Centr. Min. Geol.* 1915, 144-8.—Glass tubes 3 cm. in diam. are partially filled with S, exhausted and sealed. If tubes thus prepared are dipped in warm water for a few moments, and then cooled, a S coating will appear upon the walls; this resublimates

after a few moments. If the S end of the tube is immersed in water and warmed to 100° a white cryst. sublimate will appear on the cold portion of the tube. After a few months this sublimate becomes still more coarsely cryst. A. WANDTKE.

Covellite: A singular case of chromatic reflection. H. E. MERWIN. *Geophys. Lab. J. Wash. Acad.* 5, 341-4 (1915).—Covellite, cryst. CuS , is dark blue in powder, lighter blue on crystal surfaces, though varying in color with direction; cleavage plates appear in alcohol ($n = 1.36$) brilliant purple, in benzene ($n = 1.50$) reddish purple, and in methylene iodide ($n = 1.74$) red. Minute artificial crystals were found to transmit greenish light, owing to greater transmission in the center of the spectrum than at the ends, and measurements of n for diff. wave lengths showed remarkable variations, from 1.00 for 635 to 1.97 for 505 μ . The color effects noted are due to these variations in n combined with variations in reflective power for different wave lengths. E. T. W.

The occurrence of covellite at Butte, Mont. A. PERRY THOMPSON. *Bull. Am. Inst. Mining Eng.* 1915, 645-77.—Description of the mineral with discussion of its origin. H. L. OLIN.

Tetranickel triarsenide (maucherite) and its capacity as a silver precipitant. CHASE PALMER. *Z. Kryst. Min.* 54, 433-41 (1915); see C. A. 9, 44. E. T. W.

Bornite as silver precipitant. CHASE PALMER. U. S. Geol. Survey. *J. Wash. Acad.* 5, 351-4 (1915).—P. and Bastin (C. A. 7, 1857) have shown that chalcocite, Cu_2S , reacts with Ag_2SO_4 soln., and the reaction has been found to take place as follows: $\text{Cu}_2\text{S} + 2\text{Ag}_2\text{SO}_4 = 2\text{CuSO}_4 + 2\text{Ag} + \text{Ag}_2\text{S}$. It has also long been known that covellite, CuS , reacts with AgNO_3 to form $\text{Cu}(\text{NO}_3)_2$ and Ag_2S with no liberation of Ag. Therefore, 1 g. CuS will ppt. 2.26 g. Ag_2S , while 1 g. Cu_2S will ppt. 2.7 g. Ag, half free and half as Ag_2S . The mineral bornite contains Cu and Fe as sulfides, but the valences of the metals have never been definitely detd. A sample of bornite from Virgilina, Va., was purified by crushing and picking out visible chalcopyrite and other impurities, and was found to have the comp. Cu 62.50, Fe 11.64, S 25.4, sum 99.54%, corresponding to Cu_5FeS_8 with a slight excess of Fe, probably owing to undetected chalcopyrite. This was treated with Ag_2SO_4 soln. for 12 hrs., at first on the steam bath and then at room temp., and the products analyzed. For every atom of Cu dissolved one atom of free Ag and one Ag combined in sulfide form were pptd., proving that the Cu in bornite is in the cuprous form, so that the true formula of the mineral is $5\text{Cu}_2\text{S} \cdot \text{Fe}_2\text{S}_3$ or $\text{Cu}_{10}\text{Fe}_2\text{S}_{13}$. In writing the equation it is assumed that the Ag_2S combines with the Fe_2S_3 liberated, since the latter is not known as an independent mineral. The equation is: $\text{Cu}_{10}\text{Fe}_2\text{S}_{13} + 10\text{Ag}_2\text{SO}_4 = 10\text{Ag} + \text{Ag}_{10}\text{Fe}_2\text{S}_8 + 10\text{CuSO}_4$. E. T. W.

Datolite from Great Notch, New Jersey. C. W. COOK AND E. H. KRAUS. *Am. J. Sci.* 39, 642-5 (1915).—Chiefly crystallographic. The crystal faces are generally coated with stilbite, which is in such relationship with the datolite as to leave no doubt that the stilbite is younger. L. W. RIGGS.

The identity of footsite with connellite, with a description of two new occurrences of the mineral. W. E. FORD AND W. M. BRADLEY. New Haven. *Am. J. Sci.* 39, 670-6 (1915).—Specimens of "footeite" from the Bisbee District, Arizona, and "connellite" from the Tintic District, Utah, when compared with the original footeite and the original connellite were found to be the same species. The name connellite having priority over footeite, the latter must be discarded. Analyses: I, The original footeite, by Koenig; II, Connellite from Cornwall, by Penfield; III, Connellite from the Czar mine, Bisbee, Arizona, by Bradley; IV, Connellite from the Grand Central mine, Tintic District, Utah, by Bradley; V, Theoretical comp. according to the proposed new formula: $16\text{CuO} \cdot 2\text{CuCl}_2 \cdot 1\text{Cu}(\text{SO}_4(\text{NO}_3)_2) \cdot 19\text{H}_2\text{O}$.

	I.	II.	III.	IV.	V.
CuO.....	71.6	72.3	73.38	73.41	73.98
Cl.....	5.6	7.4	6.82	7.05	6.93
SO ₃		4.9	3.15	3.84	3.92
N ₂ O ₅			0.72	0.30	
H ₂ O.....		16.8	17.13	16.81	16.73
Sum.....		101.8	101.20	101.41	101.56
O = Cl....		1.7	1.53	1.59	1.56
		100.1	99.67	99.82	100.00

L. W. RIGGS.

Interchange of bases in stilbite. A. BEUTELL AND K. BLASCHKE. Breslau. *Centr. Min. Geol.* 1915, 142-4.—Finely powdered stilbite was shaken with solns. of neutral and ammoniacal NH₄Cl. The Ca is entirely replaced by NH₄, the process going on more rapidly in the ammoniacal soln. The amt. of NH₄⁺ entering into combination corresponds to the amt. of Ca and consequently no union of NH₃ with the OH group takes place. Fresh stilbite exchanged all of its Ca in 15 days, while thoroughly dehydrated material had only 0.1 of its Ca replaced in the same time.

A. WANDTKE.

Apatite from the magnesite quarry at Sunk, Styria. O. GROSSPIETSCH. Prague. *Z. Kryst. Min.* 54, 461-6(1915).—The mineral occurs in well developed crystals in hydrothermal veins. Analysis indicated a formula corresponding to the theory of Rogers: 4[3CaO(PO₄)₂.CaF₂] + 3CaO(PO₄).CaO. The sp. gr. = 3.2057, and *c* = 0.73341. The *ns.* and double refraction were measured, but no relation between optical properties and F content could be demonstrated.

A. WANDTKE.

"Genno-ishi." T. HIKI. *Mem. Coll. Eng. Kyoto Imp. Univ.* [2] 1, 55-8(1915).—Genno-ishi (hammer-stone), from Shinano province, is compared with jarrowite from the Clyde Estuary, Scotland. The mineral is analogous to pseudogaylussite (calcite after gaylussite) and is found as isolated crystals in clayey shale. These crystals are acute pyramidal or prismatic with rough surfaces and are covered with small crystals arranged in parallel position. Analysis shows SiO₂, 0.64; Fe₂O₃, 3.44; Al₂O₃, 1.00; CaO, 52.33; MgO, 0.48; CO₂, 37.00%; P₂O₅ and org. matter not detd. The specimen from Clyde contained more MgO (4.94), P₂O₅ (2.23), and org. matter (5.94%), but the difference is probably due to less complete leaching out of MgCO₃ and P₂O₅.

R. L. SIBLEY.

Geology of Juneau district. FREDERICK B. HYDER. *Eng. Mining J.* 99, 901-2 (1915).—A summary of the knowledge of the Au deposits of the region. The ores occur chiefly in metamorphosed sedimentaries more or less closely associated with igneous rocks, especially with metagabbro and albite-rock dikes.

E. T. W.

Occurrence of platinum at Boss Mine, Nevada. J. C. KENNEDY. *Mining Eng. World* 42, 939-40(1915).—Little definite information as to the occurrence and origin of the ore is obtainable, and its nature is described only as a "mineralogical curiosity—rather soft and earthy in character." Some samples are said to yield as high as 1500 oz. Pt per ton, and other metals of the Pt group are present, along with Au, Ag, Cu, Pb, Zn, Hg, V, U, Ce, and Yt. Methods of assay are described, and it is stated that the Pt can be parted from the Au by HNO₃ alone, because of the large % of Pd present. Some recommendations as to methods of extn. of the Pt metals are also given. Cf. Knopf, C. A. 9, 1591.

E. T. W.

The Grong copper and pyrite mines of Norway. ANDREAS D. UDHANY. *Eng. Mining J.* 99, 889-92(1915).—In this region in the extreme northern end of Norway

3 groups of deposits are known. The Gjersvik deposits comprize large bodies of pyrite containing 2-2.2% Cu and 43% S, together with several lodes of chalcopyrite. The Joma deposits are chiefly pyrite averaging 44% S, with also some ore running as high as 2% Cu. The Skorovas deposits are pyrite nearly free from Cu but averaging up to 50% S. E. T. W.

Iron ore occurrences in Cape Breton. E. LINDEMAN. *Summary Rept. Mines Branch, Canada Dept. Mines* 1913, 31-6.—Numerous deposits of hematite occupying fissures and cavities in the Cambrian and the lower Carboniferous occur throughout Cape Breton. The Fe content varies from 48 to 62%. H. L. OLIN.

White mica occurrences in the Tete Jaune Cache and Big Bend districts of B. C. H. S. DE SCHMID. *Summary Rept. Mines Branch, Canada Dept. Mines* 1913, 42-9.—The principal Tete Jaune claims are located on Mica mountain at an elevation of 7000 ft. The muscovite crystals occur in pegmatite dikes with white microcline feldspar and quartz. The mica is free from stains and is of fair quality, but systematic mining would probably not be profitable on account of the remoteness of the field and the shortness of the working season. H. L. OLIN.

Moose Mountain District in Southern Alberta. D. D. CAIRNES. *Canada Dept. Mines Geol. Surv. Mem.* 61, 62 pp. (1915).—A detailed study of the coal and gas horizons in this district to indicate their positions in the geological column. The coal occurs as anthracite, semi-anthracite or bituminous, according to the amt. of local pressure caused by folding and twisting of the rocks. Some of the coals are lignites, while in one locality a seam was found which had altered to an impure graphite. The water, volatile combined matter, fixed C and ash of the coals were detd. by fast coking. R. L. SIBLEY.

Certain points in petrographic classification. WHITMAN CROSS. *Am. J. Sci.* 39, 657-61 (1915).—A reply to the criticisms of Daly and of Lindgren of the quant. classification of igneous rocks proposed by Cross, Iddings, Pirsson and Washington.

L. W. RIGGS.

The calculation of calcium orthosilicate in the norm of igneous rocks. HENRY S. WASHINGTON. *Geophys. Lab. J. Wash. Acad.* 5, 345-50 (1915).—In the original Quantitative System it was recommended that excess CaO be calcd. as $4\text{CaO} \cdot 3\text{SiO}_2$. As subsequent work showed the nonexistence of the latter compd., it was later suggested that $3\text{CaO} \cdot 2\text{SiO}_2$ be used. Still later work having demonstrated the comparative instability of this compd., it is now recommended that the normative compd. for CaO be taken as the orthosilicate, $2\text{CaO} \cdot \text{SiO}_2$. The change necessitates new equations for the calcn. of the norm, but comparatively few rocks are of such chem. character that this calcn. is necessary, and even when it is, the change has but little effect on the classificatory position of the rocks. A simplified procedure in calcg. the norm, which has been found most economical in time and labor, is described in detail, and a table for calcg. the amts. of $2\text{CaO} \cdot \text{SiO}_2$ given. E. T. W.

Geological-mineralogical observations in India. IV. Is there a possibility of simultaneous lateritic and non-lateritic weathering in the tropics? RICHARD LANG. Tübingen. *Centr. Min. Geol.* 1915, 148-60; cf. *C. A.* 9, 191, 584.—The laterite of India is only found under the brown and humous soil, and all evidence points to the fact that laterite is a fossil deposit, and belongs to a past period of dry climate; that during the wet climate since that time, only brown and humous soils have been formed. L. thus differs from Stremme and Glinka, who regard the laterite as a product of the moist conditions. A. WANDTKE.

Limestone solution on the bottom of Lake Ontario. E. M. KINDLE. *Am. J. Sci.* 39, 651-6 (1915).—The samples studied were brought to the surface in fishermen's nets about 20 miles S. W. of Brighton, Ont., from a depth of 150 ft. They had deeply

pitted surfaces, showing a much greater solvent action of the water than that which prevails at and near the surface. This difference K. attributes to the greater conc. of CO_2 at the depths mentioned, this CO_2 being furnished by the flora and fauna of the lake bottom. L. W. RIGGS.

Saline springs of Manitoba. L. H. COLB. *Summary Rept. Mines Branch, Canada Dept. Mines* 1913, 50-3.—A preliminary report on salt wells and springs in the Westbourne and Winnipeg districts. No chem. analyses have yet been made.

H. L. OLIN.

Clay deposits near McMurray, Alberta (ELLS) 19. Coexistence of phases subjected to different pressures (NIOGLI) 2. Geology and water resources of Tularosa Basin, New Mexico (MEINZER) 14. Geology and underground waters of Texas coastal plain (DEUSSEN) 14. Two-circle goniometer (STRÖBER) 1. Model for illustrating Röntgen ray interference phenomena (HAUER) 1.

BEYSCHLAG, F., KRUSCH, O. UND VOGT, J. H. L.: *Die Lagerstätten der nutzbaren Mineralien und Gesteine, nach Form, Inhalt und Entstehung dargestellt.* 2 Aufl. Stuttgart: F. Enke. 578 ss. 20 M.

HAGER, D.: *Practical Oil Geology.* New York: McGraw-Hill Book Co. 149 pp. \$2.00.

SIMMERBACH, B.: *Die Mineralreichtümer und die bergbaulichen Verhältnisse Argentiniens.* Kattowitz: Gebr. Böhm. 27 ss. 1.20 M.

9. METALLURGY AND METALLOGRAPHY.

WILLIAM BRADY, WILLIAM T. HALL.

Progress of the Martin process in production of cast steel. G. SIROVICH. *Ann. chim. applicata* 3, 255-68(1915).—A description of the process, and of different forms of furnaces. S. predicts that this process will supplant the converter in all lines of the industry. S. LEVY.

Precipitating action of carbon in cyanide solutions. W. R. FELDTMANN. *Mining Sci. Press* 110, 791-6(1915).—In working with quartz veins of W. Africa F. found that the graphitic schist which is present ppts. Au from auriferous solns. in a manner analogous to the action of charcoal under like conditions. The Au is pptd. on the charcoal or schist as a compd., possibly a carbonyl aurocyanide. This Au compd. is decomposed and the Au is dissolved to a considerable extent by alkaline sulfide solns. Further expts. are being carried on to make practical use, in the cyanide treatment of ores, of this solubility of Au in alkaline sulfide solns. An attempt will be made to evolve an economical post-treatment of sand residues. L. A. TOUZALIN.

Home-made apparatus for cyanide tests. H. F. LUNT. *Mining Sci. Press* 110, 911-2 (1915). E. J. C.

Fumeless ore furnace burning crude oil. ANON. *Mining Eng. World* 42, 991 (1915).—An editorial discussion of an exptl. hydro-vacuum furnace described by Marquand in a thesis submitted to the Univ. of Calif. F. W. SMITHER.

Wet methods of mercury extraction. E. B. THORNHILL. *Mining Sci. Press* 110, 873-4(1915).—As a result of expts. Mulholland suggested grinding the ore in an alk. sulfide soln., whereby the cinnabar was dissolved, sepg. the soln. from the ore by filtration or decantation, pptg. the Hg out of soln. with $\text{Zn}(\text{OH})_2$, which brought down a mixt. of ZnS and HgS, dissolving the ZnS out of the ppt. with H_2SO_4 , and retorting the

residual HgS with CaO or Fe to obtain Hg. The H_2S formed by dissolving the ZnS was used to regenerate the Na_2S soln. *Reactions:* $Na_2S + HgS = Na_2S.HgS$; $ZnSO_4 + 2NaOH = Zn(OH)_2 + Na_2SO_4$; $Zn(OH)_2 + 2NaOH = Na_2ZnO_2 + 2H_2O$; $Na_2S.HgS + Na_2ZnO_2 + 2H_2O = HgS + ZnS + 4NaOH$; $ZnS + H_2SO_4 = ZnSO_4 + H_2S$; $2NaOH + H_2S = Na_2S + 2H_2O$. Where the cost of mining is low, M. estd. that Hg ores as poor as 0.3% could be worked at a profit by this process; however, no com. application of it has been made. A wet method to recover Hg as HgS from amalgamation tailings is in use at the Buffalo Mines, at Cobalt. This should be equally applicable to cinnabar ores. The HgS is dissolved out of the tailings with Na_2S soln. and the Hg pptd. on scrap Al. *Reactions:* $Na_2S + HgS = Na_2S.HgS$; $3Na_2S.HgS + 8NaOH + 2Al = 3Hg + 6Na_2S + 2NaAlO_2 + 4H_2O$; $2NaAlO_2 + Ca(OH)_2 = 2NaOH + Ca(AlO_2)_2$. From the equation, 11 lbs. Hg should be pptd. with 1 lb. Al; practically the ratio is about 7:1, as some H is evolved during the pptn. Not only is the Na_2S combined with the HgS regenerated, but the S of the HgS goes to form Na_2S . The NaOH is regenerated by the addition of CaO, which also aids settling or filtration. With a clean cinnabar ore the Hg would be obtained wholly in the liquid state without retorting, and by straining through canvas it would be made ready for market. Over 40,000 lbs. of Hg have been recovered by the Buffalo Mines by this process at an approx. cost of 13 cents per lb. The cost of installation should not exceed \$500 per ton capacity. Since standard cyanide machinery can be used (crushers, pebble mills, Dorr classifiers, thickeners, etc.), the plant could be erected in a minimum of time and Hg could be placed on the market in 3 to 4 days after the plant was put into operation. The Hg produced at the Buffalo Mines contained only traces of Ag. Com. crystals of Na_2S cost \$1.25 per cwt. f.o.b. chemical works, and the Al for pptn. consists of casting-foundry turnings costing \$2.50 per cwt., f.o.b. foundry.

F. W. SMITHER.

Quartz mining and gold recovery. JAS. B. AITKEN. *Pharm. J.* 94, 693(1915).—An account of the processes used at the Waihi gold mines, New Zealand.

S. WALDBOTT.

E. Riley. J. E. S. *J. Chem. Soc.* 107, 586-8(1915).—An obituary. L. G. C.

Metallography. H. LE CHATELIER. *Rev. métal.* 12, 1-36(1915).—A discussion and review of the importance and development of metallography. L. T. FAIRHALL.

The use of light filters with the Tassin metallographic apparatus. F. H. GETMAN. *J. Ind. Eng. Chem.* 7, 431(1915).—With the use of light filters it is possible to obtain very highly contrasted and sharply defined negatives.

ISADOR MILLER.

The effect of boron upon the magnetic and other properties of electrolytic iron melted in vacuo. TRYGVE D. YENSEN. *Univ. Ill. Eng. Exp. Sta. Bull.* 77(1915); cf. *C. A.* 9, 906.—The addition of small quantities of B to Fe melted in *vacuo*, causes the simultaneous reduction of FeO and the formation of B-Fe alloys. The magnetic properties of the Fe are slightly improved, probably because of the reduction of the FeO, but reach a max. at 0.05% B_2O_3 or 0.4% B_2O_3 -flux, beyond which they drop rapidly. The specific elec. resistance is increased 0.62 microhms for each 0.1% B combined with the Fe. Like C, B raises the elastic limit and increases the ultimate strength but decreases the toughness of Fe.

H. L. OLIN.

Alloys of bismuth and cadmium. G. I. PETRENKO AND A. S. FEDOROV. *J. Russ. Phys. Chem. Soc.* 46, 785-90(1914); see *C. A.* 9, 586.

H. M. GORDIN.

Stellite, a new alloy. ELWOOD HAYNES. *Midland Druggist* 49, 196(1915).—This alloy contains Co and Cr and is well adapted for fine cutlery. When hardening metals are added, it has an advantage of from 20 to over 100% over high-speed tool steel.

S. WALDBOTT.

Roll pressure in cold rolling brass. W. K. SHEPARD AND G. C. GERNER. *Am. Machinist* 42, 461(1915).—An investigation to det. the pressures required to roll both annealed and unannealed brass. A motor-driven rolling mill was placed on the table of a testing machine and the pressures detd. as the brass of different thicknesses was rolled. Most of the tests were made on strips 1 inch wide. Curves and tables give the results for different widths, thicknesses and percentages of reduction. W. K. S.

Practical facts in heat treating steel. R. A. MILLHOLLAND. *Iron Age* 95, 887-9 (1915).—M. suggests the use of test pieces for the treatment before working with finished product. Pieces should be annealed before machining. Light cuts and sharp tools are essential, while re-annealing is advised before the piece is finished. Gears should be warmed before heating. They should be quenched vertically to avoid warping.

H. V. MAIN.

The properties of Swedish wrought iron. N. LILIENBERG. *Iron Age* 95, 788-9 (1915).—Mfg. properties and uses are given of Fe analyzing: $P = 0.015-0.07$, $S < 0.05$, $Mn = 0.05-0.10\%$.

H. V. MAIN.

Specifications for malleable iron. E. TOUCEDA. *Iron Trade Rev.* 56, 615-6 (1915).—T. pleads that engineers give strength tests and then leave compn. to the manufacturer.

H. V. MAIN.

Permanent magnetism of certain chrome and tungsten steels. M. P. MOIR. *Phil. Mag.* 28, 738-48(1914).—In making a Cr-steel magnet, a 12% steel is superior as regards retentivity; an 8% specimen gives a stronger magnet. When a W-steel is quenched at 900°, no advantage is gained either in intensity or permanence of magnetism by increasing the % of W.

A. T. CAMERON.

The criterion of steel suitable for permanent magnets. S. P. THOMPSON. *Electrician* 75, 65-6(1915); cf. *C. A.* 8, 3284.—When steel is subjected to a cycle of magnetization for the hysteresis loop, the dimensions of the loop suffice to form a judgment as to its suitability for permanent magnets, provided max. magnetizing force was saturating during the magnetizing process. Values of remanent magnetism and coercive force are shown.

W. H. BOYNTON.

Acid open hearth steel for castings. E. F. CONE. *Iron Age* 95, 551-3(1915).—A charge is composed of 20-25% low-P pig iron, 30-35% open hearth scrap and the balance billet scrap. Not over 13% of scrap should contain Cu, which should not exceed 0.5% in the product. Using Mn pig iron is preferable to adding Mn to ladle, for time is given for the reaction, better mixing is insured and the strength of the metal is increased; however, the cost is greater.

H. V. MAIN.

Fatigue and disease of metals. P. KREUZPONTNER. *Iron Age* 95, 950-1(1915).—The diseases of metals are discussed, especially of Fe, Sn, Al. The crack in Liberty Bell illustrates diseased Fe.

H. V. MAIN.

Corrodibility of cast iron and steel. J. N. FRIEND AND C. W. MARSHALL. *Iron Age* 95, 1114-5(1915).—Cast Fe corrodes less than steel under wet and dry tests, or in NaCl soln., but more in acid soln.

H. V. MAIN.

Why iron and steel corrodes. J. ASTON. *Iron Trade Rev.* 56, 423-6(1915).—Discussion of theories of and prevention of corrosion.

H. V. MAIN.

Conclusions from steel rail research. COMMITTEE AM. RAILWAY ENG. ASSOC. *Iron Age* 95, 622-3(1915).—Rail failures may be divided into 4 classes: (1) crushed and split heads caused by segregation, (2) broken rails, square and angular, (3) broken bases, possibly caused from seams developed in first blooming passes and (4) transverse fissures, cause unknown.

H. V. MAIN.

Plating iron with lead or aluminium. W. *Metalltechn.* 39, 289; *Chem. Tech. Rept.* 38, 292 (1914).—The Fe to be coated must be scrupulously clean. In Pb plating the temp. of the bath should be 20–30° above the m. p. of Pb (327°). The bath should be protected from oxidation by means of a coating of borax, ZnCl_2 or NH_4Cl . Instead of Pb alone, the bath may consist of one of the following alloys: (1) Pb 8, Sn 1, Zn or Sb 0.02, BaCl_2 0.05–0.1 parts; (2) Pb 17, Sn 3 parts; (3) Pb 17, Sn 3, Sb 1 and Cu 1 part. Before being coated the Fe should be heated under powdered charcoal in a specially constructed oven, to avoid oxidation. For plating with Al the method of Franz Jordan is recommended, using EtOH as a reducing agent. SIMON MENDELSSOHN.

Nature of the protective oxidized coating of sheet iron for roofing. MATVEEV. *Rev. métal.* 11, 480–2 (1914); *J. Soc. Chem. Ind.* 33, 595.—The protective coating of roofing (Russian) Fe, although consisting mainly of Fe_2O_3 , also contains FeO present in a compact state in contact with the metal and forming a kind of skeleton in which the protective but porous and friable magnetic oxide is held. E. J. C.

Electric arc welding. J. F. LINCOLN. *Iron Age* 95, 949 (1915); cf. *C. A.* 9, 1455.—Welding is done with a C or Fe electrode; the latter does not tend to warp the work, but is not so rapid. The elec. welding machine is made like a transformer to save current loss. The better type gives voltage according to load instead of const. voltage.

H. V. MAIN.

Gas economy in iron works (RUMMEL) 21. Platinum at Boss Mine, Nevada (KENNEDY) 8.

ARNOLD, J. O.: **British and German Steel Metallurgy.** (Oxford pamphlet.) Milford. 2 d.

BACKERT, A. O.: **A. B. C. of Iron and Steel.** Cleveland, O.: Penton Pub. Co. 338 pp. \$5.00.

HERZOG, E.: **Die Arbeiten und Erfindungen Faber du Faur's auf dem Gebiete der Winderhitzung und der Gasfeuerung.** Halle: W. Knapp. 233 ss. 12 M.

KAUTNY, T.: **Leitfaden für Acetylschweisser.** 2 Aufl. Halle: C. Marhold. 164 ss. 1.50 M.

RZEHULKA, A.: **Die Röstung der Zinkblende und die thermochemischen Vorgänge bei diesem metallurgischen Prozesse.** Kattowitz: Gebr. Böhm. 20 ss. 1 M.

SCHULZ, E. H.: **Ueber die Volumen und Formänderungen des Stahles beim Härten.** Berlin: J. Springer. 45 ss. 1 M.

SYO, E. DE: **Die Metalle. Ihre Gewinnung und Eigenschaften.** Halle: C. Marhold. 102 ss. 1.20 M.

Text-book on Welding and Cutting Metals by the Oxy-acetylene Process. 3rd ed. Minneapolis: Vulcan Process Co. 134 pp. \$1.50.

THOMPSON, F. A.: **Stamp Milling and Cyaniding.** New York: McGraw-Hill Book Co. 285 pp. \$3.00.

VOLLENBRUCK, O.: **Beiträge zur Kenntnis des Kupolofenschmelzprozesses hinsichtlich des Verhaltens des Schwefels.** Oldenburg: G. Stalling's Verlag. 2.50 M.

ZIVIER, E.: **Entwicklung und Bedeutung der oberschlesischen Eisenindustrie.** Kattowitz: Gebr. Böhm. 25 ss. 1.20 M.

U. S., 1,141,108, June 1. A. N. DIEHL. **Hot-blast stove for metallurgical furnaces.**

U. S., 1,141,155, June 1. G. THUILLIER. **Apparatus for hardening thin metal articles, e. g., flexible razor blades similar to the Gillette blades.**

U. S., 1,141,236, June 1. J. DIEHL. Air blast and fuel chamber for metal-tempering furnaces, etc.

U. S., 1,141,377, June 1. J. M. CALLOW. Ore concentrating apparatus. Cf. C. A. 9, 591.

U. S., 1,141,419, June 1. K. SENN. Ore concentrator.

U. S., 1,141,469, June 1. H. LEISER. Forming metal bars, plates, cups, etc., by compressing a mixt. of cryst. W or Mo powder 90% and amorphous W or Mo powder 10% and heating to 1100-1400° to convert the amorphous metal into the cryst. form. Light Fe bars for making lifting magnets are made by compressing and heating to 500° a mixt. of cryst. Fe powder 80% or less and amorphous Fe 20% or more.

U. S., 1,141,719, June 1. A. J. MASKREY. Oxidizing iron or steel sheets by packing them in a retort impervious to combustion gases which heat it externally, removing the pack after heating to an annealing temp. and separately exposing the sheets to air while red hot.

U. S., 1,141,769, June 1. J. E. CARNAHAN and A. J. MASKREY. Oxidizing iron or steel sheets by heating them separately to a temp. just high enough to produce the desired color by oxidation (about 480° or lower), and immediately withdrawing them from the heating zone when this temp. is reached. Cf. C. A. 9, 50.

U. S., 1,141,770, June 1. J. E. CARNAHAN. Bluing iron or steel sheets by simultaneously oxidizing with steam and treating with S vapor at 400-800°.

U. S., 1,141,833, June 1. S. R. SALWEN. Magnetic ore separator.

U. S., 1,141,852, June 1. H. M. SUTTON, W. L. STEELE and E. G. STEELE. Method of concentrating ores.

U. S., 1,141,930, June 8. N. W. BUCH. Apparatus for galvanizing pipes, bars, etc.

U. S., 1,141,931, June 8. N. W. BUCH. Galvanizing pipes. The ends of the pipe are capped, one of the caps having a vent which is kept above the surface when the pipe is dipped into the galvanizing bath.

U. S., 1,141,972, June 8. C. H. MUHLEMAN. Ore concentrator.

U. S., 1,142,324, June 8. G. GRÖNDAL. Apparatus and method for heating ores to agglomerate or reduce them. The ore is placed in a series of Fe tubes open at both ends and fitted together to form a horizontal kiln. The ore is traversed by horizontal channels and combustion gases, from a furnace formed similarly to the tubes holding the ore and connected with them, are passed through the ore until it is sufficiently heated. Then the section of tubing containing the highly heated ore is detached and transferred to the back of the furnace to preheat air passing to it.

U. S., 1,142,497, June 8. R. COLVIN. Apparatus for concentrating ores.

Brit., 2,192, Jan. 27, 1914. F. SCHRUFF. Removing piping from ingots by dividing the ingots longitudinally through the pipes.

Brit., 3,339, Feb. 9, 1914. W. A. RUSSELL and J. LORD. Constructional details of reverberatory furnaces for the heat treatment of metals.

Brit., 3,442, Feb. 10, 1914. DIESTER MACHINE CO. A concentrating table is formed with 2 or more plateaux of successively increasing heights in the direction of the flow of the values. The table is inclined downwards from the feed side and has little or no inclination from the front to the rear. The surface is formed with plateaux approached by slopes. Riffles extend across the table and plateaux and may taper from points along a central longitudinal line, and 1 or more relatively high riffles are provided.

Fr., 466,649, Dec. 26, 1913. G. J. B. CHETWYND. Steel. See Brit., 1,306, 1913 (C. A. 8, 2313).

Fr., 467,332, Jan. 15, 1914. THE INTERNATIONAL METAL PRODUCTS CO. Treating pure iron. The malleability and rolling qualities which are lost by falling below a certain limit, are restored to C- and Mn-free Fe when they are cooled below the zone between 1000° and 800° (between dark orange and cherry-red). This zone of non-malleability corresponds to the transformation phase wherein the allotropic λ -form goes over into the β - and the α -forms. As the cooling passes through this zone, the rolling is discontinued.

Ger., 279,914, Dec. 16, 1913. R. BÖCKING & CIE., E. STUMM-HALBERG and R. BÖCKING G. M. B. H. Drying molds, cores, and the like, in foundry practice, with the employment of the waste heat of gas firing, without the addition of further air.

Ger., 280,349, Feb. 10, 1912. MONTANGES M. B. H. Machine for welding aluminium members to Al vessels.

Ger., 281,032, Jan. 10, 1914. L. SCHULTE. App. for galvanizing small articles in large quantities.

Ger., 281,281, Feb. 20, 1912. ELEKTRO-OSMOSE AKT.-GES. (GRAF SCHWERIN-GES.). Magnetic separation of friable ores, after the addition of a suitable electrolyte, which ppts. the suspended matter.

Ger., 281,311, Jan. 7, 1910. W. MATHESIUS. Obtaining metallic iron by the reduction of the Fe_2O_3 , contained in the ores, by means of CO or gases containing C, at a temp. maintained const. below the sintering temp., supplying heat by previous heating of the gas and ore to such an extent that the reaction proceeds without further exterior heating. In a vertical furnace the ore to be reduced moves downward, while the reducing gases flow upward. Both ore and gas must be raised to the reaction temp. (700 – 900°) before entering the furnace. Ordinarily a period of several hrs. of contact between the ore and the gas is sufficient to yield metallic Fe, suitably carbonized. The preheating of the ore is effected in the usual rotary furnaces which are heated by flue gases of the reducing shaft. The flame is controlled as to its oxidizing action so that FeO and Fe_3O_4 may be oxidized to Fe_2O_3 . Generator or coke-oven gases, natural gas, petroleum gases, and the like, may serve as the reducing gases. These gases may be preheated to 700 – 900° in the known Cowper app. which is in turn heated by the flue gases of the reducing furnace. The ores issuing below from the reducing furnace are cooled by being led by and in contact with H_2O -cooled Fe furnaces, and finally sprayed with H_2O so that upon coming in contact with atm. air the temp. is not over about 150° , thereby avoiding reoxidation of the finely divided Fe. The Fe is then sepd. in the dry or wet way, or magnetically. The process is applicable also for the sepn. of Ni, Co, Cu, Sn, etc.

Ger., 281,386, Aug. 10, 1912. STAHLWERK BECKER, AKT.-GES. In mfg. high speed steel, Co is added to the steel of known compn., whereby its life, even when red hot, and when working at a high speed, can be increased materially. A good high speed steel contains, *e. g.*, besides Fe, 0.70% C, 5% Cr, 18% W, 1% V, and 0.75% Mo. To this steel, Co, 10%, is added. According to expts. carried on at the Imperial Technical High School, at Berlin, the life of such steel is increased, under like conditions, 4–5 times when operating at a speed of 25 m., 6 times at a speed of 20 m., and 10 times at a speed of 15 m. A Cr-Ni steel of 100 kg. test was employed in these experiments.

10. ORGANIC CHEMISTRY.

C. A. ROUILLER.

Carl Liebermann. A. BISTRZYCKI. Freiburg. *Chem. Ztg.* 39, 165–7(1915).—An obituary.

J. H. MOORE.

Photosynthesis in organic chemistry. E. PATERNO. *Chem. News* 111, 208-10, 220-2, 231-2, 245-7 (1915); see *C. A.* 3, 1867; 4, 300; 5, 681, 682, 2632; 6, 1139; 8, 2687; 9, 618, 1315.—A collective article. E. J. C.

Fifty years' research on benzene. A. F. HOLLEMAN. *Chem. Weekblad* 12, 440-65 (1915).—A review is given of theories proposed for the constitution C_6H_6 by the best known investigators on this subject from the time of Kekulé to the present. E. H.

Action of concentrated sulfuric acid on acetylene compounds. YU. S. ZAL'KIND. *J. Russ. Phys. Chem. Soc.* 46, 897-900 (1914).—According to Dupont (*C. A.* 8, 2147), certain glycols and related compds. give a deep coloration with H_2SO_4 . To det. what kind of alcs. give this reaction, numerous substances were examd. The expts. were made by adding to 5-6 cc. of concd. H_2SO_4 a crystal of the substance or, better, a soln. of it in a few drops of AcOH or $CHCl_3$. The results were as follows: The γ -glycols of the C_2H_5 series, e. g., the Me, Et and Ph derivs. of $(HOCH_2C\equiv)_n$, give with H_2SO_4 intense colorations, sometimes with fluorescence. The colorations for the corresponding C_2H_4 compds. are much paler, and for the corresponding satd. glycols still paler. In both of these series the colorations for aryl derivs. are slightly deeper than for the aliphyl derivs. The gradual diminution in the intensity of coloration in passing from the C_2H_5 to the satd. series shows that this reaction is characteristic not of the position of the O, but of the presence of multiple, particularly triple, unions. This is further corroborated by the fact that both $Me_3C(OH)C\equiv CPh$ and $MeC(OH)(C\equiv CPh)_2$ are colored by H_2SO_4 , and that the coloration is deeper for the latter (with 2 such unions) than for the former. In all the cases examd. the color reaction is given only by concd. H_2SO_4 . If the amt. of material is small and the time it is left in contact with the acid short, the color disappears upon dilm. with H_2O . If the H_2SO_4 is dild. with AcOH the coloration persists in higher dilns. than when H_2O is the diluent. These facts show that we have here a reaction of halochromy and not a resinification or condensation.

H. M. GORDIN.

Action of magnesium on tribromoisopentane. Synthesis of a hydrocarbon $C_{10}H_{18}$ with open chain. VL. KRESTINSKII. *J. Russ. Phys. Chem. Soc.* 46, 900-8 (1914).—As shown in a previous article (*C. A.* 7, 3964), the interaction of Mg with $MeCBr(CH_2Br)_2$ yields $(CH_2\cdot CMeCH_2)_n$. In order to see whether other bromides with the Br in the 1,2,3-positions react in a similar manner, a mixt. of $MeCHBrCBrMeCH_2Br$ (a) and $Me_2CBrCHBrCH_2Br$ (b) was made to react with Mg. The mixt. of these bromides was obtained by Ipat'ev's method (*J. Russ. Phys. Chem. Soc.* 33, 532), but using Fe or Al wire as a catalyzer. The latter greatly facilitates the reaction, giving at once the tribromides, and not at first a mixt. of di- and tribromides as is obtained when the catalyzer is omitted. It was found that (a) gave the hydrocarbon $(MeCH\cdot CMeCH_2)_n$ (c), while (b) gave the isomeric hydrocarbon $(Me_2C\cdot CHCH_2)_n$ (d). (c) b. $153-5^\circ$, d_4^{20} 0.7767, n_D^{20} 1.44453, is oxidized by $KMnO_4$ to $[CH(OH)CO_2H]_n$ (e), AcOH and CO_2 , and is converted by HBr into a liquid bromide $(MeEtCBrCH_2)_n$. (d) b. $161-3^\circ$, and gives upon oxidation a mixt. of what seems to be AcOH and (e). These expts. prove that, in general, tribromides with the Br in the 1,2,3-positions are converted by Mg into diethylene hydrocarbons of a definite constitution, and that the linking of the residues takes place between those C atoms which have the Br in primary positions. The results of this reaction with C_4H_9Br , and the tribromide of tertiary hexyl alc. are promised for the near future.

H. M. GORDIN.

Isomerization of the higher acids $C_nH_{2n-2}O_2$ under the influence of caustic alkali. I. V. EGOROV. *J. Russ. Phys. Chem. Soc.* 46, 975-94 (1914).—Unsatd. acids having 1 double union in the β,γ -position are isomerized by fusion with alkali to acids with this union at the α,β -position. This explains why both kinds of acids yield at a higher temp. the same 2 satd. acids, resulting from a breakage of the mol. at the α,β -position.

Acids having the double union further from the CO_2H than the β, γ -position are generally supposed not to be affected by fusion with alkali. E.'s expts. with oleic and undecylic acids show that this supposition is wrong, since the former, with the double union in the 8,9-position, was isomerized by this method to the acid $\text{Me}(\text{CH}_2)_{11}\text{CH}:\text{CH}(\text{CH}_2)_2\text{CO}_2\text{H}$ (a) (m. $42-3^\circ$), and the latter to the isomeric acid $\text{MeCH}:\text{CH}(\text{CH}_2)_7\text{CO}_2\text{H}$ (b), b_{748} $274-6.5^\circ$, d_0^{20} 0.9309, d_4^{25} 0.9119; *barium, silver and copper salts; ethyl ester* (c), b. $257-9^\circ$, d_0^{20} 0.89665. By the action of NH_3 on (c) the amide $\text{C}_{10}\text{H}_{19}\text{CONH}_2$ was obtained, m. $77-8.5^\circ$. (b) was also converted into the corresponding alcohol, $\text{C}_{11}\text{H}_{21}\text{OH}$, b_{718} $240-6^\circ$, d_0^{20} 0.8628, d_4^{25} 0.86027; *urethan*, $\text{C}_{11}\text{H}_{21}\text{O}_2\text{N}$, m. 46.5° . (a) was accompanied by palmitic and a hydroxystearic acid. The latter is either $\text{Me}(\text{CH}_2)_{11}\text{CH}(\text{OH})(\text{CH}_2)_4\text{CO}_2\text{H}$, or $\text{Me}(\text{CH}_2)_{12}\text{CH}(\text{OH})(\text{CH}_2)_3\text{CO}_2\text{H}$, and its formation shows that OH acids are produced as intermediary products in the isomerization. When decompd. by E.'s method ("Action of Nitrogen Peroxide on Unsaturated Acids," Moscow, 1903), (a) gave tridecylic and glutaric acids, while (b) gave azelaic, acetic, suberic and what seemed to be propionic acids. The formation of the last 2 would seem to indicate that (b) was contaminated with another isomer, $\text{EtCH}:\text{CH}(\text{CH}_2)_6\text{CO}_2\text{H}$. This suggestion is supported by the fact that from the mother liquor of the above urethan another urethan sepd. out having a different cryst. form. H. M. G.

Action of phosphorus pentoxide and zinc chloride on the glycerides of hydroxystearic and ricinoleic acids and the polymerization that accompanies the reaction. Preliminary communication. S. FOKIN. *J. Russ. Phys. Chem. Soc.* 46, 1027-42 (1914).—In a previous article (*C. A.* 8, 2550) it was stated that the product of interaction of P_2O_5 or $(\text{CO}_2\text{H})_2$ on hydroxystearic acid (a) consisted chiefly of an oleic acid (b) having the double union between the 12th and the 13th C atoms (counting from the C of the CO_2H inclusive), while of the isomeric (b) with this union at the 11,12-position only a small amt. is produced. Further exam. showed this to be incorrect, the reaction of (a) with either P_2O_5 , $(\text{CO}_2\text{H})_2$ or ZnCl_2 going equally well towards the formation of both of the above isomers of (b). The product obtained by Khonovskii (*C. A.* 6, 737) by acting on ricinoleic acid (c) with HBr and then removing the latter by means of alc. KOH was, according to F., a mixt. of at least 6 isomeric linoleic acids (d), and not a mixt. of the 2 isomeric (d) obtained by F. by the action of P_2O_5 on castor oil. According to Gruen (*C. A.* 3, 1749), P_2O_5 merely changes (c) to a polymer $(\text{C}_{18}\text{H}_{34}\text{O}_2)_n$. F. thinks that G.'s caoutchouc-like substance is a polyprene (e) formed from that intermediately produced (d) which contains conjugated double unions, the reaction being similar to the formation of caoutchouc from certain hydrocarbons with conjugated unions, particularly those of the allene type. The (c) in changing to (e) is first converted into an inner anhydride, hence (e) cannot have 3 atoms of O per mol. From the glyceride or the Et ester of (a) no (e) is obtainable by means of ZnCl_2 , showing that the polymerization of (c) to (e) is not due to OH groups, but to conjugated double unions. (e) may also be obtained by the action of ZnCl_2 on wood oil, but then it differs in several respects from the (e) obtained from castor oil, making it probable that the (d) of wood oil contains allene double unions. H. M. GORDIN.

Molecular combinations of amines. A. KOCHUBBI. *J. Russ. Phys. Chem. Soc.* 46, 1048-55 (1914).—By the action of $\text{K}_2\text{Fe}(\text{CN})_6$ on $p\text{-C}_6\text{H}_4(\text{NH}_2)_2$ (a) a dark blue, almost black, compound, $4\text{C}_6\text{H}_4(\text{NH}_2)_2 \cdot \text{Fe}(\text{CN})_6 \cdot 2\text{H}_2\text{O}$, was obtained; insol. in H_2O and in most org. solvents, and but slightly sol. in hot mineral acids with formation of red solns. which are decolorized by SnCl_2 and colored yellow by Br in H_2O . With $\text{H}_2\text{Fe}(\text{CN})_6$ (a) gave a whitish substance. Leucoaniline gave with $\text{K}_2\text{Fe}(\text{CN})_6$ a dark blue compound, $[\text{CH}(\text{PhNH}_2)_2]_4 \cdot \text{Fe}(\text{CN})_6 \cdot 3\text{H}_2\text{O}$. These compds. are supposed to have a meriquinoid constitution. Moir's opinion that the oxidation products of diamines are salts of the base $\text{C}_{60}\text{H}_{48}\text{N}_{16}$ (*Chem. Zentr.* 1907, I, 344) is considered insufficiently sup-

ported by facts. Reviewing the numerous combinations of amines, the following conclusions are drawn: The amines are capable of uniting with both org. and inorg. substances; most of these combinations form salts and NO_2 derivs.; the salts obtained by partial oxidation of aryl diamines also are such mol. combinations. Werner's theory makes it possible to clear up the constitution of these combinations. An example of a rather complex formula which may be assigned to the above compds. is given.

H. M. GORDIN.

Methylantracene from frangula-emodin. N. KRASOVSKII. *J. Russ. Phys. Chem. Soc.* 46, 1067-75(1914).—There being a difference of opinion as to the constitution of the methylantracene obtained from catharto-emodin and that from frangula-emodin, K. reexamd. both and several of their derivs. and compared them with the synthetic α - and β -methylantracenes and their corresponding derivs. The results showed that the compd. from both sources is identical with β -methylantracene.

H. M. GORDIN.

Döbner's benzpyrocatechol. NIK. ROZHDESTVENSKII. *J. Russ. Phys. Chem. Soc.* 46, 1075-7(1914).—Döbner (*Ann.* 210, 246) and Bartolotti (*Gazz. chim. ital.* 27, I, 286) give different values for the m. p. and the amt. of H_2O of hydration for $\text{BzC}_4\text{H}_5(\text{OH})_2$ (a). R. prepd. this compd. by the action of Bz_2O on $o\text{-C}_6\text{H}_4(\text{OH})_2$ in the presence of ZnCl_2 and found that, when dried over H_2SO_4 , it contained no H_2O at all, and that together with (a) there was formed BzOH . Dry (a) m. 134° . H. M. G.

Etherates of aluminium iodide. N. DOMANITZKII. *J. Russ. Phys. Chem. Soc.* 46, 1078-82(1914).—The interaction of Al with allyl iodide results in the formation of the aluminium iodide etherate, $\text{AlI}_3 \cdot \text{Et}_3\text{O}$ (a), diallyl and a small amt. of an Al org. compd. (a) forms colorless or yellowish crystals, m. about 49° , sol. in Et_2O and CS_2 , is decompd. by H_2O with a hissing noise and formation of the basic aluminium iodide etherate, $\text{Al}(\text{OH})_3 \cdot \text{AlI}_3 \cdot \text{Et}_3\text{O}$ (b), colorless crystals, may be kept unchanged under Et_3O at ordinary temp., insol. in Et_2O , but sol. in CS_2 with sepn. of $\text{Al}(\text{OH})_3$, deliquesces in the air, and is slowly and quietly decompd. by H_2O . The reaction of transformation of (a) into (b) by H_2O is: $2\text{AlI}_3 \cdot \text{Et}_3\text{O} + 3\text{H}_2\text{O} = \text{Al}(\text{OH})_3 \cdot \text{AlI}_3 \cdot \text{Et}_3\text{O} + \text{Et}_3\text{O} + 3\text{HI}$.

H. M. GORDIN.

New general method of formation of mercaptans. B. K. MERZHKOVSKII. *J. Russ. Phys. Chem. Soc.* 46, 1082-4(1914).—All of the known methods for prepg. mercaptans are either clumsy or applicable to particular cases only. M.'s general method is based upon the following reactions ($\text{R} = \text{alkyl}$): $3\text{ROH} + 3\text{Br} + \text{P} = 3\text{RBr} + \text{P}(\text{OH})_3$; $4\text{P}(\text{OH})_3 + \text{Na}_2\text{SO}_4 = \text{Na}_2\text{S} + 4\text{H}_3\text{PO}_4$; $\text{Na}_2\text{S} + \text{H}_3\text{PO}_4 = \text{Na}_2\text{HPO}_4 + \text{H}_2\text{S}$; $\text{RBr} + \text{H}_2\text{S} = \text{RSH} + \text{HBr}$. The Br is added, with const. stirring and cooling, to the mixt. of the alc., P and not quite dry Na_2SO_4 , and the product, consisting of RSH, unchanged ROH and RBr, is distd. with steam. The RSH is sepd. from the ROH and the RBr by soln. in KOH and repptn. with HCl. The reaction was verified on PrOH , iso-BuOH and tert-AmOH .

H. M. GORDIN.

Homologs of tetramethyleneglycol. VIT. LONGINOV. *J. Russ. Phys. Chem. Soc.* 46, 1084-97(1914).—With a view to making homologs of $(\text{HOCH}_2\text{CH}_2)_n$, L. started with $\text{EtO}_2\text{CCH}_2\text{CH}(\text{CO}_2\text{Et})_2$ (a) made by Bischoff's method (*Ann.* 214, 58). Yield, 50%. What B. overlooked was that (a) is accompanied to the extent of 12% by the ester $(\text{EtO}_2\text{C})_2\text{C}(\text{CH}_2\text{CO}_2\text{Et})_2$, very thick oil, b_{11} $187-9^\circ$. By warming (a) with EtBr in presence of EtONa , the H of its CH is replaced by Et, and the resulting compd. upon reduction with Na in alc. (Bouveault and Blanc, *Compt. rend.* 136, 1676) gives β -ethyltetramethyleneglycol, $\text{HOCH}_2\text{CH}_2\text{CH}(\text{Et})\text{CH}_2\text{OH}$ (yield, 40%), thick, colorless and odorless liquid, does not solidify at -20° , sol. in H_2O , b_{10} $129-31^\circ$, d_{40}^{20} 0.9825, n_D^{20} 1.454. Similarly, by acting on (a) with PrBr and reducing the resulting compd.

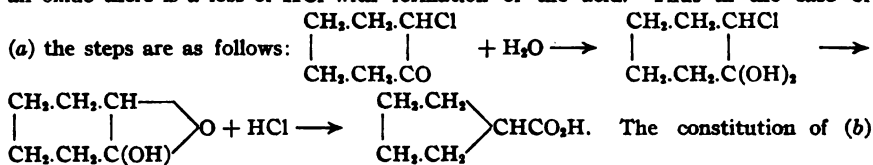
with Na in alc., β -propyltetramethyleneglycol, $\text{HOCH}_2\text{CH}_2\text{CHPrCH}_2\text{OH}$ (b) is obtained, b_{10} 138–40°, d_4^{20} 0.9625, n_{20} 1.454, resembles the preceding compd. in appearance. By heating (b) with HBr in a sealed tube 2 compds. were obtained: 2-propyl-1,4-dibromobutane, $\text{CH}_2\text{BrCH}_2\text{CH}(\text{Pr})\text{CH}_2\text{Br}$ (c) (not pure), b , 103°, d_4^{20} 1.5269, n_{20} 1.5018, and β -propyltetrahydrofuran, $\text{PrCH}_2\text{CH}_2\text{OCH}_2\text{CH}_2$, light, colorless, very mobile

liquid, b_{760} 144°, but easily volatile even at ordinary temp., d_4^{20} 0.8618, n_{20} 1.4243. By heating (c) in a sealed tube with NH_3 in MeOH it is converted into β -propylpyrrolidine, $\text{PrCH}_2\text{CH}_2\text{NHCH}_2\text{CH}_2$, colorless, mobile liquid having the odor of piperidine,

fumes in the air, readily absorbs H_2O and CO_2 , b_{760} 158–60°, gives an oily chloroaurate. By Gabriel's method (Ber. 21, 2669) (c) was converted into β -propyltetramethylene-dinaphthalimide, $(\text{C}_8\text{H}_4\text{O}_2)_2\text{NCH}_2\text{CHPrCH}_2\text{CH}_2\text{N}(\text{C}_8\text{H}_4\text{O}_2)$ (m. 99–100°) which, when heated with fuming HCl to 180°, changed to β -propylputrescine hydrochloride, $\text{C}_7\text{H}_{15}\text{N}_2 \cdot 2\text{HCl}$, hygroscopic, odorless powder, m. 247–8°. The homologs of isoprene will be reported upon later.

H. M. GORDIN.

Isomeric transformations of cyclic α -monochloro ketones. AL. FAVORSKII AND V. BOZHOVSKII. *J. Russ. Phys. Chem. Soc.* 46, 1097–102 (1914).—In analogy with open chain α -Cl ketones (*J. Russ. Phys. Chem. Soc.* 26, 559; 27, 8), cyclic α -Cl ketones ought to be converted by alkalis into acids containing 1 C atom less in the ring than the original ketone. Expts. proved this to be so, α -chlorocyclohexanone (a) giving cyclopentanecarboxylic acid, while chloro-*m*-methylcyclohexanone (b) gave methylcyclopentanecarboxylic acid (c). It is supposed that both oxidation and reduction take place in this reaction, the CO changing to $\text{C}(\text{OH})_2$, and that after formation of an oxide there is a loss of HCl with formation of the acid. Thus in the case of



used in this reaction was not established. If it be $\begin{array}{c} \text{MeCHCH}_2\text{CO} \\ | \quad | \\ \text{CH}_2\text{CH}_2\text{CHCl} \end{array}$, then (c) is

$\begin{array}{c} \text{MeCHCH}_2 \\ | \quad | \\ \text{CH}_2\text{CH}_2 \end{array} \text{CHCO}_2\text{H}$, while if in (b) the Me has another position, it will have the corresponding position in (c).

H. M. GORDIN.

Theory of nitration mixtures as applied to nitronaphthalenes. A. SAPOZHNIKOV. *J. Russ. Phys. Chem. Soc.* 46, 1102–10 (1914).—The results of Patart's expts. on the relation between the comp. of the nitration mixt. and the degree of nitration of C_{10}H_8 (*Mémoires des poudres et de salp.* 9, 11) were recalcd. in mol. % and represented diagrammatically in triangular coordinates. It is shown that, as in the nitration of cellulose, this form of diagram is to be preferred to the rectangular system used by P., and that S.'s theory of nitration (*C. A.* 3, 2223) holds good in this case too. The diagram indicates what comp. of the nitration mixt. is best suited for obtaining the desired nitrated compd. Thus, $\text{C}_{10}\text{H}_8(\text{NO}_2)_4$, requiring a mixt. of the highest nitration power, is produced when the HNO_3 , H_2SO_4 and H_2O are in such proportions that the whole of the HNO_3 is in the form of the monohydrate, which may be adjusted in various manners by adjusting the relative amts. of H_2SO_4 and H_2O taken for a given amt. of HNO_3 . The concn. of the HNO_3 in this case must, however, not drop below 35 mol.

%. The most suitable proportions of the ingredients for the production of $C_{10}H_8(NO_2)_2$ are those corresponding to $HNO_3 + H_2SO_4 + H_2O$. Between the concn. of 33 and 20 mol. % of HNO_3 is the region for the formation of $C_{10}H_8(NO_2)_2$, and below 15 mol. % of HNO_3 is the region for $C_{10}H_7NO_2$. While there is thus a general resemblance between the triangular diagrams of cellulose and $C_{10}H_8$, there is, however, an essential difference when the comp. of the nitration mixt. approaches pure H_2O or pure H_2SO_4 . Thus in the case of cellulose nitration becomes altogether impossible when the concn. of the H_2O exceeds 65 mol. %, or when the mixt. consists of HNO_3 and H_2O alone, mol. per mol., while $C_{10}H_8$ may be nitrated with a mixt. of HNO_3 and H_2O containing about 80 mol. % of the latter. Again with cellulose an undue concn. of H_2SO_4 makes nitration impossible on account of a reversal of the reaction, the concd. H_2SO_4 decomp. the esters produced, while with $C_{10}H_8$ very concd. H_2SO_4 simply chars the org. compd., frequently with formation of dark-colored products and evolution of N oxides. The latter diminish the yield by further oxidizing the NO_2 compds. These differences between the conditions of nitration of cellulose and $C_{10}H_8$ show that for the successful nitration of a given substance the required conditions must be maintained. The failure to adhere to proper conditions accounts for the unsatisfactory nitration expts. of many investigators.

H. M. GORDIN.

Tetranitromethane as reagent for the structure of molecules. O. FILIPOV. *J. Russ. Phys. Chem. Soc.* 46, 1199-201 (1914).—Expts. showed that, contrary to Ostrovnitskii's statement ("Caoutchouc and its Analogs," 1913, 42), $C(NO_2)_4$ gives no color reaction with cyclobutane derivs. Hence O.'s objection to Harries' 4-membered ring formula for caoutchouc because its bromide is not colored by this reagent is groundless. Equally groundless is his "corroboration" of Willstätter's formula for the hydrocarbon obtained by splitting off CO_2 from sorbic acid simply because it is colored by $C(NO_2)_4$.

H. M. GORDIN.

Mechanism of Strecker's reaction. G. L. STADNIKOV. *J. Russ. Phys. Chem. Soc.* 46, 1201-15 (1914).—Polemical. S. upholds his view of the mechanism of Strecker's reaction (*C. A.* 1, 1545) against Snyesarev (*C. A.* 8, 2550), claiming that the work of the latter is unreliable for several reasons, chief of which are the following: He failed to protect his reaction mixts. against the H_2O , HCl and NH_3 frequently present in the lab.; he boiled the mixts. too long, and he used KOH for the liberation of bases from their salts, thus producing NH_3 by the interaction of the alkali with the nitrogenous material and ascribing it to spontaneous decompn. The author also reproaches Krasuskii ("Reaction of NH_3 and Amines with Org. Oxides," *Diss. Kiev* 1913) for unjustly accusing him of having borrowed his ideas on this subject from K.

H. M. GORDIN.

New reaction for compounds containing the pyridine nucleus. A. E. CHICHEBABIN AND O. A. ZEIDE. *J. Russ. Phys. Chem. Soc.* 46, 1216-36 (1914).—When pyridine (a) or such of its derivs. as have the α -positions free are treated with $NaNH_2$ and the resulting compds. decompd. with H_2O , the H in these positions is replaced by NH_2 . Thus with 1 mol. of (a) $NaNH_2$ gave α - $C_5H_4NNH_2$ (b); (a) + $NaNH_2 = C_5H_4(NHNa)N + H_2$; $C_5H_4(NHNa)N + H_2O = (b) + NaOH$ (yield, about 70%). With diazobenzene salts in presence of $AcONa$ (b) gives a cryst. compound, $PhN:NNHC_5H_4N$, m. 176°. (b) also resembles $PhNH_2$ in being readily nitrated (see next abstr.). Similarly, α -picoline gave with $NaNH_2$, α' -amino- α -picoline, $C_8H_7NMeNH_2$ (c) (yield, 25%), extremely hygroscopic crystals, m. 36.5°. The β -H in (a) or its derivs. is not replaceable by NH_2 by this method, while with respect to the γ -position expts. have so far been inconclusive. Instead of $NaNH_2$, $RNHNa$ (R = org. radical) may be used, though the yield of phenylaminopyridine, C_5H_4NNHPh , obtained from $PhNHNa$ and (a) seems to be very small. It is possible that the substitution of $RNHK$ for $RNHNa$ will improve the yield. When both α -positions in (a) are free it is possible

by means of this reaction to replace both H in these positions by NH_2 . Thus, with double the amt. of NaNH_2 as is used in prepg. (b), (a) gave $\alpha, \alpha' \text{-C}_6\text{H}_2\text{N}(\text{NH}_2)_2$ (d) (Meyer and Tropsch, C. A. 8, 1575). Yield, 50%. An important peculiarity of (d) is its ability to copulate with diazo compds. with formation of azo dyes, resembling in this respect $m\text{-C}_6\text{H}_4(\text{NH}_2)_2$. An orange-red *azo dye* (e), the 1st ever made in the (a) series, is being further investigated. It seems to have the formula $\text{PhN}:\text{NC}_6\text{H}_2\text{N}(\text{NH}_2)_2$, the positions of the substituents being the same as in chrysoidine. By reduction (e) is expected to yield $\alpha, \alpha', \beta\text{-C}_6\text{H}_2\text{N}(\text{NH}_2)_3$. The NH_2 derivs. of (a) obtained by the new method usually are accompanied by other products which are being examd. In the case of (b) 1 of such by-products seems to be (d), while another possibly is $\gamma\text{-C}_6\text{H}_4\text{NNH}_2$. With quinoline, NaNH_2 gave $\alpha\text{-C}_6\text{H}_4\text{NNH}_2$ (yield, 25%), together with a fraction $b_{30} 250^\circ$ (to be examd. later). If 2 mols. of (a) for 1 of NaNH_2 be taken and the reaction temp. be higher, $\alpha, \alpha\text{-dipyridylamine}$, $(\text{C}_5\text{H}_4\text{N})_2\text{NH}$, doubtless is produced, but the expts. on its prepn. by this method are not yet completed. It was obtained by the interaction of $\alpha\text{-C}_6\text{H}_4\text{NCl}$ with (b) in presence of ZnCl_2 (yield, 25%), very long, colorless needles, m. $86-7^\circ$; its soln. in concd. H_2SO_4 is not colored by HNO_3 . Expts. were also made on the simultaneous action of NaNH_2 and MeI on α -picoline, with the expectation that the latter would at first yield the methiodide, $\text{MeC}_6\text{H}_4\text{NMeI}$, which by interaction with NaNH_2 would give $\text{MeC}_6\text{H}_4\text{NMeNH}_2$, and that this compd. by rearrangement would change to $\text{NH}_2\text{CH.CH:CH.CH:CMe.NMe}$. The results,

however, showed that instead of the latter *dimethylaminopicoline*, $\alpha, \alpha' \text{-C}_6\text{H}_2\text{NMe}(\text{NMe}_2)$ (f) is produced; colorless liquid of a feeble (a)-like odor, b. $198-200^\circ$; *chloroplatinate*, $\text{C}_6\text{H}_{12}\text{N}_2\text{HCl.PtCl}_4$; glittering orange-colored crystals, m. 190° (decompn.); *picrate*, $\text{C}_6\text{H}_{12}\text{N}_2\text{C}_6\text{H}_3(\text{NO}_2)_3\text{OH}$, yellow prisms, m. 153° . In the formation of (f) by this method the mother liquor contains, besides unchanged picoline, varying amts. of (c), obtained as the *chloroplatinate*, $(\text{C}_6\text{H}_4\text{N}_2\text{HCl})_2\text{PtCl}_4$, orange-red crystals, m. 185° , and of *monomethylaminopicoline*, also obtained as the *chloroplatinate*, $(\text{C}_7\text{H}_{10}\text{N}_2\text{HCl})_2\text{PtCl}_4$, bright red prisms, m. $178-9^\circ$. (f) was also prepd. by direct methylation of (c) by means of MeI and MgO . (a) also reacts with $\text{MeI} + \text{NaNH}_2$, giving *dimethylaminopyridine*, isolated as the *picrate*, $\text{C}_7\text{H}_{10}\text{N}_2\text{C}_6\text{H}_3(\text{NO}_2)_3\text{OH}$, m. 182° , and *monomethylaminopyridine*, also isolated as the *picrate*, $\text{C}_6\text{H}_8\text{N}_2\text{C}_6\text{H}_3(\text{NO}_2)_3\text{OH}$, m. 190° .

H. M. GORDIN.

Nitration of α -aminopyridine. A. E. CHICHIBABIN. *J. Russ. Phys. Chem. Soc.* 46, 1236-44 (1914).—Unlike $\text{C}_5\text{H}_4\text{N}$ itself, its NH_2 derivs. are readily nitrated. Thus $\alpha\text{-C}_5\text{H}_4\text{NNH}_2$ gave with HNO_3 a mixt. of α, β' -aminonitropyridine (a), yellow leaflets, m. 188° , and what seemed to be α, β -aminonitropyridine (b), yellow needles, m. 162° , the former predominating. In dil. H_2SO_4 (a) reacts with HNO_3 with elimination of N and formation of α -hydroxy- β' -nitropyridine, $\text{C}_5\text{H}_4\text{O}_2\text{N}_2$, yellowish needles, m. 184° , sol. in strong acids, but is reprecip. by the addition of much H_2O , also sol. in dil. alkali in the form of a *phenolate* which is salted out by concd. alkali in the form of needles; from its soln. in dil. alkali dil. acids ppt. the free base, showing it to be an OH compd., and not a pyridone. In the presence of concd. HCl (a) is converted by HNO_3 into α -chloro- β' -nitropyridine, m. $108-9^\circ$, has a feeble odor at ordinary temp., but when warmed with H_2O it develops a strong odor of $\beta\text{-C}_5\text{H}_4\text{NNO}_2$; sol. in concd. acids only. Upon reduction (a) gave $\alpha, \beta' \text{-C}_5\text{H}_4\text{N}(\text{NO}_2)_2$ (Meyer and Staffen, C. A. 7, 1878). According to these authors, this compd. possesses none of the properties of $p\text{-C}_6\text{H}_4(\text{NH}_2)_2$. This is not quite so. While in the cold it does not react with $\text{FeCl}_3 + \text{H}_2\text{S}$, it does so in hot dil. HCl , giving dark blue flakes which turn green by treatment with concd. HCl . Unlike (a), (b) is volatile with steam, and partly volatilizes even upon drying at 100° . It is sol. in concd. acids, giving colorless solns. which turn yellow upon diln. with H_2O , probably on account of hydrolysis.

H. M. GORDIN.

Oxidation of the methyl groups of open-chain unsaturated-compounds. B. K. MEREZHKOVSKII. *J. Russ. Phys. Chem. Soc.* 46, 1244-50(1914).—Continuing his former work (*C. A.* 9, 799), M. detd. the influence of the concn. of KMnO_4 on the oxidation of the Me groups of unsatd. open-chain compds., using propylene, isobutylene and $\text{Me}_2\text{C}:\text{CHMe}$. The concn. of the KMnO_4 varied between 0.5 and 7%, and the extent of oxidation was measured by the amt. of $(\text{CO}_2\text{H})_2$ produced along with other acids. The total amt. of acid was detd. alkalimetrically, while the $(\text{CO}_2\text{H})_2$ was detd. as $\text{Ca}(\text{CO}_2)_2$. The results, represented by a curve, were as follows: No trace of $(\text{CO}_2\text{H})_2$ is produced when the concn. of KMnO_4 is 0.5%. As the concn. rises to 3%, the amt. of $(\text{CO}_2\text{H})_2$ rises slowly, but when the concn. passes above 3%, the amt. of $(\text{CO}_2\text{H})_2$ increases very fast, reaching a max. at 7% KMnO_4 , when it constitutes 48% of the total acids, showing that at this concn. the velocity of oxidation of the Me groups equals the velocity of oxidation of the double union itself. Making similar expts. with propane, isobutane and trimethylethane, it was found that they are not affected by KMnO_4 in the above concns.

H. M. GORDIN.

Solubility of nitrophenolates in mixtures of alcohol and water. V. M. FISHER. *J. Russ. Phys. Chem. Soc.* 46, 1250-70(1914).—With a view to detg. the influence of nonelectrolytes on the solubility of salts in H_2O , the solubility of several salts at 25° in mixts. of H_2O and EtOH, MeOH or acetone, was detd. For mixts. of H_2O + EtOH the following salts were used: the picrates of Na, K and Ba, the Na salts of *p*- $\text{C}_6\text{H}_4(\text{NO}_2)\text{OH}$, 1,2,4- $\text{C}_6\text{H}_3(\text{NO}_2)_2\text{OH}$ and 1,2,4- $\text{C}_6\text{H}_3\text{Cl}(\text{NO}_2)\text{OH}$, and Ba dinitrosalicylate, while for mixts. of H_2O and MeOH or acetone K picrate and 1,2,4- $\text{C}_6\text{H}_3(\text{NO}_2)_2\text{ONa}$ were used. The results, given in several tables and diagrams, were as follows: For H_2O + EtOH all of the above salts, and probably all nitrophenolates, have an isotherm with 1 max. and 2 minima of solubility. This peculiar fact is most probably due to the same cause which imparts color to salts of colorless nitrophenols, i. e., to a particular kind of isomerization (Hantzsch, *C. A.* 1, 997). This view is corroborated by detns. of the coeff. of extinction for solns. of the nitrophenolates in H_2O + EtOH, showing that the variation in the values of this coeff. also is not a linear function of the concn. of EtOH. Owing to lack of suitable app., these detns. were only approx., more exact data being promised for a future date. The viscosity of mixts. of H_2O + EtOH containing between 0-60% EtOH was found to be but very little influenced by the presence of Na picrate (2.358 g. in 100 cc. of soln.). Detns. were also made of the variation in the elec. cond. of solns. of this salt in H_2O + EtOH when the concn. of either alc. or salt was made to vary.

H. M. GORDIN.

Condensation of phenol with unsaturated ketones. Condensation of phenol with mesityl oxide. A. P. DIANIN. *J. Russ. Phys. Chem. Soc.* 46, 1310-9(1914).—In former work it was shown that satd. ketones react with PhOH in presence of HCl to form diatomic phenols: $\text{R}_2\text{CO} + 2\text{PhOH} = \text{R}_2\text{C}(\text{C}_6\text{H}_4\text{OH})_2 + \text{H}_2\text{O}$. With a view to examg. how the reaction would go with unsatd. ketones, mesityl oxide (a) and phorone were made to react with PhOH under the influence of HCl. The work on phorone will appear later. As to (a) its reaction with PhOH yields 2,4,4-trimethyl-2-hydroxy-phenyl-2,3-dihydrobenzopyrane, $\text{O.C}_6\text{H}_4.\text{CMe}_2.\text{CH}_2.\text{CMeC}_6\text{H}_4\text{OH}$ (b) (Bulow's numera-

tion, *Ber.* 34, 1190) (yield, 56%), needles, unites with solvent of crystn., e. g., $8\text{C}_{12}\text{H}_{20}\text{O}_2 \cdot \text{Et}_2\text{O}$ (m. 171-2°), $4\text{C}_{12}\text{H}_{20}\text{O}_2 \cdot \text{EtOH}$ (m. 163-4°), $4\text{C}_{12}\text{H}_{20}\text{O}_2 \cdot \text{Me}_2\text{CO}$, $4\text{C}_{12}\text{H}_{20}\text{O}_2 \cdot \text{AcOH}$, and $4\text{C}_{12}\text{H}_{20}\text{O}_2 \cdot \text{CHCl}_3$, sol. in hot concd. alkali, sepg. on cooling as a cryst. phenolate which upon recrystn. from H_2O gradually decomps. When (b), obtained by crystn. from Et_2O , is dissolved in hot alkali, the soln. boiled to the complete removal of Et_2O and then satd. with CO_2 , it seps. as a cryst. powder which, after drying at 140°, m. 157.5°. With BzCl (b) gives a benzoyl compound, $\text{C}_{13}\text{H}_{10}\text{BzO}_2$, m. 161°, sol. in concd.

H_2SO_4 with orange-red color. With $\text{MeI} + \text{KOH}$ in MeOH (b) gives a *methyl ether*, $\text{C}_{11}\text{H}_{11}\text{MeO}_2$, thick, colorless, oily liquid, $b_{760} 285-6^\circ$, $d_{15}^{20} 1.098$; odorless at ordinary temp., but on warming develops an odor of bitter almonds; is colored orange-red by concd. H_2SO_4 , is oxidized by $\text{CrO}_2\text{-AcOH}$ to anisic acid. The formation of the latter, in connection with the fact that when fused with alkali (b) gives salicylic acid, is taken as proof that the $\text{C}_6\text{H}_4\text{OH}$ in (b) is in the *p*- while the $\text{C}_6\text{H}_4\text{O}$ is in the *o*-position. When (b) is distd. it decomps. into PhOH and $2,4,4\text{-trimethylbenzopyrane}$, $\text{O.C}_6\text{H}_4.\text{CMe}_2.\text{CH}:\text{CMe}_2$

(c), colorless liquid of a peculiar odor, $b_{24} 166^\circ$, $b_{760} 235-6^\circ$ (slight decompn.), $d_{15}^{20} 1.0085$, $n_D^{20} 1.545$, is not affected by heating with concd. KOH to 130° , reacts with Br in CS_2 with evolution of HBr , slowly decolorizes dil. KMnO_4 , is colored orange-red by concd. H_2SO_4 . When (c) is mixed with PhOH and HCl is passed into the mixt., (b) is regenerated. In the prepn. of (b) it was accompanied by a small amt. of $\text{Me}_3\text{C}(\text{C}_6\text{H}_4\text{OH})_2$. The mechanism of the reaction of (a) with PhOH in presence of HCl is supposed to be as follows: $\text{Me}_3\text{C}:\text{CHAc} + 2\text{HCl} = \text{Me}_3\text{CClCH}_2\text{CMeClOH}$; $\text{Me}_3\text{C-ClCH}_2\text{CMeClOH} + 2\text{PhOH} = 2\text{HCl} + \text{Me}_3\text{C}(\text{C}_6\text{H}_4\text{OH})\text{CH}_2\text{CMe}(\text{OH})\text{C}_6\text{H}_4\text{OH}$. The latter by loss of H_2O changes to (b). H. M. GORDIN.

Action of carbon monoxide on magnesium-organic compounds. V. EGOROVA. *J. Russ. Phys. Chem. Soc.* 46, 1319-32 (1914).—Attempts to make tert. alcs. by the action of CO on Mg org. compds. (Vinay, *Diss.*, Geneva 1913) were not successful. By passing CO into Me_3CMgCl (a) the *hydroxy ketone*, $\text{Me}_3\text{CCH}(\text{OH})\text{COCMe}_3$ (b) was obtained, m. $80-2^\circ$, could not be converted into a semicarbazone. By means of Na in crude Et_2O (b) could not be reduced, but an excess of (a) in Et_2O reduced it to the *glycol*, $(\text{Me}_3\text{CCHOH})_2$, m. $125-7^\circ$, congeals $105-10^\circ$, the (a) decomp. into C_4H_8 and HMgCl , which acts as reducing agent. Upon oxidation with KMnO_4 (b) gave $\text{Me}_3\text{CCO}_2\text{H}$ and the *diketone*, $(\text{Me}_3\text{CCO})_2$, b. $170-2^\circ$. By the action of CO on iso-PrMgBr the hydrocarbon $\text{Me}_3\text{CHCH}:\text{CMe}_2$ and a *compound*, m. $113-4^\circ$, were produced. The latter is either the *aldehyde*, $\text{Me}_3\text{CHCOC}(\text{OH})(\text{C}_6\text{H}_7)\text{C}(\text{OH})(\text{C}_6\text{H}_7)\text{C}(\text{OH})(\text{C}_6\text{H}_7)\text{-CHO}$, or the corresponding *acid*, $\text{C}_{17}\text{H}_{34}\text{O}_8$, the analytical data being inconclusive. By the action of CO on $\text{Me}_3\text{EtCMgCl}$ nothing but Me_3EtCOH (c) could be obtained. After a discussion of several possible explanations of the last reaction, preference is given the assumption that, owing to the presence of CO , the O of the air takes part in it, with the intermediate formation of $\text{Me}_3\text{EtCOMgCl}$. This assumption gains support from the fact that when air is excluded by filling the reaction flask with CO_2 , the yield of (c) drops to insignificant proportions. H. M. GORDIN.

Action of tertiary amylmagnesium chloride on ethyl oxalate. E. VENUS. *J. Russ. Phys. Chem. Soc.* 46, 1332-6 (1914).—Egorova showed (*C. A.* 5, 1420) that the reaction between Me_3CMgCl and $(\text{CO}_2\text{Et})_2$ is one of reduction. It is shown by V. that $\text{Me}_3\text{EtCMgCl}$ (a) behaves in a similar manner, the products of its interaction with $(\text{CO}_2\text{Et})_2$ being the *ester*, $\text{C}_6\text{H}_{11}\text{CH}(\text{OH})\text{CO}_2\text{Et}$, b. $78-9^\circ$, $d_4^{20} 0.9668$, $d_{15}^{21} 0.9501$, $d_4^{21} 0.9462$, the *hydroxy acid*, $\text{C}_6\text{H}_{11}\text{CH}(\text{OH})\text{CO}_2\text{H}$, m. $72-3^\circ$, and the *ethoxy acid*, $\text{C}_6\text{H}_{11}\text{CH}(\text{OEt})\text{CO}_2\text{H}$, m. $107-8^\circ$. The reduction is ascribed to HMgCl which, together with C_6H_{10} , is produced by the decompn. of (a). The formation of C_6H_{10} in this reaction was proved by converting it into its bromide. H. M. GORDIN.

Structure of Gustavson's hydrocarbons obtained from pentaerythritol. O. FILIPOV. *J. Russ. Phys. Chem. Soc.* 46, 1141-99 (1914).—From an exhaustive exam. of the work done by himself and others on Gustavson's "vinyltrimethylene" (a) and its derivs., F. comes to the conclusion that (a) is a mixt. of $\text{CH}_3.\text{CMe}:\text{CH.CH}_2$ (b), b. 37.5° , and $\text{CH}_3.\text{C}(\text{:CH}_2).\text{CH}_2.\text{CH}_2$ (c), b. 42° , while the alc. obtained by G. from (a)

is $\text{CH}_3\text{C}(\text{OH})\text{Me}.\text{CH}_2\text{CH}_3$ (d). The $(\text{CH}_3\text{CO}_2\text{H})_2$ formed in the oxidation of (a) comes from (c) according to the following scheme: $(c) \rightarrow \text{CH}_3\text{C}(\text{OH})(\text{CH}_2\text{OH}).\text{CH}_2\text{CH}_3$

$(e) \rightarrow \text{CH}_3.\text{CO}.\text{CH}_2\text{CH}_3 \rightarrow (\text{CH}_3\text{CO}_2\text{H})_2$, while the simultaneously formed $\text{AcCH}_2\text{CH}_2\text{CO}_2\text{H}$ comes from (b): $(b) \rightarrow \text{CH}_3\text{C}(\text{OH})\text{Me}.\text{CH}(\text{OH}).\text{CH}_3 \rightarrow$

$\text{AcCH}_2\text{C}_2\text{CO}_2\text{H}$. As to the $\text{CH}_3(\text{CH}_2\text{CO}_2\text{H})_2$ which is also found among the oxidation products of (a), it owes its production to an isomerization of the 4-membered ring of (c) to a five-membered ring, the scheme being as follows: $(c) \rightarrow (e) \rightarrow \text{CH}_3\text{C}(\text{OH})(\text{CHO}).\text{CH}_2\text{CH}_3 \rightarrow \text{CH}_3.\text{CO}.\text{CH}(\text{OH}).\text{CH}_2\text{CH}_3$

$\rightarrow \text{CH}_3(\text{CH}_2\text{CO}_2\text{H})_2$. An attempt was made to prep. (d) synthetically by the action of Mg on $\text{AcCH}_2\text{CH}_2\text{CH}_2\text{I}$ (cf. Zelinskii and Moser, *Ber.* 35, 2648), in order to compare it with the (d) from (a), but the attempt failed. While the formation of the above acids in the oxidation of (a) may be accepted as proof of its consisting of (b) and (c), a better proof would be to compare these 2 hydrocarbons as obtained from (a) with the (b) and the (c), as well as with all other hydrocarbons of the formula C_6H_{10} , made synthetically. Owing, however, to difficulties of prepn., no attempts were made to carry out such syntheses. But since an equally satisfactory proof of the nature of (a) is obtainable by reducing it and comparing the product with all hydrocarbons of the formula C_6H_{10} , the work was carried into that direction. There are 3 cyclic compds., C_6H_{10} : cyclopentane (f), ethylcyclopropane (g), and methylcyclobutane (h). Of these (f) is known, and is entirely different from the reduction product of (a), while on synthesizing (g) and (h) and comparing them with this reduction product, it was found that the latter was identical with (h). Hence F.'s view of the comp. of (a) must be correct, since both (b) and (c) ought to give (h) by reduction. (g) was made from $\text{CH}_3\text{CH}_2\text{CHAc}$ (Lipp, *Ber.* 22, 1207) by acting on it

with $\text{N}_2\text{H}_4.\text{H}_2\text{O}$ and treating the resulting compd. with KOH (Kizhner's method). (g) $b_{715} 36.5-7^\circ$, $d_4^{20} 0.7055$, $d_4^{18.25} 0.6866$, $n_D^{18.25} 1.37973$. In synthesizing (h) the work of Perkin and Coleman (*J. Chem. Soc.* 53, 201) was repeated, substituting, however, $\text{C}_6\text{H}_5\text{Me}_2$ for PhMe. But the product was found to consist of a mixt. of $n\text{-C}_6\text{H}_{12}$, piperylene and $\text{PrCH}:\text{CH}_2$, with a probable admixt. of a very small amt. of (h). Equally unsuccessful was the attempt to prep. (h) by the action of Zn dust on $\text{CH}_3\text{BrCH}_2\text{CH}_2\text{CHBrMe}$ (L., *Ber.* 22, 2570), both in alc. and in acid soln., the product in the 1st case being $n\text{-C}_6\text{H}_{12}$, while in the 2nd case an indefinite mixt. (b. $30-70^\circ$) resulted. (h) was finally synthesized by K.'s method from cyclobutyl aldehyde (i) and $\text{N}_2\text{H}_4.\text{H}_2\text{O}$. As to (i) it was made by a complex series of reactions, starting with $\text{BrCH}_2\text{CH}_2\text{CH}_2\text{Cl}$ and $\text{Na}_2\text{C}(\text{CO}_2\text{Et})_2$. (h) $b_{715} 36-6.5^\circ$, smells like CHCl_3 , $d_4^{20} 0.7118$, $d_4^{18} 0.695$, $n_D^{18} 1.38473$, gives $\text{iso-C}_6\text{H}_{12}$ when hydrogenated at 205° in presence of reduced Ni. Another proof that (a) is not a $(\text{CH}_2)_6$ deriv. is the fact that when its reduction product is passed, even very slowly, over Al_2O_3 at 326° , it still remains satd., since $(\text{CH}_2)_6$ derivs. under these conditions are converted into unsatd. open chain compds. (Ipat'ev, *J. Russ. Phys. Chem. Soc.* 35, 603). While (a) upon reduction gives (h) exclusively, showing that in this case both (b) and (c) are hydrogenated simultaneously, it is different when each of them is hydrogenated separately in presence of Pd, (c) under these conditions changing to (h), while (b) is converted into $\text{iso-C}_6\text{H}_{12}$, showing that, at least in the presence of Pd, (b) is less readily hydrogenated than (c), and that the excess of H converts the former into an open-chain compd. In accord with F.'s view of the comp. of (a), G.'s dibromide obtained from (a) is $\text{CH}_3\text{CBr}(\text{CH}_2\text{Br}).\text{CH}_2\text{CH}_3$. This,

when treated with PbO, gives (i) which, under certain conditions, isomerizes to cyclopentanone. The mechanism of the formation of (a) from $C(CH_2Br)_4$ (j) consists in

the production of spiropentane, $\begin{array}{c} CH_2 \\ | \\ CH_2 - C - CH_2 \\ | \\ CH_2 \end{array}$, as intermediary product. This isom-

erizes to (c), which then partly changes to (b). The isomerization of (c) to (b) is facilitated by EtOH, since this isomerization may be brought about by heating (c) with $ZnBr_2$ and $ZnBrOH$ in the presence of a considerable amt. of dil. alc., while if in the prepn. of (a) from (j) only a trace of EtOH be used, the product consists almost exclusively of (c). The isomerization of (c) to (b) is best accomplished by passing the former over asbestos covered with Al_2O_3 at 300° . A conversion of (c) into an unsatd. open-chain compd. does not take place in this reaction, at least not at this temp.

H. M. GORDIN.

Constitution of allantoin and allied substances. HENRY D. DAKIN. Herter Lab., New York. *J. Chem. Soc.* 107, 434-9(1915).—The explanation of Mendel and D. (*C. A.* 4, 2309) that the optical inactivity of allantoin is due to keto-enol tautomerism is defended against Titherley's criticisms (*C. A.* 7, 3486). The optical instability of other hydantoins in which this change is possible confirms this view. Attempts to resolve 3-methylallantoin (A) and homoallantoin (B) by feeding to rabbits, by the use of actively fermenting yeast, and with the aid of bacteria and molds, failed. (A) gives no ppt. with Wiechowsky's reagent ($Hg(OAc)_2$ and $NaOAc$), while (B), which contains no substituent in position 3, gives a ppt. *d*-Alanine and $KCNO$ in H_2O on the H_2O bath for 1 hr. gave *l*- α -carbamidopropionic acid, $MeCH(NHCO_2NH_2)CO_2H$, prisms, sinters 195° m. $198-200^\circ$, $[\alpha]_D^{20} -9.5^\circ$ in H_2O ; 3 g., boiled 2 hrs. with 50 cc. H_2O and 9 cc. concd. HCl , gave *l*-methylhydantoin, $MeCH.NH.CO.NH.CO$, crys-

tals, m. $175-7^\circ$. Its $[\alpha]_D^{20}$ was 50.6° in H_2O , probably a minimum value, owing to possible racemization. This takes place rapidly in alk. soln. *dl*- $MeCH(NHCONH_2)CO_2H$ sinters 182° and m. 185° , not 155° , as given in the literature. Similarly, *dl*- α -methylhydantoin m. 150° , not 125° or 140° .

M. HEIDELBERGER.

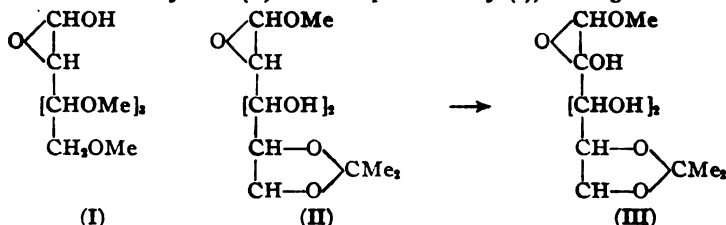
Phototropy and thermotropy. VI. Polymorphic vanillylidenearylamines produced by trituration and by the influence of actinic light. ALFRED SENIER AND ROBERT B. FORSTER. Galway. *J. Chem. Soc.* 107, 452-9(1915); cf. *C. A.* 8, 3781; 9, 202. —(th = thermotropic, lt = higher limit of thermotropy, tl = thermotropic at the temp. of solid CO_2 , tlt = thermotropic between room temp. and the temp. of solid CO_2). Triboluminescence and phototropy were not observed, although deeper colored polymorphic forms were obtained by 3 or 4 months' exposure to sunlight. The deepening of the color on exposure to sunlight in the case of the polymorphic varieties obtained by titrituration (r) was usually more pronounced than in the case of the original substances. The apparently permanent polymorphic forms, in general more deeply colored than the original substances, obtained by exposure to sunlight, are denoted by s. All m. ps. are cor. *Vanillylidene derivatives of:* Aniline, m. 157° , not $152-3^\circ$ (Ott, *Monatsh.* 26, 335(1905)), tl, lt, 150° , no r, s. *o*-Toluidine, th $20-90^\circ$, no r, s. *m*-Compd., tl, lt 80° (cf. S. and Shephard, *C. A.* 4, 1025); r, changes back after 1 week in the dark, tl, lt 25° ; s. *p*-Compd., m. $119-20^\circ$, not 117° (Manchot and Furlong, *C. A.* 4, 459), tl, lt 100° ; r, reverts at about 50° ; s. *o*-4-Xylidine, faintly yellow needles, m. $112-3^\circ$, tl, lt 100° , changes on cooling to a darker form, instead of, as is usual, to a lighter form; r, tl, reverts 100° ; s. *m*-4-Xylidine, plates, m. 109° , tlt, also darkens when cooled; s; no r. *p*-Xylidine, faintly yellow needles, m. 103° , tl, lt 100° ; r, reverts 90° . *ψ*-Cumidine, very pale yellow needles, m. $123-4^\circ$, tl, lt 110° ; s; r, tlt, reverts at about 70° . *p*-Chloroaniline, almost colorless prisms, m. $128-9^\circ$, tl, lt 125° ; r, tlt, reverts at about

60°; s. *m*-Bromoaniline, brownish yellow, m. 75°; r, softens 67°, m. 70°; both are th between 20 and 65°; s. *p*-Bromoaniline, pale yellow needles, m. 123-4°, th 20-120°; r, reverts 60°; s. *p*-Aminophenol, chocolate plates, decomp. above 170°, m. 201-2°. *m*-Anisidine, deep yellow prisms, m. 118-9°, tl, lt 117°; r, reverts at about 60°; s. *p*-Anisidine, nearly colorless needles, m. 132°, tl, lt 130°; r, tlt, reverts at about 60°; s. *o*-Aminobenzoic acid, tl, lt 160°, no r or s. *m*-Aminobenzoic acid, yellow and orange crystals, gradually changing to the orange form; solns. in acetone and MeOH are deep red, apparently very sensitive to polymorphic change. *p*-Aminobenzoic acid, yellow and orange-red crystals (cf. M. and F., *loc. cit.*), the latter being changed by the slightest friction to the yellow form, which decomp. above 200° and m. 213-4°; r, tlt; s. *Benzidine*, gamboge-colored crystals, decomp. above 150°, m. 184-6°, tlt; r, tl, lt 170°, the color being deepest at room temp.; s. α -Naphthylamine, pale yellow needles, m. 113-4°, tl, lt 110°; r, tlt, reverts at about 60°; s. β -Naphthylamine, biscuit-colored needles, m. 148-9°, th from 20-135°; r, reverts at about 90°; s. M. H.

Organic derivatives of silicon. XXIII. Further experiments on the so-called siliconic acids. JOHN A. MEADS and FREDERIC S. KIPPING. Nottingham. *J. Chem. Soc.* 107, 459-68 (1915); cf. *C. A.* 8, 1956.—The generality of the conclusions developed in the previous paper is demonstrated by the results now reported. Decompn. of $\text{PhCH}_2\text{SiCl}_3$ with ice-cold H_2O produces very little of the insol. glue-like condensation products unless the soln. is kept for several hrs. Extn. with Et_2O and manipulation of the product as in the case of the mixt. obtained from PhSiCl_3 gave a colorless, flaky resin, m. 40-50°; systematic fractional pptn. of this from Et_2O by means of light petroleum gave a series of amorphous products ranging from a sol. fraction of low mol. wt., differing little in compn. from $\text{PhCH}_2\text{Si}(\text{OH})_3$, to an insol. partial anhydride of high mol. wt. The principal components were, apparently, compds. produced from 3, 4 and 5 mols. of $\text{PhCH}_2\text{Si}(\text{OH})_3$. Ppts. of "benzylsiliconic acid" obtained from alk. soln. melt somewhat higher than those obtained above and corresponded more closely to the glue-like preps. of the preceding paper. Decompn. of $\text{PhCH}_2\text{SiCl}_3$ with steam gave a hard, brittle solid, m. about 60-70°, sol. in the org. solvents, probably essentially a mixt. of the final condensation products of the trihydroxide. Sodium benzylsiliconate, probably $\text{PhCH}_2\text{SiO}_2\text{Na}$, crystals, from any of the "acid" preps. and alc. NaOMe evapd. over H_2SO_4 and KOH; readily sol. in cold H_2O . About 0.5 of the pasty product obtained by passing vapors of PrSiCl_3 into ice- H_2O was sol. in Et_2O ; evapn. of this gave a glue-like mass which rapidly lost its solubility. The insol. portions appear to be $(\text{PrSiO})_2\text{O}$ (cf. Melzer's "propylsiliconic acid," *C. A.* 3, 176). When alk. solns. of the Pr compd. were acidified or satd. with CO_2 an insol. oil pptd. after some time, immediately if NH_4Cl was used as the pptg. agent. Sodium propylsiliconate, prepd. like the benzyl compd., needles or prisms, sol. in H_2O . M. HEIDELBERGER.

Derivatives of a new form of glucose. JAMES C. IRVINE, ALEXANDER W. FIFE and THOMAS P. HOGG. Univ. St. Andrews. *J. Chem. Soc.* 107, 524-41 (1915).—The γ -methylglucoside (A) used was prepd. according to Fischer (*C. A.* 8, 3036), care being taken to use acetone-free reagents. For the methylation expts. it was found unnecessary to distil (A) before use. 12 g. (A) were treated 4 times by the usual $\text{MeI-Ag}_2\text{O}$ process, yielding, after repeated fractionation controlled by n detns., tetramethyl- γ -methylglucoside (B), $\text{C}_{11}\text{H}_{22}\text{O}_6$, mobile liquid, b_{D}^{20} 106°, readily sol. in H_2O and org. solvents, non-reducing, very easily hydrolyzed, instantly reduces alk. KMnO_4 in the cold, n_{D}^{20} 1.4458, d_4^{15} 1.1064, $[\alpha]_{\text{D}}^{20}$ -14.6° in H_2O . A table is given contrasting these properties with those of the α - and β -compds. A 5% soln. of (B) hydrolyzed slowly in 0.01 N HCl at 40°, more quickly at 100°, the $[\alpha]_{\text{D}}$ passing through a max. (negative). The acid concn. was finally raised to 0.1 N and the heating continued until the $[\alpha]_{\text{D}}$ remained const. at -5.4°. For rapid work, 0.1 N acid may be used from the start.

The resulting *tetramethyl-γ-glucose* (C) resembles glycerol, $b_{0.08}$ 122°, n_D 1.4585, d_4^{15} 1.1644, $[\alpha]_D^{20}$ -19.7° in MeOH, in H₂O, initial, -3.85°; final, -7.21°; resembles (B) with solvents and KMnO₄, reduces Fehling soln. on warming, reacts in boiling H₂O with PhNHNH₂ and HOAc, giving a dark oil which could not be purified, but which seemed to be a hydrazone rather than an osazone. (C) does not react with PhNH₂; with MeOH containing 0.25% HCl it rapidly yields (B), the $[\alpha]_D$ changing from - to + and back again. 2 g. (C) in 200 cc. H₂O was treated with 16 cc. 2 N NaOH and then gradually, with shaking, with 56 cc. KMnO₄ (1 cc. = 0.01575 g. KMnO₄). CO₂ was passed through the mixt., which was filtered and evapd. dry *in vacuo*. Extn. with Et₂O gave 0.6 g. neutral, mobile liquid, possibly a *tetramethylpentitol*. The Et₂O-insol. residue was acidified with HCl and extd. with Et₂O in Hagemann's app., yielding 1.4 g. of a *tetramethylgluconolactone*, C₁₀H₁₈O₆, initial $[\alpha]_D$ in aq. alc., 59°, after 4 hrs., 46°. Reduction of (C) according to I. and Paterson (C. A. 8, 2341), except that the Et₂O soln. of the sugar was very dil. and 2.5% Na-Hg was used, gave, after 2 reductions, a *tetramethylsorbitol*, $b_{0.4}$ 125°, n_D 1.4568, $[\alpha]_D$ -6.2° in H₂O; a soln. in 0.5 N H₂BO₃ showed optical changes which are taken to indicate the presence of 2 adjacent OH groups (Böseken, C. A. 8, 95), which would point to the formula MeOCH₂CH-(OMe)CH(OMe)CH(OMe)CH(OH)CH₂OH. (B) condenses readily with acetone in the absence of catalysts; in order to convert the resulting compd. into a volatile deriv. it was methylated by the MeI-Ag₂O method, but underwent simultaneous oxidation. The portion volatile under 0.05 mm. was remethylated and refractionated until sepd. into (1) *trimethyloxy-γ-methylglucoside monoacetone* (D), C₁₂H₂₄O₇, $b_{0.08}$ 105-6°, n_D 1.4493, d_4^{15} 1.1133, consists of at least 2 isomers, as shown by the differing $[\alpha]_D$ (-3.4° and 0° in MeOH) when refractionated into 2 equal parts; and (2) a disaccharide deriv., *anhydrobisdimethyloxy-γ-methylglucoside monoacetone*, viscous syrup, $b_{1.4}$ 200°, n_D 1.4587. Hydrolysis of (D) in 0.1 N HCl at 90° for 50 min. gave a const. $[\alpha]_D$ of 41°, yielding a *trimethyloxy-γ-methylglucoside*. In an extended discussion it is concluded tentatively that (C) is best represented by (I), although the formation of



the unimol. lactone is hard to reconcile with this view. The formation of the above oxy derivs. is explained according to the scheme (II) $\rightarrow$ (III), with anhydride formation between the tertiary OH groups in the case of part of the oxidized γ -methylglucoside monoacetone and subsequent methylation of the anhydride and the unchanged oxy compd.

M. HEIDELBERGER.

Synthesis of gluco-*m*-hydroxycoumarin and glucoprotocatechuic acid. F. MAUTHNER. Budapest. *J. prakt. Chem.* 91, 174-9(1915).—In view of the widely extended occurrence of glucosides of hydroxycoumarin and of phenolcarboxylic acids in various plants, M. has synthesized representatives of both classes for study and comparison; *tetraacetylgluco-*m*-hydroxycoumarin* (a) was obtained in 60% yield by adding 7.5 g. acetobromoglucose in 10 cc. acetone to 3 g. *m*-hydroxycoumarin + 0.7 g. NaOH in 10 cc. cold H₂O and allowing the mixt. to stand for 5 hrs., with occasional addition of a few cc. of acetone to keep the liquid homogeneous; needles from MeOH, m. 177-8°. A 70% yield of *gluco-*m*-hydroxycoumarin* was obtained by shaking (a) for 16 hrs. with 6% Ba(OH)₂, needles from absolute alc., sinter 200°, m. 219-20°. It has a bitter taste,

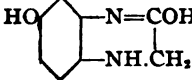
and is sol. in cold 10% NaOH. *Methyl tetraacetylglucoprotocatechuic acid*, prepd. similarly to (a), m. 167–8°, needles from MeOH. On standing for 23 hrs. at 37.5° with Ba(OH)₂ it is converted into *glucoprotocatechuic acid*, hygroscopic needles from AcOEt, m. 81–2°. It gives a yellow color with FeCl₃, has a sour taste, does not reduce Fehling soln. and is easily hydrolyzed by dil. acids.

D. BRESE JONES.

Synthesis of the depside of gentisinic acid. F. MAUTHNER. Budapest. *J. prakt. Chem.* 91, 179–89 (1915).—3,6-(MeO)₂C₆H₂COCl (a), previously described as an oil (cf. C. A. 7, 2544), was obtained as crystals from petr. ether, m. 53–4°. On standing 0.5 hr. with an excess of NH₄OH it gave 3,6-dimethoxybenzamide, leaves from C₆H₆ + petr. ether, m. 141–2°: *benzanilide derivative*, from (a) and PhNH₂ in Et₂O for 2 hrs., needles from ligroin, m. 98–9°; 3,6-dimethoxybenzoyl-*p*-hydroxybenzoic acid (b), by vigorously shaking at –10° a mixt. of 3.5 g. of (a) in 20 cc. acetone with 2.2 g. *p*-HOC₆H₄CO₂H, 1.8 g. NaOH, 20 cc. H₂O and 10 cc. acetone, needles from dil. acetone, m. 161–2°; *methyl ester*, from (a) and *p*-HOC₆H₄CO₂Me, needles from MeOH, m. 72–3°; 3,6-dimethoxybenzoylvanillic acid, from (a) and vanillic acid, needles from dil. acetone, m. 176–7°; *methyl ester*, from (a) and Me vanillate, needles from MeOH, m. 113–4°; *m*-benzoic acid derivative, needles from dil. acetone, m. 140–1°; *methyl ester*, needles from MeOH, m. 81–2°; 2,3-hydroxynaphthoic acid derivative, needles from C₆H₆, m. 185–6°; *methyl ester*, needles, m. 150–1°; *monomethylgentisinic acid derivative*, needles from acetone, m. 131–2°; *syringic acid derivative*, crystals from dil. acetone, m. 173–4°; 3,6-dimethoxybenzoyl-*p*-hydroxybenzoyl chloride (c), from (b) and PCl₅, pptd. from CCl₄ with ligroin, m. 107–8°. *Penta*-[3,6-dimethoxybenzoyl-*p*-hydroxybenzoyl]glucose, prepd. by shaking for 50 hrs. a mixt. of 21 g. of (c), 25 cc. dry CHCl₃, 2.1 g. α -glucose and 8.1 g. quinoline, and pouring the resulting product into 700 cc. cold MeOH, m. 92–3°, d₄¹⁵ 1.5914, α_D^{19} 24.09.

D. BRESE JONES.

2,4-Dinitrophenylglycine. EDM. WALDMANN. Vienna. *J. prakt. Chem.* 91, 190–202 (1915).—The 70% yield of 2,4-(NO₂)₂C₆H₃NHCH₂CO₂H (a) obtained by Sanna (*Chem. Zentr.* 1904, 1393) and Abderhalden and Blumberg (C. A. 4, 3066) can be increased 15% by using the components in the following proportions: 54 g. (NO₂)₂-C₆H₃Cl in 400 cc. alc. heated for 2 hrs. with 20 g. H₂NCH₂CO₂H and 48 g. NaHCO₃ in 200 cc. H₂O. By reducing (a) in alk. media, reddish brown, amorphous substances are formed. In acid media, both NO₂ groups are simultaneously reduced, forming well defined cryst. compds. 2,4-Diazoxyphenylglycine was prepd. by reducing (a) in alc. with SnCl₄ + HCl; yellowish brown, lustrous leaves, becoming red 217°, decomp. on further heating. *Ethyl ester*, similarly prepd., red leaves. By reducing (a) with Sn and concd. HCl, 7-aminohydroxydihydroquinoxaline hydrochloride (b) was obtained in 80% yield, white needles, m. above 300° (decompn.). Warmed with AcONa in H₂O, it gives the *free base*, yellow needles + 2H₂O, m. 181°. On standing it becomes green. It has acidic reaction, and forms salts with acids and bases, reduces Fehling soln. with formation of a brownish yellow ppt. *Stannic chloride salt*, C₈H₆N₂O₂·2HCl·SnCl₄, long needles having an acid reaction. *Sulfate*, C₈H₆N₂O₂·H₂SO₄, rose needles. By recrystg. from H₂O it loses H₂SO₄ with formation of the salt (C₈H₆N₂O₂)₂H₂SO₄, small red leaves; *oxalate*, red leaves, m. 219°; *ferrocyanide*, (C₈H₆N₂O₂)₃·H₄Fe(CN)₆, white leaves which become green on standing; *potassium salt*; *sodium salt*, small yellow leaves, hydrolyzed by H₂O, forming a yellow cryst. ppt.; *triacetyl derivative*, insol., yellowish white ppt. On diazotizing (b) yielded 2,7-dihydroxydihydro-

quinoxaline,  in 65% yield, reddish brown, flocculent ppt. It

gives a reddish yellow soln. with NaOH, from which it is not reprecipitated on addition of acids; with hot or concd. HCl it gives a reddish violet soln., from which it can be re-

pptd. by cooling or addition of H_2O . On oxidation with $\text{K}_3\text{Fe}(\text{CN})_6$, (b) gave a red compound, sol. in alkalis but insol. in acids. With Ba, Mg, Hg or Ag salts it forms reddish brown flakes. Oxidized with FeCl_3 , (b) gave 7-aminodihydroxydihydroquin-oxaline hydrochloride, brown, cryst. powder. The dibromo derivative, $\text{C}_6\text{H}_4\text{N}_2\text{OBr}_2$, was obtained from (b) and $\text{Br}\cdot\text{H}_2\text{O}$, yellow ppt., sol. in both acids and alkalis.

D. BREESE JONES.

Action of 1,2,4-chlorodinitrobenzene on *p*- and *m*-aminobenzoic acids. B. LINKE. Vienna. *J. prakt. Chem.* 91, 202-12 (1915).—2,4-Dinitrodiphenylamine-4'-carboxylic acid (a), prepared by warming on a H_2O bath for 6-8 hrs. a mixt. of 41 g. $\text{ClC}_6\text{H}_3(\text{NO}_2)_2$, 28 g. $p\text{-H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$ and 11 g. CaCO_3 in 50% alc., dissolving the reaction product in NaOH and pptg. with AcOH, decomps. on rapid heating, but when slowly heated is unaffected at 225° , yellow powder from AcOH + PhOH, insol. in most org. solvents, but forms an orange soln. with concd. H_2SO_4 ; sodium salt, vermillion crust; methyl ester, by warming (a) with MeOH and H_2SO_4 , microscopic orange needles from MeOH, becomes red 75° , and bright yellow at 178° ; ethyl ester, yellowish red needles from EtOH. On reduction with Na_2S , (a) gave 2,4-nitroaminodiphenylamine-4'-carboxylic acid, reddish brown powder, decomps. 225° ; with cold, concd. H_2SO_4 it gives a dark brown coloration, which with H_2O becomes yellowish brown. With concd. NaOH a cherry soln. is formed, but it shows no reaction with FeCl_3 ; hydrochloride, yellowish brown powder, decomps. 195° . Sn or SnCl_2 with HCl converts (a) into the diamino derivative, white powder which in the air changes to dark violet, decomps. 195° ; hydrochloride, thread-like needles from concd. HCl, decomps. $175\text{--}80^\circ$, unstable in the air, and reduces alk. AgNO_3 . With cold, concd. H_2SO_4 it gives a colorless soln., which becomes violet on diln. Diazotized and coupled with R salt or with FeCl_3 , it gives cherry solns. 2,4-Dinitrodiphenylamine-3'-carboxylic acid (b), prepd. similarly to (a), small, yellow needles, stable at 225° . It gives wine-colored solns. with cold, concd. H_2SO_4 , which yield yellow needles on diln.; sodium salt, orange needles + $2\text{H}_2\text{O}$; with salts of the alkali earths it gives yellow ppts.; methyl ester, orange needles from MeOH, m. 126° ; ethyl ester, yellow needles from EtOH, m. 105° . By reduction with Na_2S (b) yields the nitro-amino derivative, reddish brown powder, decomps. $215\text{--}18^\circ$; hydrochloride, reddish brown when moist, and dark green when dry, decomps. $175\text{--}80^\circ$. The corresponding diamino derivative was obtained by reducing (b) with Sn and HCl, very unstable in the air; hydrochloride, sandy, cryst. powder, decomps. $165\text{--}70^\circ$. It gives colored solns. with FeCl_3 , NaNO_2 , dil. mineral acids and with alkalis, and reduces alk. AgNO_3 .

D. BREESE JONES.

Addition products of nitric and picric acids with unsaturated organic compounds. G. REDDELIEN. Leipzig. *J. prakt. Chem.* 91, 213-44 (1915).—The formation of addition products of HNO_3 with α - and β -unsatd. ketones, which has been previously shown (cf. C. A. 7, 997), is attributed to the unsatd. O of the CO. R. has obtained the addition of HNO_3 to a large number of compds. having the unsatd. groups, CO, N:N, and C:N. Analogous addition compds. were obtained with picric acid, even with compds. having the C:C linkage. These compds. are easily decompd. by H_2O , leading to an equil.: $\text{BzH}\cdot\text{HNO}_3 + \text{H}_2\text{O} \rightleftharpoons \text{BzH} + \text{HNO}_3\cdot\text{H}_2\text{O}$. Unsatd. compds. having adjacent conjugate linkages, 1 of them being a CO or C:N, yield less stable addition compds. than do those having only 1 double linkage, but an adjacent C:C, on the other hand, greatly increases their stability. For those definite, intermediate addition products formed in reactions such as nitration and halogenation, R. proposes the name "Vorverbindungen." A review and discussion of the constitution of C_6H_3 is given, in which evidence for the C:C linkage is pointed out. The following addition products were prepd.: benzaldehyde nitrate, from BzH and HNO_3 (d. 1.371) at 0° , colorless oil at -30° , decomps. quickly in the air, becoming yellow and yielding

HNO_3 . It is also decompd. by H_2O , Et_2O and alc.; *acetophenone nitrate*, properties similar to the BzH deriv.; BzPh.HNO_3 ; $(\text{C}_6\text{H}_5)_2\text{CO.HNO}_3$; $(\text{C}_6\text{H}_5\text{CO})_2\text{HNO}_3$; *benzil nitrate*, yellow prisms, unstable in the air; PhCH:CHCHO.HNO_3 ; *camphor nitrate*; *benzaldehyde picrate*, long, yellow prisms, m. $70-2^\circ$, unstable; $\text{BzMe.HO(NO}_2)_2\text{C}_6\text{H}_5$; *cinnamylaldehyde picrate*, yellow prisms, m. $66-7^\circ$. On standing for 3 months in a desiccator it lost 5% PhCH:CHCHO ; *dibenzalacetone picrate*, orange, rhombic crystals, m. $113-4^\circ$, quite stable; *asobenzene nitrate*, red crystals, extremely unstable; *asobenzene picrate*, red crystals; *stilbene picrate*, brown needles, m. $94-5^\circ$. No addition products of HNO_3 with unsatd. hydrocarbons could be isolated, the resulting products being NO_2 derivs. or resins.

D. BREESE JONES.

Bromination of aniline. H. FRANZEN AND A. HENGLEIN. Karlsruhe. *J. prakt. Chem.* 91, 245-57(1915).—A new and convenient method of prep. $p\text{-BrC}_6\text{H}_4\text{NH}_2$, and $2,4\text{-Br}_2\text{C}_6\text{H}_3\text{NH}_2$. PhNBrCHBrPh was obtained in 83% yield as a yellow powder by slowly adding 80 g. Br in 80 cc. CHCl_3 to 90 g. PhN:CHPh in 150 cc. CHCl_3 , and allowing to stand 1 hr. at 0° . On boiling with abs. alc. for 1 hr. it is converted into *benzylidene-p-bromoaniline hydrobromide*, bright, yellow cryst. powder, m. 215° (decompn.), which on warming in abs. alc. with $\text{C}_6\text{H}_5\text{N}$ loses HBr and is converted into *benzylidene-p-bromoaniline* (a), leaves, m. 67° . Yield, 90%. The 2 above reactions are thus represented: $\text{PhNBrCHBrPh} \longrightarrow p\text{-BrC}_6\text{H}_4\text{NHCHBrPh} \longrightarrow p\text{-BrC}_6\text{H}_4\text{N:CHPh}$. On warming 170 g. of (a) in 200 cc. abs. alc. + 500 cc. dil. HCl , and removing the BzH by distn. with steam, $p\text{-BrC}_6\text{H}_4\text{NH}_2$ was obtained in 61% yield. In an analogous way, starting out with $p\text{-BrC}_6\text{H}_4\text{N:CHPh}$, $2,4\text{-Br}_2\text{C}_6\text{H}_3\text{NH}_2$ and $2,4,6\text{-Br}_3\text{C}_6\text{H}_2\text{NH}_2$ were prepd., the 2 compds. being readily sepd. by heating the mixt. with dil. H_2SO_4 , whereby the $2,4,6$ -deriv. forms an insol. salt. *Benzylidene-p-bromoaniline dibromide*, dark yellow, amorphous powder, m. 182° . Yield, 84%. *Benzylidene-2,4-dibromoaniline hydrobromide*, yellow, cryst. powder, which with $\text{C}_6\text{H}_5\text{N}$ is converted into $2,4\text{-Br}_2\text{C}_6\text{H}_3\text{NH}_2$ in 48% yield; *2,4-dibromoaniline derivative*, yellow needles, m. 67° ; *dibromide derivative*, orange needles, m. $115-20^\circ$ (decompn.); yield, 68%. On boiling with alc. it gave $2,4,6\text{-Br}_3\text{C}_6\text{H}_2\text{NH}_2$. $\text{Br}_2\text{C}_6\text{H}_4\text{HNH}_2$ could not be made by this method.

D. BREESE JONES.

Ethyl orthoformate as an alkylating agent. F. VON WALTHER. Dresden. *J. prakt. Chem.* 91, 258-60(1915).—The prepn. of some nitrophenetoles by action of HC(OEt)_3 on the corresponding nitrophenols. As is the case with other strong acids, picric acid in H_2O readily hydrolyzes HC(OEt)_3 , but when heated alone in an oil bath up to 170° for 0.5 hr., the 2 components yield $\text{C}_6\text{H}_3(\text{NO}_2)_3\text{OEt}$, white needles from ligroin, m. 78.5° . Under the same conditions the reaction of $2,4\text{-C}_6\text{H}_3(\text{NO}_2)_2\text{OH}$, which is a weaker acid, with HC(OEt)_3 is incomplete, but a 50% yield of $\text{C}_6\text{H}_3(\text{NO}_2)_2\text{OEt}$ was obtained by distg. the components over a free flame, and occasional addition of HC(OEt)_3 to compensate for the amt. which distils over unchanged, white needles, m. 86° .

D. BREESE JONES.

Cycloglycylglycines. Direct synthesis by the action of glycerol upon amino acids. L. C. MAILLARD. *Ann. chim.* 3, 48-120(1915); cf. *C. A.* 6, 495, 621; 8, 3423. —M. presents arguments in favor of his nomenclature for the cyclic dipeptides and describes in detail a number of homologs in the cycloglycylglycine series that have been mentioned but not characterized in his previous articles. A comprehensive, critical review of the work of other investigators in this field shows that all of the compds. described by M. have been previously synthesized. *Cyclosarcosylsarcosine*, prepd. by the usual methods, bitter needles, m. $149-50^\circ$, was found to be identical with the anhydride obtained by Traube (*Ber.* 15, 2110) and by Mylius (*Ber.* 17, 286). *Cycloalanylaniline* (A), needles, m. $282-2.5^\circ$, was shown to be the *dl*-mixt., identical with Fischer's *dl*-alanine anhydride (3,6-dimethyl-2,5-diketopiperazine; cf. *Ber.* 34, 433).

An unidentified by-product in the formation of (A) was probably an alkaloid of the pyrazine series. *dl*-Leucine was the parent substance of *dl*-cycloleucylleucine (B), needles, m. 271°, identical with *dl*-leucinimide, m. 271°, prepd. by Fischer (*Ber.* 34, 433; 35, 1075; 37, 2486) and by other investigators. An unidentified by-product in the formation of (B) from leucine responded to the usual alkaloidal reactions and was probably a pyrazine deriv.

LOUIS E. WISE.

Plurality of starches. CHARLES TANRET. *Bull. soc. chim.* 17, 83-97(1915).—A large part of this work has been previously outlined (cf. *C. A.* 8, 2964-5). Starch is apparently an intimate mixt. of amylose and amylopectin. Pure (?) amylose is rapidly dissolved when starch is treated with boiling H₂O for a few min., whereas the amylopectins are ordinarily insol. under these conditions. Pure amylopectin solns. may be obtained by heating starch with H₂O at 130° in sealed tubes and quant. removing the amyloses by fixation upon washed cotton or cellulose material. Amylopectin solns. give purplish red colorations with I, while amylose solns. give the typical starch-I blue coloration. A series of expts. was made in which fixed wts. of an anhydrous starch (from a known source) were treated with fixed wts. of H₂O at temps. ranging from 45-100°. The solns. were allowed to cool and the dissolved amylose colorimetrically detd. by comparison with the standard blue coloration with I, produced by a definite amt. of pure amylose. T. finds that the amt. of amylose remaining in soln. depends on the temp. at which the expt. was carried out. Starches from different sources furnish varying % of "amylose" (at a definite temp.). T. concludes that "amylose" is probably a mixt. of different homologous "amyloses," and that the "plurality" of starches has been definitely proven. Pure amylopectin preps. swell in cold H₂O. The "gelatinization" of starch caused by hot H₂O probably results from the simultaneous soln. of amylose and the swelling of amylopectins. "Skins" formed in concg. starch solns. are due to sepn. of amyloses.

LOUIS E. WISE.

Iodohydrins of phenylcyclohexene and phenylmethylcyclohexene. M. L& BRAZIDEC. *Bull. soc. chim.* 17, 97-109(1915); cf. *C. A.* 9, 614.

L. E. W.

Action of acetic anhydride upon alkaloids of the morphine series. II. Morphine bases in which acetic anhydride causes no rupture of the nitrogen linkage. M. TIF-FENEAU. *Bull. soc. chim.* 17, 109-14(1915); cf. *C. A.* 9, 1747.—T. shows that diacetyl-morphine, acetylcodeine, acetylmorphine and acetylthebaine are not acted upon by Ac₂O. **III. The apomorphine series. Diacetyl and triacetyl apomorphine.** With PORCHER. *Ibid* 114-9; cf. *C. A.* 8, 3191.—Upon heating 3 g. apomorphine-HCl with 10 cc. Ac₂O for 20 hrs., T. and B. obtained a mixt. of 2.4 g. *diacetyl apomorphine* (A), needles from AcOEt-petr. ether, m. 129°, [α]_D -47.2° (in Ac₂O), and 1.45 g. *triacetyl apomorphine* (B), m. 137°, purified by crystn. from Et₂O-AcOEt. *Hydrochloride* of (A), forms stable aq. solns., [α]_D -67.26° (H₂O). *Methiodide* of (A), m. 233°. (A) is an emetic, but (B) possesses no emetic properties.

LOUIS E. WISE.

Catalytic hydrogenation of liquids under the influence of common metals at moderate temperatures and pressures. A. BROCHET. *Bull. soc. chim.* 17, 124-30 (1915); cf. *C. A.* 9, 1602, 1746.—A more detailed description of the reduction of indigo to indigo white by means of H in the presence of active Ni. The rate of H absorption by indigo solns. has been graphically represented in 3 expts. by taking the number of cc. of H absorbed per min. as ordinates and the time in min. as abscissas. Max. absorption is reached after 15-20 min.

LOUIS E. WISE.

Action of sodamide upon allyldialkylacetophenones. II. Preparation of 3,5-dimethyl-3-ethyl- and 3,3-diethyl-5-methylpyrrolidones. A. HALLER AND E. BAUER. *Compt. rend.* 160, 541-3(1915); cf. *C. A.* 8, 2673.—Allyldialkylacetophenones, BzCRR'-

$\text{CH}_3\text{CH}_2\text{CH}_2$, reacting with NH_2Na , yield 3,3-dialkyl-5-methyl-2-pyrrolidones, $\text{RR}'\text{C}(\text{CH}_3)\text{CHMe.NH.CO}$ and PhH . Thus $\text{BzCMeEtCH}_2\text{CH:CH}_2$ gives rise to

3,5-dimethyl-3-ethyl-2-pyrrolidone, m. 82° , b_{16} $134-6^\circ$, and $\text{BzCEt}_2\text{CH}_2\text{CH:CH}_2$ yields 3,3-diethyl-5-methyl-2-pyrrolidone, m. $49-50^\circ$, b_{16} $144-6^\circ$. LOUIS E. WISE.

Biochemical synthesis of the mono- α -D-galactoside of ethyleneglycol. E. BOURQUELOT, M. BRIDEL AND A. AUBRY. *Compt. rend.* 160, 571-3 (1915).—Ethyleneglycol mono- α -D-galactoside (A), $\text{C}_6\text{H}_{11}\text{O}_5 \cdot \text{O} \cdot \text{CH}_2\text{CH}_2\text{OH}$, microneedles, m. $133-4^\circ$, $\alpha = 0^\circ$, without action upon Fehling soln. and quant. hydrolyzed by either dil. H_2SO_4 or emulsin, was prepd. by the following method: 300 cc. of an aq. soln. ($[\alpha]_D$ $18^\circ 20'$) of 261 g. $(\text{CH}_2\text{OH})_2$, 35 g. galactose and 5 g. emulsin was kept at 33° for about 2 months, 3 g. of fresh emulsin added, the mixt. kept at lab. temp. until the const. $[\alpha]_D$ $13^\circ 32'$ had been reached, and then treated with 3 vols. of 95% EtOH, and filtered. After removal of EtOH, H_2O and $(\text{CH}_2\text{OH})_2$ by distg. under diminished pressure, the sirupy residue was treated with 400 cc. H_2O and 4 g. of fresh bottom yeast and 5 g. glucose to insure galactose fermentation. After standing 10 days, the fermented liquor was concd. to 100 cc., 300 cc. EtOH added, the soln. filtered, concd. further to a sirup, which after treatment with successive portions of dry AcOEt, to remove traces of $(\text{CH}_2\text{OH})_2$, was extd. with abs. EtOH. These exts., after evapn. to dryness, resoln. in abs. EtOH and addition of Et_2O , yielded (A). LOUIS E. WISE.

Action of acylamino acid chlorides on sodiomalonic ester. IV. E. IMMENDÖRFFER. Univ. Berlin. *Ber.* 48, 605-16 (1915); cf. Gabriel, C. A. 9, 313.—*N*-Methyl-*C*-diethylglycine nitrile, $\text{MeNHCET}_2\text{CN}$, in 34 g. yield from 25 g. KCN and 25 g. $\text{MeNH}_2 \cdot \text{HCl}$ in 100 cc. H_2O shaken 3 hrs. with 60 cc. Et_2CO , b_{745} $165-7^\circ$, smells of camphor, produces headache, sol. in H_2O with strong alk. reaction; *picrate*, lemon-yellow needles, decomps. 98° ; *chloroplatinate*; *chloroaurate*, rectangular, mostly quadratic tables; *hydrochloride*, m. $76-7.5^\circ$. From 13 g. of the cold nitrile treated slowly with 14 cc. BzCl and then shaken 3 hrs. with 40 g. KHCO_3 in 160 cc. H_2O is obtained 21 g. *N*-methyl-*C*-diethylhippuronitrile, 6-sided plates from alc., m. $112-2.5^\circ$; 10 g. introduced in the course of about 1 hr. into 20 cc. cold H_2SO_4 with const. stirring and poured upon ice gives 10 g. of the acid, needles or elongated 6-sided plates from C_6H_6 or AcOEt, m. 186° , converted by 10 parts of boiling 20% HCl into *N*-methyl-*C*-diethylglycine hydrochloride, rhombic tables and prisms from alc., m. $246-7^\circ$; free glycine, sublimes in voluminous flocks without melting, seps. from 50 parts alc. in striated prisms, forms no Cu salt. The hippuric acid, warmed 3 hrs. with SOCl_2 , gives the chloride which with boiling MeOH yields the methyl ester, needles from petr. ether, m. $89-91^\circ$. Dimethyl *N*-methyl-*C*-diethylhippurymalonate, from the above chloride (from 5 g. acid) in 2 vols. $\text{CH}_2(\text{CO}_2\text{Me})_2$ and 0.84 g. Na and 16 cc. $\text{CH}_2(\text{CO}_2\text{Me})_2$ in 100 cc. C_6H_6 shaken overnight at 38° (yield, 2.5 g.), granular crystals from ligroin, m. $106-8^\circ$, regenerates the hippuric acid on heating with H_2O or moist solvents, while 1 g. cautiously warmed in 3 cc. HI and finally boiled 10 min. gives BzOH , the above glycine and 1-methyl-2-diethyl-5-phenylpyrrolone, leaves from Et_2O , m. 138° ; *picrate*, m. about 152° ; *chloroaurate*; *chloroplatinate*. *N*-Methyl-*C*-methylethylglycine nitrile, in 7 g. yield from 6 g. KCN, 5 g. $\text{MeNH}_2 \cdot \text{HCl}$ and 12 cc. AcEt in 30 cc. H_2O at 40° , b_{718} $149-54^\circ$; *hydrochloride*, hygroscopic; *picrate*, m. $88-9^\circ$ (decompn.); *chloroplatinate*, 6-sided golden brown plates, blackens 235° ; *chloroaurate*, scales. The nitrile (11.2 g.) with 13 cc. BzCl and 12 g. calcined soda, shaken 3 hrs. with 30 cc. H_2O , gives 21 g. of the hippuronitrile, plates from 1.5-2.0 parts alc., m. $81-2^\circ$; free acid (yield, 90%), needles from 16 parts C_6H_6 , m. $164-5^\circ$; *chloride*, yellowish crystals; *methyl ester*, leaflets from ligroin, m. $85-7^\circ$. *N*-Methyl-*C*-methylethylglycine, rectangular plates from alc., sublimes without melting. Dimethyl *N*-methyl-*C*-methylethylhippurymalonate, in 1.2 g. yield from 5 g. of the above

chloride, 1.4 g. Na and 12 cc. $\text{CH}_3(\text{CO}_2\text{Me})_2$ in 75 cc. C_6H_6 , rhombic plates from ligroin, m. $116-8^\circ$ (112° if heated slowly); 0.7 g. with 2 cc. of HI (d. 1.7) gives 0.12 g. of 1-methyl-2-methylethyl-5-phenylpyrrolone, needles from ligroin, m. $91.5-3.0^\circ$; hydrochloride, hydroiodide (needles), picrate (needles), chloroaurate. *N*-Ethyl-*C*-dimethylglycine nitrile, in 28.5 g. yield from 23 g. $\text{EtNH}_2\cdot\text{HCl}$ and 25 g. KCN in 100 cc. H_2O shaken 3 hrs. with 40 cc. acetone, b₇₆₁ $143-4^\circ$; hydrochloride, hygroscopic prisms, m. $109-10.5^\circ$; picrate, needles, darkens 158° , m. $166-8^\circ$; chloroplatinate, 6-sided plates; chloroaurate, needles. From 11.2 g. of the base and 12 cc. BzCl is obtained 20 g. *N*-ethyl-*C*-dimethylhippuric nitrile, rhombic plates from alc., m. $76-8^\circ$, b. about 275° (slight decompn.), partially hydrolyzed on long standing with soda, also losing BzOH on boiling; acid, 4-sided prisms and rhombic plates from AcOEt , m. $161.5-2.0^\circ$. *N*-Ethyl-*C*-dimethylglycine, prisms from $\text{AcOH}\cdot\text{EtOH}$, sublimes without m.; hydrochloride, prisms from $\text{EtOH}\cdot\text{Et}_2\text{O}$, m. $249-51^\circ$ (decompn.). Chloride, m. above 145° . Methyl ester, needles, m. 68° . Dimethyl *N*-ethyl-*C*-dimethylhippurymalonate, m. $111-3^\circ$. 1-Ethyl-2-dimethyl-5-phenylpyrrolone, quadrangular prisms from ligroin, m. 50° ; hydroiodide, m. 170° , quickly turns yellow; picrate, needles, m. $145-6^\circ$. *p*-*N*-gem.-Tetramethylhippuric nitrile, in 10 g. yield from 9 g. *p*- $\text{MeC}_6\text{H}_4\text{COCl}$ and 6 g. MeNHCM_2CN , plates and prisms from alc., m. 133° . Acid, rhombic plates from alc., m. 205° . Dimethyl *p*-*N*-gem.-tetramethylhippurymalonate, in 0.6 g. yield from 2 g. of the chloride of the above acid, 0.9 g. Na and 8 cc. $\text{CH}_3(\text{CO}_2\text{Me})_2$ in 50 cc. C_6H_6 , yellowish 4-sided plates from ligroin, m. $98-103^\circ$. *p*-Tolyltrimethylpyrrolone, plates, m. 125° ; picrate, m. $134.5-6.0$; hydroiodide; hydrochloride; chloroaurate; chloroplatinate. *m*-*N*-gem.-Tetramethylhippuric nitrile, in 12 g. yield from 14 g. *m*- $\text{MeC}_6\text{H}_4\text{COCl}$ and 8.5 g. MeNHCM_2CN , plates from alc., m. 86° ; acid, m. 169° . Dimethyl *m*-*N*-gem.-tetramethylhippurymalonate, in 1.5 g. yield from 6.7 g. of the above acid (converted into the chloride), 1.4 g. Na and 12 cc. $\text{CH}_3(\text{CO}_2\text{Me})_2$ in 75 cc. C_6H_6 , needles from ligroin, m. $112-4^\circ$. *m*-Tolyltrimethylpyrrolone, thin plates from ligroin, m. 83° ; picrate, needles, m. 154° ; hydroiodide; hydrochloride; chloroaurate; chloroplatinate. In the hope of obtaining $\alpha\text{-NH}_2$ ketones of the type $\text{NH}_2\text{CM}_2\text{COCH}_2\text{X}$ ($\text{X} = \text{alkyl}$) (Gabriel, C. A. 7, 2570) from $\text{C}_6\text{H}_5(\text{CO})_2\text{NCMe}_2\text{COCHNa}(\text{CO}_2\text{R})_2$ with EtI instead of MeI it was found that the salt is slowly converted into Et benzoylenedimethylpyrrolonecarboxylate on heating with acetone or EtI , immediately on boiling with H_2O , while the EtI , probably owing to steric hindrance, does not react with it, or only very slowly. C. A. R.

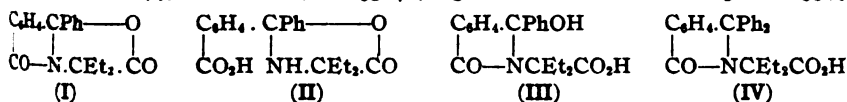
1,4-Dibiphenylenebutadiene. WILHELM WISLICHENUS. Univ. Tübingen. *Ber.* 48, 617-24 (1915).—The yellow-red hydrocarbon originally obtained from alc. fluorene, NaOEt and HCO_2Et and thought to be a methenylbisfluorene (*Ber.* 35, 765 (1902)) but since obtained under various conditions (C. A. 5, 482) is also formed on long standing of fluorene and alc. ethylate but in good yield only when atm. O has an abundant chance to react; the compd. has now been shown to be 1,4-dibiphenylenebutadiene (a); it is probably identical with Pummerer and Dorfmueller's "dehydrothylidenebisfluorene" (C. A. 7, 3342), Mayer's red by-product "A" (C. A. 8, 94) and Stollé's "dehydrobenzylidenebisfluorene" (C. A. 8, 119). From 20 g. fluorene allowed to stand, protected from moisture and CO_2 , for 3-4 weeks in 200 g. Et_2O with 7 g. K in 50 g. alc. and treated twice a day for about 0.5 hr. each time with dry air or O free from CO_2 , is obtained about 10 g. of crude (a) as a red-yellow ppt. mixed with a small amt. of a red to dark red substance; the ppt. is washed with Et_2O and H_2O , dried, freed from unchanged fluorene with boiling Et_2O and extd. with C_6H_6 or xylene, the 1st exts. removing the more sol. red by-product. The solns. of (a) in org. solvents are pure yellow but deposit red-yellow prisms becoming deep scarlet above 200° , m. $372-4^\circ$ (partial sublimation), sol. in cold fuming H_2SO_4 with blue color quickly changing to green; warmed with AlCl_3 in PhNO_2 it gives a deep green color changing to a turbid red; with CrO_2 -

AcOH is formed fluorenone; slow distn. with Zn dust in H gives fluorene; with Cl or 10-2 mols. SO_2Cl_2 in CHCl_3 is obtained a *chloro derivative*, $\text{C}_{21}\text{H}_{18}\text{Cl}_4$, m. $215-9^\circ$ (gas evolution), forms a red substance with alc. KOH. *Picrate* of (a), $\text{C}_{22}\text{H}_{18}\cdot 2\text{C}_6\text{H}_3\text{O}_7\text{N}_3$, m. about 260° (decompn.), regenerates (a) with hot aq. NH_3 . Boiled with excess of Zn dust in 150 cc. of AcOH until the soln. is almost colorless, 1 g. of (a) gives *dibiphenylenebutene* (b), yellowish needles from C_6H_6 , m. $267-8^\circ$, behaves like (a) towards fuming H_2SO_4 and AlCl_3 in PhNO_2 , absorbs 6 atoms of Br, with evolution of HBr, in CCl_4 . (a) heated 3 hrs. at 220° with 6 mols. of 57% HI and a little P or (b) in alc. boiled with 2.5% Na-Hg give *dibiphenylenebutane*, m. 225° , sol. in fuming H_2SO_4 without color, behaves like (a) and (b) towards AlCl_3 in PhNO_2 , absorbs 4 atoms Br, with evolution of HBr.

CHAS. A. ROULLER.

Some derivatives of α -amino- α -methylbutyric acid and α -amino- α -ethylbutyric acid. PAUL FREYTAG. Univ. Berlin. *Ber.* 48, 648-57(1915); cf. Gabriel, *C. A.* 5, 1426.— α -*Phthalimido- α -methylbutyric acid* (a), $\text{C}_8\text{H}_4(\text{CO})_2\text{NCMeEtCO}_2\text{H}$, short needles from H_2O , m. $141.5-3.0^\circ$, is obtained by gradually introducing NH_3 - $\text{CMeEtCO}_2\text{H}$ into 1 mol. melted $\text{C}_6\text{H}_4(\text{CO})_2\text{O}$, heating to quiet fusion to 160° , pouring into a warm dish, cooling, powdering, rubbing up with cold H_2O and soda, filtering and pptg. with HCl; 0.29 g. dissolves in 100 cc. H_2O at 22° , 0.9 g. at 100° . *Silver salt*. The part of the reaction product insol. in soda (about 0.1 of the NH_3 acid used) is *bi-gem.-methylethyldiketopiperazine*, $\text{CMeEt.NH.CO.CMeEt.NH.CO}$, tables or slender

needles, m. 340.5° ; solubility in 100 cc. alc., 0.60 and 1.80 g. at 27° and 78° , resp., in 100 cc. H_2O , 0.24 and 0.51 g. at 27° and 100° . α -*Phthalimido- α -ethylbutyric acid* (b), prepd. like its homolog except that the temp. is raised to 200° , m. $161-2^\circ$; *silver salt*, browns 218° ; m. 232° (decompn.). In the prepn. of the acid there is also formed as by-product *tetraethyldiketopiperazine*, m. $346-6.5^\circ$; solubility in alc., 0.75 and 1.80 g. in 100 cc. at 26° and 78° ; in 100 cc. H_2O , 0.11 and 0.22 g. at 26° and 100° . *Chloride* of (b), from (b) and PCl_5 , needles from ligroin, m. $73-5^\circ$; 4 g. in 40 cc. C_6H_6 , slowly treated with 4 g. AlCl_3 , allowed to stand overnight, decompd. with ice, dil. HCl and 2 drops of dil. HNO_3 and freed from C_6H_6 with steam gives a thick tar, a portion of which was converted by warm 33% KOH and a little MeOH into the phthalaminic acid which, when boiled with concd. HCl, almost completely dissolves; on cooling, phthalic acid seps. and concn. of the filtrate yields an easily deliquescent substance which is probably α -amino- α -ethylbutyrophenone hydrochloride, $\text{BzCET}_2\text{NH}_2\cdot\text{HCl}$; its aq. soln. yielded easily sol. rodlets with AuCl_3 and PtCl_4 in H_2O and alc.; Na picrate gave yellow rodlets which with KOH yielded oily drops volatile with steam and having the odor of aromatic amines. The tar, therefore, undoubtedly contained α -*phthalimido- α -ethylbutyrophenone*. When another portion of this tar was recrystd. twice from a little alc., it yielded about 20% of *phenyl- $[\alpha$ -hydroxyphthalimidyl]- α -ethylbutyric lactone* (I), flat needles, m. $133-4^\circ$; 2 g. boiled a few min. with 1.5 cc. of 33%



KOH and 5 cc. each of H_2O and alc. gives 0.8 g. of an *acid* (II) or (III), platelets and broad rodlets, sinters 199° , m. 201° , which, when boiled 2 hrs. with 20 parts of 5% HCl, yields $\text{BzC}_6\text{H}_4\text{CO}_2\text{H}$ and $\text{H}_2\text{NCEt}_2\text{CO}_2\text{H}$. These 2 acids are obtained directly when 2 g. of the lactone in 8 cc. AcOH is heated 3 hrs. at 138° with 6 cc. fuming HCl. *Diphenylphthalimidyl- α -ethylbutyric acid* (IV), obtained in 3 g. yield from the chloride from 10 g. (b) treated slowly in 60 cc. C_6H_6 with 20 g. AlCl_3 , heated 2 hrs. on the H_2O bath, cooled, decompd. with ice and dil. HCl, steam distd. and the resulting tar repeat-

edly extd. with hot aq. NH_3 and the exts. pptd. with HCl , 6-sided elongated crystals from AcOH or C_6H_6 , m. 254° , converted by 3 hrs. heating at 140° with AcOH -fuming HCl into phthalophenone and $\text{H}_2\text{NCEt}_2\text{CO}_2\text{H}$. Chloride of (a), oil; the product from 10 g. (a), treated in 50 cc. C_6H_6 with 15 g. AlCl_3 and boiled 1 hr., yields 2 products: (1) α -phthalimido- α -methylbutyrophenone, elongated 6-sided plates from alc., m. $78-80^\circ$, giving with fuming HCl - AcOH after 1.5 hrs. in a xylene bath α -amino- α -methylbutyrophenone hydrochloride; chloroaurate and -platinate, rodlets; picrate, yellow prismatic rodlets, m. 193° ; free base, oil; (2) diphenyl- α -phthalimidyl- α -methylbutyric acid, rhombic columns from alc., needles from C_6H_6 , m. 283° , sol. in concd. H_2SO_4 with green color, hydrolyzed to phthalophenone and $\text{H}_2\text{NCMeEtCO}_2\text{H}$. The yield of this acid is increased by increasing the amt. of AlCl_3 and the length of heating (3 hrs.), 4.2 g. being obtained from 10 g. (a). When 22 g. (b) is warmed with 18 g. PCl_5 until liquid, freed from POCl_3 in *vacuo* at 100° and then cautiously heated over a free flame, energetic decompn. with gas evolution sets in and a yellow greenish oil distils over, solidifying to a yellowish cryst. mass (17.5 g.) which seps. from much H_2O , 5 parts alc. or 50% AcOH in needles which on distn. form fatty, H_3BO_3 -like scales, m. 83° , are volatile and have a peculiar overpowering odor; they are γ -phthalimidopentene, $\text{C}_6\text{H}_4(\text{CO})_2\text{NCEt}:\text{CHMe}$, and with boiling HI give $\text{C}_6\text{H}_4(\text{CO})_2\text{NH}$ and Et_2CO . Similarly, from the chloride of (a) is obtained β -phthalimidobutene, $\text{C}_6\text{H}_4(\text{CO})_2\text{NCMe}:\text{CHMe}$ or $\text{C}_6\text{H}_4(\text{CO})_2\text{NCEt}:\text{CH}_2$, m. 90° , b_p 215° ; it absorbs 2 atoms Br in C_6H_6 , giving the dibromide, leaflets from ligroin, m. $77-8^\circ$, which loses HBr in *vacuo* at 100° ; on heating over a free flame, an oily mixt. distils over from which by fractional crystn. from petr. ether were isolated β -phthalimidobromobutene, rodlets, m. $92-3^\circ$, and another substance, m. 130° .

CHAS. A. ROUILLER.

Epifucose. EMIL VOTOCEK AND J. CERVENY. Prag. Ber. 48, 658-60(1915).—Fuconic lactone was transformed in the usual way (heating with aq. $\text{C}_6\text{H}_5\text{N}$, best 4 hrs. at $145-50^\circ$) into epifuconic acid which was sepd. from the unchanged fuconic acid by repeated crystn. of the Ba salts from H_2O or pptn. from H_2O by alc., the progress of the sepn. being followed under the microscope until the salt consisted solely of needles. From this salt were prepd. the free epifuconic acid and its lactone and the latter reduced with Na-Hg , giving epifucose as a viscous syrup becoming quite hard in *vacuo* over H_2SO_4 , $[\alpha]_D$ about -9° , and yielding a phenyl- and *p*-bromophenylosazone, m. 204° , identical with those obtained from fucose.

CHAS. A. ROUILLER.

Triarylmethyls. XIII. *m*-Quinoids. W. SCHLENK AND MAX BRAUNS. Univ. Jena. Ber. 48, 661-9(1915).—A careful repetition of the work of Stark (C. A. 8, 1118) gave results entirely different from his and showed that the hydrocarbon obtained by the action of metals on $m\text{-C}_6\text{H}_4(\text{CPh}_2\text{Cl})_2$ (a) is not a *m*-quinoid but a bis-triarylmethyl, thus affording further evidence that *m*-quinoids are not capable of existence. The results obtained by Stark were probably due to the presence of some *p*-compd. in his (a) and to the fact that he did not exclude atm. O with sufficient care. Schlenk and B. found that for the prepn. of (a) absolutely free from the *p*-compd. it is necessary to start from a $m\text{-C}_6\text{H}_4(\text{CO}_2\text{H})_2$ free from the slightest trace of the *p*-acid; such a product is best obtained from (*m*- MeC_6H_4); 150 g. $[3,4\text{-Me}(\text{H}_2\text{N})\text{C}_6\text{H}_3]_2$ in dil. HCl is pptd. as the HCl salt with much concd. HCl , drained off, rubbed to a thin paste with H_2O , diazotized at room temp. with N_2O_5 (from As_2O_5 and HNO_3), filtered into 4 l. alc., slowly treated with 300 g. Zn dust, decanted, boiled 1 hr. with 200 g. fresh Zn dust, cooled, filtered, distd. until an oily turbidity appears in the distg. flask, cooled, the oil sepd., the aq. alc. liquid dild. with much H_2O , extd. with Et_2O , the ext. combined with the oil, washed with H_2O , dried, distd., and the distillate freed from any remaining base with gaseous HCl . There is thus obtained 75 g. (MeC_6H_4); 20 g. is added to a hot mixt. of 500 cc. concd. H_2SO_4 in 700 cc. H_2O and 160 g. CrO_3 in 300

cc. H_2O , boiled overnight, cooled, dild. with H_2O and the crystd. $\text{C}_6\text{H}_4(\text{CO}_2\text{H})_2$ purified by dissolving in H_2O and a little NH_3 , filtering and pptg. with HCl . Yield, 9–10 g. To prep. (a), 140 g. PhBr in 300 cc. Et_2O is converted into the Grignard reagent and the hot soln. treated dropwise with 30 g. $m\text{-C}_6\text{H}_4(\text{CO}_2\text{Me})_2$ in 200 cc. C_6H_6 , boiled 4 days, cooled, decompd. with ice and dil. H_2SO_4 , the Et_2O layer dried, freed of Et_2O and C_6H_6 on the H_2O bath, the residue taken up in hot benzene (b. $100\text{--}50^\circ$), cooled, and the amorphous deposit pptd. from 8 parts AcOH by satg. with gaseous HCl ; the cryst. (a) thus obtained is again pptd. from AcOH with HCl , boiled 1 hr. with 2.5 parts each of AcCl and C_6H_6 and distd. on the H_2O bath; on cooling (a) deposits in prisms, m. 140.5° , very sensitive to moisture. When shaken in C_6H_6 under CO_2 with mol. Ag , 1 Cl atom is removed, the soln. becoming intensely yellow, owing to the formation of the monovalent radical $\text{ClCPh}_2\text{C}_6\text{H}_4\text{CPh}_2\dots$; this soln. eagerly absorbs O and at once becomes colorless, but in a few moments the yellow color returns and can again be destroyed by shaking with air; after 4–5 repetitions of this process, the soln. becomes permanently colorless, indicating the existence of an equil.: 1 mol. colorless hexaarylethane $\rightleftharpoons$ 2 mols. colored triarylmethyl, which is destroyed by formation of a colorless superoxide by the triarylmethyl. The yellow soln. shows a characteristic band spectrum (narrow, sharply defined, very dark band at $\lambda 513\text{--}7$, with complete absorption in the visible spectrum from $\lambda 493$). The CPh_2Cl group still remaining can easily be detected by running a drop of the soln. upon melted PhOH , the latter becoming intensely red-brown. The removal of this 2nd Cl atom requires much more energetic treatment; shaking for days in C_6H_6 in sealed tubes under CO_2 with a large excess of mol. Ag will not affect its removal but on boiling with Cu bronze the yellow soln. after a time becomes violet, owing to the formation of the bivalent radical, $\text{C}_6\text{H}_4(\text{CPh}_2\dots)_2$. In thin layers this soln. is blue and shows an intense band at $\lambda 576\text{--}636$, sharply defined towards the red, less sharply towards the green; on shaking with air it instantly and permanently becomes colorless. On concn. it deposits a substance of the comp. $\text{C}_{20}\text{H}_{14}$, which, however, is no longer identical with the free bistriarylmethyl, for it is colorless and its solns. in boiling xylene or anisole are also colorless. It is apparently a complicated condensation product. XIV. Theory of the "quinocarbonium salts." W. SCHLENK AND R. OCHS. *Ibid* 676–80; cf. *C. A.* 8, 2728.—Tri- α -thienylmethyl perchlorate (a), which cannot have a quinoid structure, is in all respects analogous to Ph_3CClO_4 , indicating that the so-called "quinocarbonium" colored triarylcannabinol salts are really simply carbonium compds. α -Iodothiophene, light yellow oil, b.₁₀ 78° , is obtained in 40–4 g. yield from 37 g. $\text{C}_4\text{H}_5\text{S}$ and 112 g. HgO in 150 cc. C_6H_6 treated with 111 g. I in 15 g. portions in the course of 15 min., sepd. from the HgI_2 and excess of C_6H_6 , washed with C_6H_6 and fractionated; 30 g. in 120 cc. Et_2O are treated in the usual way with 10 g. Mg shavings, cooled, decanted from the excess of Mg, treated about 0.5 hr. with CO_2 and decompd. with ice and dil. H_2SO_4 , giving 15–9 g. of $\alpha\text{-C}_4\text{H}_5\text{SCO}_2\text{H}$, m. 124° ; 16 g. of the acid in 150 cc. alc. treated 2 hrs. with dry HCl yields 14 g. of the Et ester, b.₁₈ 96° ; 6 g. of this ester in 20 cc. Et_2O is slowly dropped into a boiling soln. prepd. by treating 16 g. $\text{C}_4\text{H}_5\text{SI}$ in 100 cc. Et_2O with 4 g. Mg shavings and pouring from the excess of Mg; after 2 hrs. boiling, the reaction mixt. is decompd. with ice and H_2SO_4 and extd. with Et_2O ; the dark red-brown soln. of triethienylcannabinol thus obtained is at once treated with 6 cc. of 70% HClO_4 , whereupon (a) seps. in crystals with blue luster, deflagrates on heating, forms a yellow-brown powder, gives in $(\text{CHCl}_3)_2$ an intensely yellow soln. showing a characteristic broad absorption band and conducting the elec. current. XV. Some bistriarylmethyls. W. SCHLENK AND MAX BRAUNS. *Ibid* 716–28; cf. *C. A.* 7, 2578.—When 30 g. $p\text{-Ph-C}_6\text{H}_4\text{I}$ in 100 cc. Et_2O is boiled 2.5 hrs. with 10 g. Mg powder activated by Baeyer's method, decanted from the excess of Mg, dild. with 100 cc. C_6H_6 , treated hot with 5 g. ($p\text{-MeO}_2\text{CC}_6\text{H}_4$), in small portions and boiled 4 hrs. there is obtained p,p' -biphenylene-

bis[dibiphenylcarbinol], $[\text{C}_6\text{H}_4\text{C}(\text{C}_6\text{H}_4\text{Ph})_2\text{OH}]_2$, needles from xylene, m. somewhat above 260° , colored intensely violet by concd. H_2SO_4 , the soln. showing an intense band at λ about 610–480, sharply defined towards the red, less sharply towards the blue; treated 0.5 hr. in boiling xylene containing a little AcCl with dry HCl , it gives *p,p'*-biphenylenebis[dibiphenylchloromethane], needles with 1 mol. xylene, m. about 271° , sol. in molten PhOH with intense dark violet color; 2 g. boiled 0.5 hr. in 75 cc. C_6H_6 under CO_2 with 10 g. Cu bronze gives *p,p'*-biphenylenebis[dibiphenylmethyl], identical with Schmidlin's " β -tribiphenylmethyl" (*C. A.* 7, 1017), blue needles with strong green metallic luster, whose blue soln. shows a band at λ about 660–570. Although its mol. wt. could not be detd. because when once dry it is no longer easily sol., it is doubtless monomol. for its blue solns. are instantly and permanently decolorized by shaking with air; the peroxide so formed could not be obtained pure; it seps. from C_6H_6 -gasoline as a white powder with 87.46% C and 5.8% H . [$p\text{-C}_6\text{H}_4\text{CPh}_2\text{OH}$] (Chichibabin, *Ber.* 40, 1812 (1907)), obtained in 10 g. yield from the Grignard reagent from 12 g. PhBr in 100 cc. Et_2O added to 9 g. ($p\text{-BzC}_6\text{H}_4$) suspended in 100 cc. C_6H_6 and boiled 3 hrs., seps. with 1 C_6H_6 ; its yellow-red soln. in $\text{AcOH-H}_2\text{SO}_4$ shows a strong band at λ about 550–480; 8 g. in 120 cc. Et_2O satd. with HCl at room temp. and treated with 20 cc. AcCl gives the bischloromethane which, shaken 1 day with Cu bronze in C_6H_6 , gives the bis[diphenylmethyl], crystals with green metallic luster, forming a dark powder whose intensely red-violet solns. show a band at λ about 600–540. The ($p\text{-BzC}_6\text{H}_4$)₂ is obtained as silvery needles from PhNO_2 , m. 216° , in 28 g. yield from 50 g. each BzCl and AlCl_3 on the H_2O bath treated with 20 g. Ph_3 in small portions. *m,m'*-Biphenylenebis[diphenylcarbinol], flat prisms and tablets from xylene, m. $183\text{--}4^\circ$, colors concd. H_2SO_4 orange-red, is obtained in 8 g. yield from the Grignard reagent from 18 g. PhBr in 100 cc. Et_2O boiled 48 hrs. with 5 g. (*m*- $\text{MeO}_2\text{CC}_6\text{H}_4$)₂ in 100 cc. C_6H_6 ; 5 g. boiled 0.5 hr. with 50 g. AcCl and 50 cc. C_6H_6 gives the bischloromethane in lancet-shaped crystals, m. $175\text{--}6^\circ$, colors PhOH intensely dark brown; 1.5 g. shaken 24 hrs. in 12 cc. C_6H_6 under CO_2 with 8 g. Hg gives the bis[diphenylmethyl] in colorless needles, forming orange-red solns. with 2 bands; an intense one at $\lambda_{512\text{--}20}$ and a faint one at $\lambda_{481\text{--}93}$; the soln. is at once decolorized by air but after a few sec. the color reappears; this phenomenon may be repeated 8–10 times before the decolorization is permanent, indicating that the substance is considerably associated in soln.; a 3% soln. in freezing C_6H_6 gave a mol. wt. of 880. Attempts to prep. the isomeric *o,o'*-compd. failed because the impure, badly crystg. *biscarbinol* when treated with HCl and AcCl gave, instead of the chloromethane, anhydro-*o,o'*-biphenylenebis[diphenylcarbinol], $(\text{C}_6\text{H}_4\text{-CPh}_2)_2\text{O}$, m. $291\text{--}3^\circ$, unchanged by heating with PCl_5 in PCl_5 . Tetraphenyl-*o*-xylene-glycol, obtained in 18 g. yield from the PhMgBr from 30 g. PhBr in 100 cc. Et_2O boiled 24 hrs. with 20 g. phthalophenone in 200 cc. C_6H_6 , prisms from C_6H_6 -benzine, m. 198° , sol. in H_2SO_4 with dark orange-yellow color. All attempts to convert it into the dichloride (with HCl , AcCl , SO_2Cl_2 , PCl_5) failed, the product, which is also obtained with the most varied dehydrating agents, being tetraphenylphthalane, $\text{C}_6\text{H}_4(\text{CPh}_2)_2\text{O}$, needles, m. $174\text{--}5^\circ$, sol. in H_2SO_4 with orange-yellow color.

CHAS. A. ROUILLER.

Preparation of glucosaminic acid. HANS PRINGSHEIM AND GERHARD RUSCHMANN. Univ. Berlin. *Ber.* 48, 680–2 (1915).—The acid is obtained in 9.7 g. yield when 20 g. glucosamine-HCl in 400 cc. H_2O is treated with 110 g. yellow HgO , heated on the H_2O bath with frequent shaking until the Hg ppt. becomes gray, boiled 5 min. over a free flame, filtered, decompd. with H_2S on the H_2O bath, filtered, concd. *in vacuo* at $50\text{--}60^\circ$ to incipient crystn., allowed to stand 24 hrs. in the ice chest, filtered from the 1st crop of the acid, again concd. *in vacuo* to about 100 cc., and completely pptd. in the cold with 96% alc. The combined crops are dissolved in the necessary amt. of hot H_2O and again pptd. with alc. when cold.

CHAS. A. ROUILLER.

Absorption spectra and chemical constitution (GOUDRIAAN) 2. Oxidation of alcohols in the presence of ferrous oxide and ferrous salts (DOROSHEVSKII) 2.

FISCHER, E.: Ueber Phosphorsäureester des Methylglucosids und Theophyllinglucosids. Berlin: G. Reimer. 50 Pf.

SCHOELLER, A.: Ueber Seleno-Naphten-Chinon. Oldenburg: G. Stalling's Verlag. 4.50 M.

TRUTTWIN, H.: Ueber Umlagerungs-Reaktionen bei Arylamiden der *m*-Nitrobenzolsulfonsäure. Oldenburg: G. Stalling's Verlag. 38 ss. 3 M.

WILLGERODT, C.: Die organischen Verbindungen m. mehrwertigem Jod. Stuttgart: F. Enke. 266 ss. 9.20 M.

WILLSTÄTTER, R. UND MALLISON, H.: Ueber die Verwandschaft der Anthocyane und Flavone. Berlin: G. Reimer.

WINDAUS, A.: Untersuchungen über Colchicin. Heidelberg: C. Winter. 40 Pf.

11. BIOLOGICAL CHEMISTRY.

WILLIAM J. GIES, EDGAR G. MILLER, JR., PAUL E. HOWE.

A. GENERAL.

FRANK P. UNDERHILL.

Individuality of oxidizing and reducing enzymes. A. BACH. Geneva. *Arch. sci. phys. nat.* 39, 59-71(1915); cf. C. A. 8, 3800.—Purified peroxidase, catalase and phenolase do not reduce silver solns. or react with fuchsine-bisulfite and are probably not aldehydes. Each of the enzymes is an individual whose reactions cannot be regarded as being due to different manifestations of an aldehyde as claimed by Woker (C. A. 8, 3663).
E. M. FRANKEL.

Physical theory of the permeability of living cells. P. GIRARD. *Compt. rend.* 159, 376-9(1914).
E. M. FRANKEL.

In memoriam. Francis Humphreys Storer. LEWIS W. FETZER. *Biochem. Bull.* 4, 1-17(1915).—Biographical. A bibliography of the publications of Prof. Storer is included.
A. P. LOTHROP.

Behavior of keratin sulfur and cystin sulfur, in the oxidation of these proteins by potassium permanganate. I. TH. LISSIZIN. Univ. Moscow. *Biochem. Bull.* 4, 18-23(1915).—Human hair was digested with 2% KMnO_4 . In the mass of dissolved oxidation products, 9% of the total S occurred as H_2SO_4 , 2.5% as oxyprotosulfonic acid and 88.5% as H_2O -sol. organic substance. A method is outlined for the isolation of this latter substance, which is pptd. by Pb acetate, is slightly sol. in dil. alc., insol. in 95% alc., acid in reaction, very hygroscopic, gives the biuret reaction, and is decompd. by mineral acids with the formation of H_2SO_4 . When cystin was oxidized in a similar manner, 47% of the S was split off as H_2SO_4 and among the oxidation products a small amt. of H_2S was always present; H_2S is never found in the distillates of the oxidation products of hair.
A. P. LOTHROP.

Organic phosphorus compounds of wheat-bran. CHARLES J. ROBINSON AND J. H. MUELLER. Univ. Louisville, Ky. *Biochem. Bull.* 4, 100-17(1915).—The organic P of wheat bran is present mainly in the form of phytin, similar to that from many other sources. It is most readily sepd. from a 0.2% HCl ext. of bran by pptn. with Cu acetate. A cryst. tri-Ba salt is readily prepared. There is also present another substance, similar in compn., which forms a Ba salt containing 34% Ba as compared

with 38% in Ba phytate. It does not dialyze, indicating that the mol. is larger than that of Ba phytate. A third compd. which differs widely from phytin, containing more C and less P, can be sepd. It yields a pentose on hydrolysis and forms a Ba salt containing only 31% Ba. It has not been obtained in cryst. form and its compn. is uncertain; the formulas, $C_6H_{18}O_{24}P_2Ba_2$, for the Ba salt and $C_4H_{14}O_{24}P_2$, for the acid accord most closely with the analytical results but the agreement is not entirely satisfactory. Cf. Anderson, *C. A.* 6, 3428; 8, 3310; 9, 1622. A. P. LOTHROP.

Influence of low temperatures upon enzymes. JOSEPH S. HEPBURN. *Biochem. Bull.* 4, 136-50(1915); *J. Frank. Inst.* 179, 581-5(1915).—A review. A. P. L.

Does butter-fat contain nitrogen and phosphorus? THOMAS B. OSBORNE AND ALFRED J. WAKEMAN. Conn. Agr. Expt. Sta. *J. Biol. Chem.* 21, 91-4(1915).—The growth-promoting substance in butter-fat is concd. in the butter-oil that remains after the removal of the solid fraction by crystn. from alc. at -20° . If this butter-oil does contain P and N, it is present in such minute amt. as to make its isolation impossible. The traces of N and P that have been detected in butter-fat were probably derived from butter-milk in the butter before centrifugalization; butter-milk is rich in both N and P. These expts. apparently exclude from the list of possible substances, that might be the cause of the growth-promoting power of butter-fat, all compds. containing either N or P. A. P. LOTHROP.

Studies of autolysis. I. The accelerating effect of manganous chloride on liver autolysis. H. C. BRADLEY AND MAX MORSE. Univ. Wis. *J. Biol. Chem.* 21, 209-21(1915).—In dil. solns., pig and dog livers autolyze until about 25% of the total N cannot be pptd. by tannic acid; about 75% is undigested, even in the presence of active enzyme. If $MnCl_2$ is added, from 75 to 90% of the N is sol. in tannic acid and the undigested residue consists chiefly of connective tissue. The equil. is changed proportionately by the addition of $MnCl_2$ until a conc. of 0.1 M is reached; increasing conc. beyond this gradually diminishes the speed and lowers the equil. point. The $MnCl_2$ appears to alter the normally resistant liver proteins in such a way as to render them digestible by liver protease, thus increasing the effective mass of substratum in the digest. "The pseudo-equilibria represent therefore true points of equil., detd. by the mass of proteins constituting the effective substratum present in each case. The other proteins present are unavailable and exercise no influence on the equil. of the reaction." A. P. LOTHROP.

Comparative rate of oxidation of enzymes and their corresponding pro-enzymes. W. E. BURGE. *Proc. Am. Physiol. Soc.; Am. J. Physiol.* 36, 357(1915).—Pepsinogen is more resistant to oxidation than pepsin, trypsinogen than trypsin. J. F. LYMAN.

The diastases of the blood. HUGH MCGUIGAN AND C. L. V. HESS. *Proc. Am. Physiol. Soc.; Am. J. Physiol.* 36, 359-60(1915).—Diastase is present in dog blood. A quant. method for diastase in blood is described. J. F. LYMAN.

Oxidation in the red corpuscles of the goose. J. F. MCCLENDON. *Proc. Am. Physiol. Soc.; Am. J. Physiol.* 36, 364-5(1915).—Induction shocks failed to show any increase in intracellular oxidation. J. F. LYMAN.

Oxidizing power of oxyhemoglobin. J. F. MCCLENDON. *Proc. Am. Physiol. Soc.; Am. J. Physiol.* 36, 366(1915).—Recrystd. oxyhemoglobin and methemoglobin oxidized 0.01 N α -naphthol and *p*-phenylenediamine as rapidly as solns. of red corpuscles of equiv. concn. J. F. LYMAN.

The production of enzymes and its causes. H. ZIKRS. *Monatsh. Landw.* 7, 24; *Biedermanns Zentr.* 44, 68-9(1915).—Z. cultivated in glucose soln. for 14 yrs. a strain of yeasts capable of fermenting saccharose. When these were again brought into a saccharose soln. after about 300 or 400 subcultures had been made $(NH_4)_2SO_4$

and asparagine as N source), a strong fermentation took place at once. The same result was obtained when freshly killed yeasts from the glucose soln. were used. Similar expts. carried out with maltose soln. also gave the same results. The conclusion is drawn that the yeast contains both invertase and maltase in the form of a zymogen.

C. F. MILLER.

Studies on amylases. VIII. The influence of certain acids and salts upon the activity of malt amylase. H. C. SHERMAN AND A. W. THOMAS. *J. Am. Chem. Soc.* 37, 623-43 (1915).—Weak acids (acetic, propionic, phosphoric), strong acids (HCl, HNO₃, H₂SO₄), and acid phosphates (Na and K) produced optimum activation of malt diastase in concentrations corresponding to the same actual acidity— $p_H^+ = 4.2$ to 4.6, detd. electrometrically. Special methods for the purification of the enzyme, starch, and reagents are given. It is stated that measurements of the amylolytic action of purified amylase cannot be used for comparison with measurements of the saccharogenic action of the same prepn. **IX.** Experiments upon the purification of malt amylase. H. C. SHERMAN AND M. D. SCHLESINGER. *Ibid* 37, 643-8 (1915).—A new method of purification, consisting of dialysis at low temp. and pptn. with (NH₄)₂SO₄ and alc., yielded maltase of max. activity—1570. The most active prepn. contained 15.2% N, less than that obtained by Osborne (*J. Am. Chem. Soc.* 18, 536-42). The higher diastatic power and lower N content are ascribed to the low temp. of dialysis, which minimizes the possible hydrolysis of the enzyme itself in the process of prepn.

W. A. PERLZWEIG.

Amylases. X. Comparison of certain properties of pancreatic and malt amylase preparations. H. C. SHERMAN AND M. D. SCHLESINGER. Columbia Univ. *J. Am. Chem. Soc.* 37, 1305-19 (1915); cf. preceding abstr.—Although the best amylase prepn. obtained in S.'s lab. from the pancreas and from malt are very similar in physical properties and chem. nature, they do not seem to be identical. Malt amylase is most active in an acid soln., while pancreatic amylase is most active in an alk. soln. In the presence of its proper activating electrolyte but with time, temp. and substrate the same, the diastatic power of pancreatic amylase is around 4000 (new scale), that of malt amylase about 1570. In the amylase from pancreatin, proteolytic activity is concd. with concn. of the diastatic power, while the purified malt amylase shows no proteolytic activity. The malt prepn. retains its diastatic power much longer in H₂O, the pancreatic product in 50% alc. and when allowed to act upon starch; the rapidity of deterioration is proportional to the purity of the prepn. Heating the dry products to 100° destroys about 1/3 of the activity of the pancreas amylase and 1/2 that of the malt amylase. The rapidity of deterioration in H₂O increases with the temp., this being the more marked with the pancreas amylase. Pancreatic amylase in H₂O is preserved to an important extent by a mixt. of NaCl and NaH₂PO₄ while the deterioration of malt amylase may be hastened by its activating salt (NaH₂PO₄). In long digestion expts. with a large excess of sol. starch (1% soln. with PhMe as antiseptic) at 40°, a malt amylase prepn. produced 2450 times its wt. of maltose in 30 min. and 93,000 times its wt. after 48 hrs., when it ceased to be active, while a pancreas prepn. having the same relative activity, as compared with the most active product, produced 8,000 times its wt. of maltose in 30 min., 440,000 times its wt. in 48 hrs. and 516,000 times its wt. in 96 hrs.; values for other pancreas prepn. are given. Malt amylase deteriorates as much in 1 day at a diln. of 1:10,000,000 as in 10 days at a diln. of 1:10,000. In 50% alc. both amylases are much more stable at 5-10° than at about 23°. Both amylases are essentially proteins, giving the typical color reactions, containing 15-6% N and being hydrolyzed to NH₃ acids; the Van Slyke method shows that the distribution of the N among the NH₂ acid radicals is about the same as in such proteins as edestin and casein. Both are sol. in H₂O and 50% alc., insol. in strong alc. and acetone, show the same colloidal

appearance under the ultramicroscope, are retained by parchment paper and collodion membranes; 1% solns. heated above 50° form ppts. of coagulated albumin, the coagulum giving a violet-blue biuret reaction, while the filtrate gives a biuret reaction which is rose-red in the case of the pancreas, violet-red in that of the malt prepn. The coagulum from 200 mg. of a malt prepn. (equiv. to 0.1836 g. of dry, ash-free substance) in 20 cc. H₂O slowly heated with const. stirring to 50–5°, weighed 0.1136 g. and contained 16.1% N. The filtrate, containing 0.0700 g. of the original substance, contained 0.00959 g. or 13.7% N. A pancreas prepn. gave 11.6% of its wt. of coagulum with 16.9% N while the uncoagulable portion contained 14.9% N. When 200 mg. of a malt amylase prepn. (with a diastatic power of 1470 when fresh and 1050 at the time of the expt.) in 20 cc. H₂O was dialyzed against 200 cc. H₂O at 5–10° for 48 hrs., its activity was reduced to 750; the dialysate showed about 6% of the activity of the original soln. and when added to the dialyzed soln. slightly increased the activity of the latter. The concd. dialysate gave a distinct biuret reaction notably pinker than that of the original soln. but the same concd. dialysate gave no color with ninhydrin. S. and S. conclude that both amylases are complex proteins consisting of an albumin and a proteose (or peptone) fraction, sepd. by hydrolysis when heated in H₂O, the albumin fraction coagulating. In the case of malt amylase, this cleavage appears to be easily reversible, so that the enzyme does not rapidly deteriorate on standing in H₂O, but if the soln. is dialyzed, it does deteriorate rapidly, probably owing to the removal of a cleavage product, and as the dialysate restores the diastatic power only to a slight extent, the dialyzable proteose fraction probably undergoes some further, not readily reversible cleavage in the relatively large amt. of H₂O. With the pancreatic amylase, the cleavage is apparently much less readily reversible, and the proteose fraction may also more readily undergo further cleavage, since the concd. soln. of the non-coagulable portion gives a pinker biuret reaction. In both cases the amylolytic action probably first involves a combination of the amylase with the starch, the labile constituent of the enzyme being protected from destructive change while in such combination.

CHAS. A. ROULLER.

Studies on enzyme action. XIII. The lipase of soy beans. K. G. FALK. New York. *J. Am. Chem. Soc.* 37, 649–53(1915).—The action of lipase from soy beans was studied by methods used for that of lipase from castor beans (cf. *C. A.* 9, 634) and in duodenal contents (cf. *C. A.* 8, 1435). The action of lipase on triacetin in solns. of NaCl, NaF, MgSO₄, MnSO₄, MeOH, and EtOH resembles, in general, that of castor-bean and duodenal lipase. Heat and drying produced effects upon soy bean lipase that were similar to those previously observed for castor bean lipase and esterase. A prepn. of soy bean lipase had practically the same composition as the castor bean product.

W. A. PERLZWEIG.

Enzymes of the central nervous system. H. M. ENGLISH AND C. G. MACARTHUR. *J. Am. Chem. Soc.* 37, 653–64(1915).—Sheep brain contains lipase, erepsin, amylase, catalase, enzymes which decompose arbutin and salol, and probably a pepsin- or trypsin-like enzyme, or both. Lipase and proteases are best extd. with a mixt. of glycerol and H₂O, or with H₂O alone. Exts. of dry tissue were more active than those of fresh tissue, especially after extn. with benzene for removal of lipins. Lipase acted most powerfully upon triacetin and monoacetin; also upon lecithin and cephalin. Its activity followed the laws of enzyme action regarding concn. of enzyme and substrate, and reaction time, having been accelerated by the presence of Na glycocholate, saponin, or a mixt. of Na₂HPO₄ and NaH₂PO₄; it was at its best in a slightly acid medium. Erepsin acts best in an alk. medium. Exts. of gray matter were, in general, more active than those of white. Higher activity was obtained with exts. of cerebrum, cerebellum, and midbrain than with those of medulla, or corpus callosum. Similar amts. of lipase

were found in dog, sheep, beef, human brains, respectively. Negative results were obtained in tests for peroxidase, oxidase, reductase, guanase, urease, rennin. W. A. P.

Identity of heliotropism in animals and plants. I. JACQUES LOEB AND HARDOLPH WASTENREYS. *Proc. Nat. Acad.* 1, 44-7(1915).—The different parts of the spectrum of a carbon arc light are shown to exercise the same relative efficiency in the production of heliotropic responses in the animal *Eudendrium* (polyps) as in the seedlings of the plant *Avena*. II. *Science* 41, 328-30(1915).—Two types of heliotropic (biological) substances are suggested; one with the max. of sensitiveness or absorption in the yellowish green, near $\lambda = 534 \mu$, and the second with the max. of sensitiveness in the blue, near $\lambda = 477 \mu$. Both of these types are distributed in both animal and plant kingdoms, independently of systematic boundaries. W. A. PERLZWEIG.

Biochemical systems and their role in the development of the organism. W. BECHTEREW. *Rev. gen. sci.* 25, 770-7(1914).—Discussion of the interdependence of factors in heredity and evolution, and of biochemical systems such as the internal secretions. W. A. P.

Nature of antagonism. W. J. V. OSTERHOUT. Harvard Univ. *Science* 41, 235-6(1915).—The author attempts to explain the antagonism of both electrolytes and non-electrolytes on the basis of their opposite effects on protoplasm. He reaches this conclusion from his studies on the effects of substances on the permeability of protoplasm. For a description of these expts. cf. *C. A.* 6, 2438; 9, 327. W. A. P.

Biochemical research of glucosides hydrolyzable by emulsin in some plants of Papilionaceae and Scrophularineae. E. BOURQUELOT AND A. FICHTENHOLZ. *J. pharm. chim.* 11, 219-25(1915).—By observing the optical rotation upon the successive action of invertin and emulsin on solns. of the various exts., and detg. the % of reducing sugar formed, the presence of glucosides was indicated in *Cytisus laburnum*, *Ononis natrix*, *Psoralea bituminosa*, *Indigofera leptostachya*, *Scrophularia aquatica*, *Linaria spuria*, *L. elatine*, *L. cymbalaria*, *L. vulgaris*, *L. purpurea* and *Euphrasia officinalis*. Only 2, *Coronilla varia* (Legum.) and *Melampyrum arvense* (Scroph.) gave no indication of glucosides. The sugars are cane sugar, except that in *Linaria spuria*. *Linaria* is especially rich in glucosides. (Cf. *C. A.* 1, 767; 5, 514). S. WALDBOTT.

Physico-chemical research on the animal liquids. IX. The curve of the neutralizing power of urine. G. QUAGLIARIELLO AND E. D'AGOSTINO. Univ. Naples. *Atti accad. Lincei* 23, II, 638-45(1914).—The effect on the conc. of H ions of the addition of increasing amts. of HCl and NaOH was detd.: (1) in urine of a normal man; (2) in synthetic urine (an aq. soln. of Na_2HPO_4 , KCl, CaCl_2 , MgSO_4 , H_2SO_4 , NaOH, HCl, Na urate and urea); (3) in 0.05 N KH_2PO_4 . The log. of the H ion conc. is plotted against the amt. of HCl or NaOH added. The neutralization curves obtained in (2) and (3) are quite different from those obtained in (1). In both (2) and (3) there is a marked critical point. Q. and A. ascribe this difference to the presence in natural urine of a phosphoric-uric acid complex, which is not formed in synthetic urine. The lower dissociation const. of the complex acid explains the higher neutralizing capacity of the natural as compared with synthetic urine. E. J. WITZEMANN.

B. METHODS AND APPARATUS.

STANLEY R. BENEDICT.

The simplest and quickest demonstration of iodine in urine, saliva and in other body fluids. I. SCHUMACHER. *Deut. med. Wochschr.* 41, 196-7(1915).—A tablet of $(\text{NH}_4)_2\text{S}_2\text{O}_8$ is placed on a piece of filter paper and 5 to 7 drops of the fluid to be examd. are added. If iodides are present, I is set free and stains the cellulose of the paper blue. Even some I in organic combination is liberated. S. AMBERG.

Simple method of quantitative urea determination in small amounts of blood for the purpose of diagnosis of kidney lesions. A. HAHN. *Deut. med. Wochschr.* 41, 134-6(1915).—Further simplification of the previous method of Hahn and Saphra (cf. *C. A.* 8, 2172) for the detn. of urea in urine. A very small amt. of a dry prepn. of soy urease is used (0.015-0.02 g.). One cc. urine is measured into a 50 cc. flask and to this 10 cc. water and 2 drops methyl orange are added. This is titrated immediately with 0.1 *N* HCl to change the indicator to orange yellow, not red. Then a small amt. of enzyme and 3 drops of toluene are added, whereupon the flask is well stoppered and left standing until the next day, when it is titrated with 0.1 *N* HCl. One cc. 0.1 *N* HCl corresponds to 3 mg. urea. The urea in blood is detd. as follows: One cc. serum is placed in a flask and 20 cc. water, a little enzyme and 3 drops toluene (not more) are added. In a second flask are placed 1 cc. serum, 10 cc. water and toluene. Both flasks are stoppered and left standing 8-20 hrs. at room temp. The contents of each flask are now treated in the same manner, i. e., 20 cc. 0.1 *N* HCl are added and the fluid transferred to a 150 cc. flask with distd. water. 0.5 cc. of a 5% KIO₄ soln. and some KI are added and the soln. shaken well. The yellow I color must now appear. 20 cc. 0.01 *N* thiosulfate soln. are run in and then 2 cc. 1% starch soln. This soln. is titrated with 0.1 *N* I soln. The change from a whitish turbidity to green is sufficiently sharp. The difference between the I added to flask I and II gives the alkalinity derived from the urea, and needs only to be multiplied by 0.0003 to obtain the urea in 1 cc. serum. S. AMBERG.

Color reaction of gallic acid and tannic acid and its application. C. T. MÖRNER. *Pharm. Zentralkalle* 56, 13(1915).—Priority is claimed for Griessmyer (*Z. anal. Chem.* 11, 43(1872)) in the matter of the reaction described by Schewket (cf. *C. A.* 8, 327, 723). C. O. EWING.

The use of formalinized blood corpuscles in the complement fixation test. W. PFREILER AND K. LOSSOW. *Mitt. Kaiser Wilhelms Inst. Landw. Bromberg* 5, 276-80 (1913); through *Exp. Sta. Rec.* 30, 779.—Blood corpuscles should be treated in an unwashed state with HCHO and then kept on ice, or at room temp., and washed when required for use. E. M. FRANKEL.

The diagnosis of plague by means of the precipitin test of Ascoli. H. BERLIN. *Centr. Bakt. Parasitenk., Abt. I* 75, 466-85(1915).—An ext. made by boiling in NaCl soln. the organs of an animal infected with plague, artificially or naturally, will give a ppt. with plague antiserum. The reaction is positive with exts. of either fresh or putrid organs from infected animals. The amt. of ppt. depends on the amt. of plague bacilli in the organs. In making the test, undild. serum and exts. should be used. The reaction is not specific as it is sometimes given with normal organ extracts. It is positive if the infected organs have remained in formalin or alc. for a long time. This test should not replace the bacteriological test, but should be used as an aid to it. J. H. L.

Convenient methods for demonstrating the biochemical activity of microorganisms, with special reference to the production and activity of enzymes. C. H. CRABILL AND H. S. REED. *Va. Agr. Expt. Sta. Biochem. Bull.* 4, 30-44(1915).—Descriptions are given of methods, adapted to the needs of the class room, for making semi-permanent demonstrations of the activities of microorganisms. "The methods are designed to show the presence and action of products of cellular activity upon appropriate substances incorporated in thin layers of agar in Petri dishes." Methods have been devised to show the presence of amylase, emulsin, lipase, proteases, erepsin, trypsin, amidase and cytase, and for the formation of lactic or other acids. A. P. LOTHROP.

Role of serum antitrypsin in the Abderhalden test. J. BRONFENBRENNER, W. J. MITCHELL, JR. AND PAUL TITUS. *West. Penn. Hosp., Pittsburgh. Biochem.*

Bull. 4, 86(1915).—The appearance of dialyzable cleavage products in the serum is dependent upon "the removal of serum antitrypsin, which in turn liberates the normal proteases of the serum, thus setting the serum into autodigestion." The anti-tryptic activity of serum, as tested against trypsin soln., diminishes in a sp. manner in serum of pregnant individuals so that the estn. of antitrypsin may be used as a method of diagnosis of pregnancy parallel with or complementary to the Abderhalden test.

A. P. LOTHROP.

The estimation of lipid and acid-soluble phosphorus in small amounts of serum. ISIDOR GREENWALD. Harriman Research Lab., N. Y. *J. Biol. Chem.* 21, 29-36 (1915).—The method depends upon the formation of finely suspended strychnine phosphomolybdate, which is yellow in color when placed in a colorimeter. Measure 1 cc. of serum into a 10 cc. volumetric flask, containing about 8 cc. of 1% picric-1% acetic acid mixt. and make up to the mark with the same soln. The serum must be free from hemoglobin. Allow to stand 2 hrs. with occasional shaking and filter through a 5.5 cm. No. 589 black ribbon C. S. & S. filter paper into a standard 10 cc. cylinder. Read the vol. of the filtrate, transfer to a Jena test tube, 200 x 20 mm.; add a few glass beads and boil down to 1 cc. Add 1 cc. concd. H_2SO_4 and heat until all the picric acid has been distd., heating the sides of the tube to insure complete removal. Complete the oxidation by adding 1-2 drops of concd. HNO_3 and heating. The residue and filter paper (lipoid P) are transferred to another test tube and oxidized by adding 1 cc. of H_2SO_4 and as much HNO_3 as is necessary. Cool, dil. and almost neutralize with 10% NaOH (from Na). Make up to 50 cc. and take aliquot portions, usually 20 and 10 cc., for the detns. Measure these amts. into 50 cc. volumetric flasks, add 5 cc. of dil. HNO_3 (35 cc. concd. HNO_3 dild. to 100 cc.) and dil. to about 45 cc. Mix thoroughly and add 2 cc. of the reagent of Pouget and Chouchak. ((A) Dissolve 95 g. of molybdic acid and 30 g. of dry Na_2CO_3 in 600 cc. warm H_2O , cool, add 141 cc. concd. HNO_3 and dil. to 1000 cc. (B) Dissolve 2 g. of strychnine sulfate in 90 cc. warm H_2O and dil. to 100 cc. For use, add 1 cc. of B to 10 cc. of A, filter and use at once.) Make up to 50 cc. and mix. At the same time measure 5 cc. of a soln. containing 0.0131 mg. P (0.03 mg. P_2O_5) into another flask and treat similarly. Allow to stand 20 mins. and compare the colors in a Dubosq colorimeter, setting the standard at 80 mm. In calcg. the results make proper correction for the vol. of soln. adhering to the protein-picric ppt. The error is about $\pm 2\%$. The amt. of P not pptd. by the acetic-picric acid mixt. varies in normal individuals between 2 and 6 mg. per 100 cc. of serum, apparently depending on the diet and stage of digestion. The amt. of lipoid P is usually from 7 to 13 mg. per 100 cc. and is less subject to variation in the same individual than is the amt. of acid-sol. P. In nephritis there is retention of inorganic PO_4 and an increase in the amt. of lipoid P in the serum.

A. P. LOTHROP.

The estimation of non-protein nitrogen in blood. ISIDOR GREENWALD. Harriman Research Lab., N. Y. *J. Biol. Chem.* 21, 61-8(1915).—The use of CH_3OH for the pptn. of proteins as recommended by Folin and Denis (*C. A.* 7, 1209) in their method for the detn. of non-protein N in blood is open to the objection that added amino acids cannot be quant. recovered in the filtrate and that it exts. also a certain amt. of lipoid N which, although non-protein, does not belong in the same fraction as urea and amino-acid N. When a 2.5% CCl_3CO_2H soln. is substituted for CH_3OH as proposed by G., the lipoids are completely pptd. with the proteins, added amino acids can be quant. recovered and the final filtrate, free from protein, contains all the H_2O -sol., non-protein blood constituents. The method is as follows: dil. blood to 10 times its original vol. with 2.5% CCl_3CO_2H soln., filter after 30 min., shake the filtrate with about 4 g. of kaolin per 100 cc. and filter again. Measure portions of the filtrate into large Jena test tubes, add a few glass beads, 1 cc. of concd. H_2SO_4 and a few drops of 5% $CuSO_4$.

soln. and boil down until the mixt. chars. Add about 0.3 g. K_2SO_4 and heat 5 min. after the mixt. is colorless. Cool, dil., add a little powd. pumice and distil as recommended by Bock and Benedict (*C. A.* 9, 813). Proceed subsequently according to the method of Folin and Denis. It is most convenient to use 10 cc. of filtrate, equiv. to 1 cc. of blood, and to dil. the distillate, after Nesslerizing, to 50 cc. Using this method G. has found the normal amt. of non-protein N in human blood to be about 30 mg. per 100 cc. instead of about 22 mg. It appears that a considerable amt. of non-protein N normally present in blood, the nature of which is yet to be detd., is not extd. when CH_3OH is used as the protein precipitant.

A. P. LOTHROP.

A note on the determination of nitrogen by the Kjeldahl-Folin-Farmer method. VICTOR J. HARDING AND FRANCIS H. S. WARNEFORD. McGill Univ. *J. Biol. Chem.* 21, 69-71(1915).—While the Folin-Farmer method is satisfactory for the detn. of total N in minute amts. in physiological fluids, the inherent errors are too large to allow its use in detg. the % of N in small amts. of organic compds. and the calcn. of formulas therefrom.

A. P. LOTHROP.

Gastrointestinal studies. VIII. A method for the quantitative estimation of trypsin in the gastric contents. WILLIAM H. SPENCER. Jefferson Med. College. *J. Biol. Chem.* 21, 165-7(1915).—Prepare 5 reagent tubes, Nos. 1, 2, 3, 4 and 5. Add to tubes 1 and 2, 0.5 cc. of gastric contents, which have been filtered if turbid. To tubes 2, 3, 4 and 5 add 0.5 cc. distd. H_2O . From tube 2 remove 0.5 cc. and add to tube 3. Mix and transfer 0.5 cc. from tube 3 to tube 4. Repeat for tube 5. This gives dilns. of gastric contents of 1, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ and $\frac{1}{16}$. To each tube add 1 drop of a 1% alc. soln. of phenolph., and drop by drop 2% $NaHCO_3$ until a light pink color is produced. Add to tubes 1, 2, 3 and 4, 0.5 cc. of casein soln. and to tube 5, 1 cc. (Prepare the casein soln. by dissolving 0.4 g. of casein in 40 cc. 0.1 *N* $NaOH$. Add 130 cc. of distd. H_2O and 30 cc. of 0.1 *N* HCl). Incubate the tubes at 40° for 5 hrs. Ppt. the undigested casein by adding drop by drop a soln. containing 1 cc. of glacial $AcOH$, 50 cc. of 95% alc. and 50 cc. distd. H_2O . The tubes in which digestion is complete remain clear; a turbidity appears in the others. The tryptic values are expressed in terms of diln., complete digestion in a diln. of $\frac{1}{4}$ for example indicating a tryptic value of 4. Controls of boiled gastric contents must show no digestion and become turbid on addn. of the pptg. soln.

A. P. LOTHROP.

Note in defense of the Folin-Farmer method for the determination of nitrogen. OTTO FOLIN. Harvard Med. School. *J. Biol. Chem.* 21, 195-9(1915).—F. discusses the recent criticisms by Bock and Benedict (*C. A.* 9, 813) of the original Folin-Farmer method. When the air supply for aeration comes from out of doors, no NH_3 is obtainable in blank tests. If lab. air is employed a possible source of error may be introduced. Errors due to traces of NH_3 in the H_2SO_4 and K_2SO_4 apply with nearly equal force to the Kjeldahl method. If the Ostwald pipet is used explicitly as described, the error is only about 0.1%, not 1% or over as claimed by Bock and Benedict. Colorimetric readings are subject to the "personal equation" and may amount to 1%. Experience and const. use, however, reduce the error to considerably less than 1%. Titration with 0.02 *N* $NaOH$, using methyl red as indicator, can be substituted for the colorimeter by those who cannot readily learn to use that instrument with accuracy and certainty.

A. P. LOTHROP.

Creatinine and creatine determinations. The occurrence of creatine. J. L. MORRIS. Washington Univ. *J. Biol. Chem.* 21, 201-8(1915).—A method has been devised for the detn. of creatinine and creatine in the presence of acetone, acetoacetic acid or glucose; it is much more rapid than the methods involving extn. and distn. The creatinine is pptd. as the double salt of K and creatinine, the ppt. is redissolved and the creatinine value of the soln. detd. To 100 cc. of urine add 1 g. of picric acid and

warm to not more than 60° on a H₂O bath to hasten the soln. of the picric acid. Cool, stir well and allow to stand 4 hrs. Decant through a Gooch crucible and return to the beaker the ppt. caught on the asbestos. Dissolve the double salt by heating on a H₂O bath with 100 cc. of 0.5 N HCl, transfer to a 500 cc. volumetric flask and make up to the mark with hot H₂O used in rinsing the beaker. Filter a portion from asbestos and det. the creatinine in a 10 cc., 5 cc. or smaller amt. of soln. which gives a value nearest a 1 mg. standard. Use as a standard a soln. of K creatinine picrate containing 1 mg. of creatinine per 10 cc. (0.5388 g. of the double salt in 1000 cc. 0.1 N HCl). In detg. *crealine*, add to 100 cc. of urine 20 cc. of 5 N HCl and heat in an autoclave at 120° for 40 mins. Neutralize the HCl with 10% NaOH. Make up to 200 cc., filter and use 100 cc. of the filtrate for pptn. of the K creatinine picrate. Add 1.5 g. of picric acid, hastening soln. by heating over a free flame, and allow to stand overnight. Complete the detn. as already described. *The pptn. is not complete in either case and a correction of 8 mg. should be added in each detn. of creatinine and one of 12 mg. in the creatinine-creatinine detn.* The method should *not* be used for general routine work but possesses a distinct advantage when interfering substances are present. That the creatine appearing as an additional amt. of creatinine after hydrolysis is really such and not some other substance converted into a form giving the color reaction, is shown by the fact that this resultant "creatinine" is pptd. as the double picrate under the same quant. conditions as is creatinine. The identity of the creatine reported in the urine of children, post partum women, diabetics and fasting individuals is thus established.

A. P. LOTHROP.

New technic for the administration of "606." F. NARBONA. *Gac. farm. españ.*; *Boll. chim. farm.* 53, 10(1914).—Five-tenths cc. pure MeOH and the desired amt. of "606" are carefully mixed in a mortar; 4–6 cc. (according to the amt. of "606" employed) of physiol. serum are then added. This method of administration assures absence of inflammation and supuration.

H. S. PAINE.

Simplification of the hemin crystal test. NIPPE. *Boll. chim. farm.* 53, 139(1914).—A soln. is prepd. from 0.1 pt. KBr, 0.1 pt. KI, 0.1 pt. KCl and 100 pts. glacial AcOH. Several drops of this soln. are added to the blood sample and the latter is heated on a glass slide with cover disk until bubbles are formed. Crystals may then be observed with the low power of the microscope. Excess of the soln. may be removed by evapn. or aspiration.

H. S. PAINE.

Sterilization of phosphate sera. GUYOT. *Giorn. farm. chim.* 53, 72(1914).—Cheron phosphate serum gives a slightly alk. reaction to litmus and cochineal and is rendered turbid by the action of heat; this turbidity may be prevented by the addition of acid. G. recommends the addition of 8 drops official H₃PO₄ to 100 cc. Cheron serum. The latter prep. then remains clear after sterilization and may be injected into tissues without producing irritation or inflammation.

H. S. PAINE.

Determination of acetone in urine. L. SOBEL. *J. suisse pharm.*; *Giorn. farm. chim.* 63, 470(1914).—The method of Lieben which consists in isolation of the Me₂CO by distn. and estn. by means of the formation of CHI₃ has been rendered exact by S. Add several cc. HCl to 200–250 cc. urine and distil through a Liebig condenser; treat the distillate with KI and K₂CO₃; collect the ppt. of CHI₃ on a filter and carefully wash with H₂O until the filtrate fails to give a ppt. with AgNO₃; place the CHI₃ with the filter in a flask with fuming HNO₃ and several crystals of AgNO₃ and bring to boiling under a reflux condenser. After suitable diln. the AgI thus formed is collected on a filter, washed, dried and weighed. The wt. of AgI multiplied by 0.1171 gives the wt. of Me₂CO.

H. S. PAINE.

A micro-method for the determination of freezing points. ERLING SCHREINER. *Tidsskrift Kem. Farm. Terapi* 12, 69–72(1915).—The operation is conducted in a

Dewar flask (10 x 18 cm. inside), which contains a 20% soln. of glycerol. Into this is inserted a condenser through which circulates NaCl soln. A ring stirrer encircles the condenser and is moved up and down at 20 to 60 strokes per min. Outside the stirrer a thermometer is inserted into the glycerol and to this is attached the capillary tube containing the sample to be examd. The sample is frozen and allowed to melt by slowly increasing the temp., and the formation of the meniscus noted. A detn. can be accomplished in $\frac{1}{2}$ hr. The vol. required for the detn. need not exceed 0.005 cc. A table gives the results of examns. of 12 salt solns. and 2 sera. These results were compared with similar detns. in the usual Beckmann app.; 7 of them were identical. The max. discrepancy was 0.02°; this difference was observed in both salt and serum samples.

A. R. ROSE.

Device for sterilization (DEUSSEN) 1. Reactions of vanillin (HAUSSLER) 7. The sensitiveness of a chemical reaction (BARLADEAN) 2. Constitution of allantoin and allied substances (DAKIN) 10. Detection of methyl alcohol (FELLENBERG) 7.

KRIEGBAUM, K.: Ueber den mikroskopischen Nachweis v. Oxydase in Gewebeschnitten m. e. Anh. über Vitalfärbung. München: G. Franz. 44 ss. 2 M.

C. BACTERIOLOGY.

ERNEST D. CLARK.

Reduction and alcoholic fermentation. HERBERT STANGE. Univ. Leipzig. Z. Gärungsphysiol 5, 65-150(1915).—The reducing power of yeast juice was tested with a number of reducible substances. At the beginning of fermentation reducible substances in moderate concn. may have a stimulating effect (methylene blue) or an inhibiting effect (selenious acid). In 0.1 mol. conc. all reducible substances are strongly inhibitory, especially tellurate, thiosulfate and methylene blue. Selenious acid and selenite exert an extraordinary depression. The fermentation quotient, $C_2H_5OH:CO_2$, is invariably lower than that corresponding to the theoretical equation. This change is brought about by an increased production of CO_2 , the absolute value of which is identical for exts. of the same dried yeast prepn. In the presence of S and TeO_2 , both of which depress the total fermentation only slightly, no change in the quotient in the sense of the Grüss and Kostychev theory was observed. The amts. of reduction product are extremely small in comparison to the fermentation, especially with S and thiosulfate. The reduction of telluric acid is proportional to the concn. and to the vigor and the time of fermentation. The reducing power of non-fermenting juice is attributed to the proteolytic process, since addition of telluric acid increases the CO_2 production. Quantitatively considered, reduction is an insignificant concomitant phenomenon of alcoholic fermentation and proteolysis. The assumption of a reducing ferment has no experimental basis.

A. W. DOX.

Influence of the radioactivity of the air on the microorganisms of the atmosphere. A. TRILLAT AND FOUASSIER. Compt. rend. 159, 817-9(1914). E. M. FRANKEL.

Organic nutrition of a marine bacterium. H. COUPIN. Compt. rend. 160, 151-2 (1915).—*Micrococcus spumaeformis* does not grow on gelatin media containing pure water but thrives if 2.5% of NaCl is added. It easily assimilates glucose, fructose, galactose, sucrose, maltose, glycerol, mannitol, glycogen and peptone, whereas tyrosine, glycocoll and fatty substances are only poorly used. The organism does not utilize lactose, starch, dextrin, inulin, egg-white, primary alcs., glycol, erythrol, formaldehyde or organic acids. It ferments glucose, galactose, fructose, sucrose, lactose, EtOH, glycerol and mannitol. In general it requires sugar and peptone for its nutrition.

E. M. FRANKEL.

Marine yeast. H. COUPIN. Compt. rend. 160, 251-2(1915).—Marine yeast, *Torula marina*, may be cultivated in fresh water containing peptone or glucose, or on

gelatin, potato, or carrots, but its fermentation is not as marked as when it is grown on sea-water media. E. M. FRANKEL.

Factors which influence the development of *Penicillium glaucum*. Contributions to the knowledge of antiseptics and narcotics. H. J. WATERMAN. Delft. *Centr. Bakt. Parasitenk., Abt. II* 43, 639-88(1915). J. H. LEWIS.

Development of alkalinity in *Glomerella* cultures. HOWARD S. REED AND J. T. GRISOM. Va. Agr. Expt. Sta. *J. Biol. Chem.* 21, 159-63(1915).—The fungus used was *Glomerella rufomaculans*, the cause of the bitter rot of apples. The alkalinity developed in the culture medium is due to the formation of (a) carbonates, (b) NH_3 , and (c) organic bases. The carbonates probably arise from the combination of Na^+ , K^+ and NH_4^+ with the CO_2 formed by fermentation of the carbohydrate in the culture medium. The NH_3 is formed by the autolysis of the fungus protein rather than by denitrification. Bases of the hexone and purine series are also developed as a result of autolysis of the fungus protein. A. P. LOTHEP.

Quantitative determination of sulfur in the culture medium for the detection of the bacteria producing hydrogen sulfide. H. W. REDFIELD AND CLARENCE HUCKLE. Cornell Univ. *J. Am. Chem. Soc.* 37, 612-23(1915).—Using the methods described in another paper (cf. *C. A.* 9, 1069) for the estn. of S in peptone, the authors studied (a) the total amt. of S broken down by putrefactive bacteria in an unadjusted culture medium contg. 3% Witte peptone and 0.75% KCl, (b) the forms of S most readily used by these bacteria, and (c) the forms resulting from their activity. W. A. P.

Germicidal power of glycerol on various microorganisms under various conditions. E. H. RUEDIGER. *Philippine J. Sci.* 9B, 465-77(1914).—R. states that glycerol has a distinct, though feeble germicidal action, the latter being weaker at 15° than at $30-5^\circ$. Germicidal action also depends on the diluent; the microorganisms died sooner in glycerol dild. with physiol. salt soln. than in glycerol diluted with bouillon or horse serum. In dild. up to 50%, glycerol failed to destroy the anthrax organism in 15 days. This may be due to presence of resistant spores. Glycerol appears to act as a selective poison upon plague, cholera and diphtheria organisms. All the non-spore-forming organisms died in less than 4 days in 50% glycerol-physiological salt soln. W. A. P.

Antiseptic role of some insoluble substances. LOUIS RÉNON, CH. RICHET FILS AND ANDRÉ LEPINE. *Compt. rend. soc. biol.* 76, 64-6(1914).—The antiseptic action of electrically produced colloidal C (the size of the particles being approx. $4-6 \mu\mu$) was measured by means of its retarding action on the acidification of milk by the lactic acid bacillus. The colloidal C exerted an undeniable antiseptic action which increased with the amt. of C present, the latter acting in this respect as an ordinary antiseptic. No acceleration of the action of the lactic acid bacilli by minimal amts. of colloidal C was detected, this being contrary to the observation of Richet in the case of chem. antiseptics. H. S. PAINE.

Yeast production from sugar and mineral salts (MARBACH) 16. Measurement of yeast fermentation (WOLFF) 16.

D. BOTANY.

CARL L. ALSBERG.

Exchange of nutrients in plants. P. MAZÉ. *Compt. rend.* 159, 809-11(1914).—Chem. activity of living protoplasm regulates the relations of the cell to the exterior, independently of the laws of osmosis. E. M. FRANKEL.

Experiments on the pigments of the chromoleucites. V. LUBIMENKO. *Compt. rend.* 160, 277-80(1915); cf. *C. A.* 8, 1602.—The transformation of chloroleucites into chromoleucites involves the formation, by oxidation and reduction, of a number of

pigments resembling carotin and xanthophyll, and their isomers lycopin and rhodoxanthin. E. M. FRANKEL.

Free nitrogen and the higher plants. M. MOLLIARD. *Compt. rend.* 160, 310-3 (1915).—Higher plants, like the radish, do not utilize atmospheric N. E. M. F.

Carbon nutrition of horticultural plants. H. FISCHER. *Gartenflora* 63, 125-32 (1914); *Exp. Sta. Rec.* 31, 532.—Excess of CO₂ in the air materially increases the yield of fruit and flowers over the normal. E. M. FRANKEL.

Studies on the physico-chemical properties of vegetable saps. III. A comparison of the physico-chemical constants of the juices expressed from the wall with those from the included carpellary whorl in proliferous fruits of *Passiflora gracilis*. J. A. HARRIS AND ROSS A. GORTNER. *Carnegie Inst. Biochem. Bull.* 4, 52-79(1915).—Detns. were made of sp. gr., concn., depression of f. p., osmotic pressure, elec. cond., and mean mol. wt. of the cell sap from the tissues of the wall and the abnormal carpellary whorl of fruits with trimerous fruit wall and tetramerous proliferation. Sixty samples of this class were obtained by the dissection of about 100,000 fruits of *Passiflora gracilis*. The physico-chem. constns. are all susceptible to the influence of the environmental and possibly to the physiological state of the plant upon which the fruit is borne. The sp. gr., concn. (wt. of solutes/wt. of H₂O), sp. elec. cond. and osmotic pressure are all higher in the sap of the fruit wall than in that from the carpellary whorl. The concn. of electrolytes is relatively higher in the fruit wall while that of nonelectrolytes is higher in the sap of the proliferation. The mean mol. wt. of the solutes is quite variable but apparently is somewhat higher for the solutes of the abnormal tissues. The paper is limited to the presentation of facts; no attempt is made to discuss the physiological significance of the results. A. P. LOTHROP.

Plant pigments. The chemistry of plant pigments other than chlorophyll. CLARENCE J. WEST. *Rockefeller Inst. Biochem. Bull.* 4, 151-60(1915).—A review. A. P. LOTHROP.

Plant pigments. Their color and interrelationships. B. HOROWITZ. *Columbia Univ. Biochem. Bull.* 4, 161-72(1915).—A review. A. P. LOTHROP.

CURTJUS, T. UND FRANZEN, H.: *Ueber die chemischen Bestandteile grüner Pflanzen.* 7 Mitteilg. Heidelberg: C. Winter. 20 ss. 75 Pf.

KÖNIG, J. UND RUMP, E.: *Chemie und Struktur der Pflanzen-zellmembran.* Berlin: J. Springer. 88 ss. 2.80 M.

KRATZMANN, E.: *Zur physiologischen Wirkung der Aluminiumsalze auf die Pflanze.* Wien: A. Hölder. 19 ss. 68 Pf.

E. NUTRITION.

PHILIP B. HAWK.

NORMAL.

Nutrition and strength of Arabs. J. AMAR. *Compt. rend.* 159, 811-4(1914).—Statistical. E. M. FRANKEL.

Muscular work and respiratory quotient. SERGIUS MORGULIS. *Columbia Univ. Biochem. Bull.* 4, 173(1915).—A correction (see C. A. 8, 3815). A. P. LOTHROP.

Digestibility of rations for steers. H. W. MUMFORD, H. S. GRINDLEY, L. D. HALL AND A. D. EMMET. *Univ. Ill. Agr. Expt. Sta., Bull.* 172, 235-78(1914).—Results are given relating to the effect, in steers, upon the coeffs. of digestibility (1) of variations in the proportions of roughage and concentrates in the ration, (2) of the substitution of a nitrogenous concentrate for a part of the grain in the ratio of 1:5, and (3) of variations in the amt. of feed consumed from maintenance rations to full feed. W. A. PERLZWEIG.

Forms of nitrogen in growing pigs, with special reference to the influence of the quantity of protein consumed. W. E. JOSEPH. Univ. Ill. Agr. Expt. Sta., *Bull.* 173, 289-317(1914).—No difference was observed in the nature of the nitrogenous material produced in growing pigs, on varying the quantity of protein consumed between 0.32 and 0.94 lb. per 100 lbs. of live wt. Only the character of the body proteins remains unchanged, the amt. of these being affected, when the supply of food-protein is deficient.

W. A. PERLZWEIG.

ABNORMAL.

Ratio between amino nitrogen and total nitrogen in the urine of those sick with croupous pneumonia. E. SIGNORELLI. Inst. for advanced studies, Florence. *Lo sperimentale* 68, 117-131(1915).—The ratio amino N:total N is in general 0.01-0.02 notwithstanding the alterations of the exchange which is produced in the pneumonics. In the crisis of the disease the urine shows a large amt. of N, and after the crisis a gradual increase of total N. At the crisis there is a greater endogenous production of NH_3 acids, but the equil. between the NH_3 acids is destroyed and their concn. in the blood is not altered. This is probably the cause of the constancy of the ratio. In one case which failed to bear out the above conclusions severe albuminuria was observed; this would introduce an inaccuracy in the NH_3 acid detns. by the Henriques-Sørensen method.

H. W. BANKS, 3RD.

Change in amino acids during fasting. A. FRANCESCO. Lab. of the Italian Hospital, Buenos Ayres. *Lo sperimentale* 68, 137-44(1915).—In dogs under normal conditions on a mixed diet sufficient to maintain const. body wt., a nearly const. amt. of amino acids was eliminated. The ratio amino N: total N has an individual value (const. within certain limits) for each animal. During fasting to the point of exhaustion and death of the animal the ordinary oscillations in the % of NH_3 -N were observed. The av. over the whole period was, however, greater than under normal conditions. This increase was most noticeable toward the end of the period. F. concludes, therefore, that splitting of proteins, especially during the last days of fasting, undergoes appreciable modification.

H. W. BANKS, 3RD.

Analyses of the urine of a man during a two-week fast. R. WATANABE AND R. SASSA. Tokio. *Z. Biol.* 64, 373-408(1914).—Minimum N output was reached in the second week (0.18-0.20 g. per kg.). There was a steady increase in the ammonia N, and total acidity. The uric-acid-N diminished at first and then rose towards the end. The purine-N remained const., while the creatinine-N ran parallel to the total N in a ratio of 1:7.1. The Cl output diminished steadily. The N:P₂O₅ ratio was quite high (5.8:1). The mol. diuresis ($\Delta \times$ urine vol.) increased up to the 4th day and then diminished.

E. M. FRANKEL.

A case of levulose in urine. ED. JUSTIN-MUELLER. *J. pharm. chim.* 11, 218-9 (1915).—A certain specimen reduced Fehling soln., but showed negative optical rotation. Levulose was plainly indicated by the dark red ppt. with Selivanov's reagent. The sample of urine was taken in a case of indigestion due to overeating of raisins and figs. Another sample from the same person showed no trace of sugar.

S. W.

Harmful effect of a vegetable diet. C. VOEGTLIN. *Proc. Am. Physiol. Soc.; Am. J. Physiol.* 36, 367(1915).—Expts. with monkeys, white mice, rats, hogs, and fowls with exclusive diets of (1) cereals, (2) fresh vegetables, (3) legumes, (4) mixts. of cereals, legumes and fresh vegetables demonstrate the inadequate compn. of these foods.

J. F. LYMAN.

Feeding experiments on rats. III. Organs with an internal secretion. J. F. GUDERNATSCH. *Am. J. Physiol.* 36, 370-9(1915).—Fresh beef thyroid added to the diet of either male or female rats prevented or interfered with pregnancy. Whether

this results from a general weakening effect of the thyroid food or from an injurious action on the sex cells is not detd.

J. F. LYMAN.

F. PHYSIOLOGY.

ANDREW HUNTER.

The relation between the efficiency, gaseous exchange and food consumption of the mammalian heart. E. ROHDE AND NAGASAKI. Heidelberg. *Zentr. Physiol.* 27, 1114-22(1914).—Normally O consumption bears a direct relation to the work done. In disturbances due to narcotics, lack of O, CO poisoning, muscarine, veratrine, etc., the work diminishes more rapidly than the O consumption. Every diminution of energy exchange is accompanied by a rise in carbohydrate metabolism and lowering of metabolism of protein and fat, the former effect being primary while the latter is secondary. Diminished oxidation due to lack of O or to KCN results in appearance of organic acids and aldehydes. Parallel with these disturbances in carbohydrate metabolism there is depression in the ratio of the O consumption to work. This cannot be referred to modified sugar metabolism for, in CO₂ poisoning sugar metabolism does not change while the ratio of O consumption to work is depressed. R. and N. believe impaired energy relations are due to increased H ion concn. in the muscle cells.

E. M. FRANKEL.

Studies on the physiology of reproduction in the domestic fowl. XIII. The failure of extract of pituitary body (anterior lobe) to activate the resting ovary. RAYMOND PEARL AND FRANK M. SURFACE. Maine Agr. Expt. Sta. *J. Biol. Chem.* 21, 95-101(1915).—On account of the well established connection between the pituitary body and the genital organs, the effect of injection of exts. of the anterior lobe of the pituitary of the cow on the resting ovary was studied. The autumn moulting period was chosen for the study as that is the only long-continued and certain period of true physiological rest of the ovary. The birds were all normal, healthy, yearling fowls in the process of moulting at the end of their first or pullet laying year. The injection of pituitary ext. "into the abdominal cavity of hens in which the ovary is in a completely resting condition did not cause an activation of the ovary, in the sense of inducing ovulation at an earlier date than that at which it would normally occur."

A. P. LOTHROP.

Changes in the blood after muscular activity and during training. E. C. SCHNEIDER AND L. C. HAVENS. *Am. J. Physiol.* 36, 239-59(1915).—Exercise causes a rapid increase in hemoglobin, erythrocytes, leucocytes, and sp. gr. of the blood. Evidence is presented indicating that the erythrocytes are called out from an abdominal store perhaps through the action of epinephrine. The leucocytes are squeezed out of the tissues by the muscular movements.

J. F. LYMAN.

Influence of blood transfusion on the kidneys. I. A. RABENS. *Am. J. Physiol.* 36, 294-8(1915).—Detns. of urinary total N, urea, NH₃, amino acids, P, Cl, reducing sugars, acidity and sp. gr. with normal and depancreatized dogs before and after transfusions of normal blood do not give any evidence of injury to the kidneys by the method of transfusion. Dogs excrete only 10 to 14% as much chlorides following pancreatectomy as before the operation, the diet remaining constant.

J. F. LYMAN.

Distribution of gastrin in the body. R. W. KEETOM AND F. C. KOCH. *Proc. Am. Physiol. Soc.; Am. J. Physiol.* 36, 353(1915).—Gastrin, a hormone having a stimulating action on the gastric glands, was prepd. from pyloric and fundus portions of the stomach and in lower concs. from cardiac portions, intestinal mucosa and esophagus. In other tissues its presence could not be demonstrated.

J. F. LYMAN.

Relation of red corpuscles and the hemoglobin to the oxygen tension of the respired air. H. C. DALLWIG, A. C. KOLLS AND A. S. LOEVENHART. *Proc. Am. Physiol.*

Soc.; Am. J. Physiol. 36, 356-7(1915).—When O tension of respired air is reduced below 14% of an atm., red corpuscles and hemoglobin increase after 3 to 7 days due to increased activity of the bone marrow. J. F. LYMAN.

Influence of depancreatization upon the state of glucemia following the intravenous injection of dextrose in dogs. I. S. KLEINER AND S. J. MELTZER. *Proc. Am. Physiol. Soc.; Am. J. Physiol.* 36, 361-2(1915).—After intravenous injections of dextrose (4 g. per kg.) into depancreatized dogs blood sugar does not return to its former value in 1.5 hrs. as it does with normal animals. J. F. LYMAN.

Apnea as an after-effect of pulmonary distension, and its dependence on the vagus nerves. T. S. GITHENS AND S. J. MELTZER. *Proc. Am. Physiol. Soc.; Am. J. Physiol.* 36, 363(1915).—Apnea may be produced by the mere distension of the nerve endings of the pulmonary vagus without the aid of a chem. factor (acapnia), even when the air used for distension contains 5% CO₂, provided the vagus nerves are intact. J. F. LYMAN.

Changes in the content of hemoglobin and red corpuscles in the blood of man at high altitudes. E. C. SCHNEIDER AND L. C. HAVENS. *Am. J. Physiol.* 36, 380-97 (1915).—Comparative effects of abdominal massage and exercise at different altitudes on hemoglobin and red corpuscle content of the blood in peripheral vessels indicate that the rapid increases observed during the first 2 or 3 days spent at a high altitude are due in part to the throwing into the general circulation of a large mass of reserve corpuscles from the abdominal area and in part to a loss of fluid from the blood. Blood-forming centers also become more active at high altitudes. J. F. LYMAN.

Effect of partial adrenal deficiency upon sympathetic irritability. R. G. HOSKINS. *Am. J. Physiol.* 36, 423-9(1915).—The removal of 0.5 to 0.7 of the adrenal tissue in the dog resulted in a depressed irritability of the sympathetic nervous system as shown by low blood pressure, decreased vasomotor reaction to nicotine, and unchanged reaction to epinephrine. J. F. LYMAN.

Action of glandular extracts on the secretion of cerebrospinal fluid. C. H. FRAZIER AND M. M. PERT. *Am. J. Physiol.* 36, 464-87(1915).—Saline exts. of pancreas, spleen, kidney, liver, ovary and testes do not influence the rate of secretion of the choroid plexus. An apparent increased rate is due to mechanical rather than secretory effects in that the fall in arterial blood pressure following injections of the exts. increases pressure in the cranial venous sinuses, thus forcing out preformed fluid in the ventricles and cisterna magna. Brain exts. cause a secretion independent of blood pressure. Thyroid exts. have a specific inhibitory effect. J. F. LYMAN.

Researches on the perfused heart. Some effects of sodium chloride. W. BURRIDGE. Oxford. *Quart. J. Exp. Physiol.* 8, 303-30(1915).—An active displacement of Ca salts is a factor in the production of the diastolic failure which follows perfusion of isotonic NaCl through the frog heart. After perfusion of isotonic NaCl (1) the action of Ca salts in shortening the refractory period, (2) the action of the same salts in producing tonus, and (3) their action in supporting the spontaneous contractions are all greatly increased. Two-fold relations exist in the heart between the salts of Na and Ca. They are antagonistic in regard to their mutual adsorption on the surface of certain of the heart colloids (surface effects); they are antagonistic in regard to the changes in the state of aggregation each induces in these same colloids (deep effects). The state of aggregation induced by Ca is one unfavorable to its own activity in its function of tonus production, etc.; the state of aggregation induced by Na favors these latter functions of Ca. The favoring action of Na on these Ca functions outweighs its antagonism. Hence, if the amt. of NaCl in a perfusion soln. be increased, the effective action, in certain directions, of the Ca salts already present in that soln. will

also be increased, but at a distinctly later period, and *vice versa*. Cf. following abstract. V. C. M.

Further experiments on the relation between the action of calcium salts and alkalies on the perfused heart. W. BURRIDGE. Oxford. *Quart. J. Exp. Physiol.* 8, 331-39(1915).—It is shown that the action of the alkali in inducing changes whereby the effective action of a given conc. of Ca in producing tonus is increased, is antagonized by Ca salts, and it is suggested that Ca salts induce a state of aggregation in certain heart colloids which is unfavorable to their own activity in producing tonus. Alkalies first prolong and then shorten the refractory period of the heart, and thus a marked summation of contractions is made possible. Cf. preceding abstract. V. C. M.

The lipid-content of vascular endothelium. J. TAIT AND J. A. HEWITT. Edinburgh and St. Andrews. *Quart. J. Exp. Physiol.* 8, 391-3(1915).—In 2 sets of analyses of the endothelium of the aortae of the ox the Et_2O ext. was found to amount to 8.41 and 9.25%. This did not support the authors' supposition that the slight adhesion of blood to the walls of blood vessels might be due to the existence of a large amt. of lipoids in the endothelium. V. C. M.

The lipid content of peritoneal endothelium. J. TAIT AND W. CAMPBELL. Edinburgh. *Quart. J. Exp. Physiol.* 8, 395-7(1915).—The lipid content of the peritoneal endothelium of 2 sets of bullocks was found to be 15.06 and 14.8%; of 2 sets of sheep, 14.6 and 13.06%. V. C. M.

Displacement by oxygen of carbon monoxide from combination with hemoglobin. MAURICE NICLOUX. *Compt. rend. soc. biol.* 76, 328-31(1914).—The classical view that CO-hemoglobin is a very stable compd., upon which O exerts practically no action, is based upon a misconception, since the interaction of oxyhemoglobin, CO and O should be considered as a balanced reaction, thus: $\text{HbO}_2 + \text{CO} \rightleftharpoons \text{HbCO} + \text{O}_2$ (Hb = hemoglobin). Hemoglobin, when placed in contact with mixts. of CO and O, combines (both *in vivo* and *in vitro*) with the 2 gases in proportions which are detd. by the resp. tensions in the mixt. and regulated by the mass action law. Expts. *in vitro* with pig blood satd. with CO showed that CO was readily displaced by pure O from combination with hemoglobin. The degree of satn. of the blood was expressed as the % of CO-hemoglobin based on the total amt. of hemoglobin, this being the quotient (multiplied by 100) of the amt. of CO present in 100 cc. blood divided by the amt. of CO contained in 100 cc. of the same blood when satd. When pure O was used, the % of CO-hemoglobin decreased from 100 to 7.3 in 12 hrs.; this corresponded to a decrease from 23.15 cc. to 1.7 cc. CO in 100 cc. blood. When air was employed, the % of CO-hemoglobin decreased from 100 to 15.5 in 15 hrs., all other detg. conditions being identical with those prevailing when pure O was used; this corresponded to a decrease from 26.2 cc. to 6.7 cc. CO in 100 cc. blood. Respiration of O is, therefore, the most desirable treatment in cases of CO intoxication, but only those forms of app. which permit introduction of O into the pulmonary alveoli should be used. H. S. P.

Factors affecting the coagulation time of blood. VI. The effect of rapid and progressive hemorrhage upon the factors of coagulation. KATHERINE DRINKER AND C. K. DRINKER. *Am. J. Physiol.* 36, 305-24(1915).—Rapid progressive hemorrhage causes a decrease in coagulation time approx. paralleled by a fall in antithrombin. Prothrombin underwent no regular change, usually increasing slightly, then decreasing slightly. The accuracy of the results for fibrinogen are questioned. A decrease is indicated. Platelet counts did not vary following hemorrhage. J. F. LYMAN.

G. PATHOLOGY.

H. GIDEON WELLS.

Functional modifications produced by cholera toxin on the various systems of the organism. G. CICCONARDI. Univ. of Naples. *Lo sperimentale* 68, 69-112

(1915).—The method of prepg. and purifying the cholera toxin (a nucleoprotein) is given, and the effect of its injection in rabbits and guinea pigs is studied with regard to temp., circulation, respiration, renal function, motor function of the intestine and muscular functions. The effects produced in the animals are similar to the characteristic symptoms of cholera in man, viz.: strong lowering of temp., pathologic variations in the circulation and respiratory app., stoppage of the renal secretion, diarrhea upon exciting peristalsis, and muscular contraction.

H. W. BANKS, 3RD.

Variations in the hemolytic power of the serum of the frog after removal of the liver. V. RONCA. Univ. Modena. *Lo sperimentale* 68, 305-19(1915).—Total removal of the liver caused a marked decrease in the hemolytic power of the serum toward the erythrocytes of a rabbit, and an increase in the metachromatic granular substance of the nucleated cells. The blood as usual coagulated rapidly. When anemia was induced by bleeding, the natural hemolytic power of the serum toward rabbit erythrocytes returned rapidly. The removal of the spleen had no effect upon the production of the natural hemolysins of the frog toward rabbit erythrocytes. Extracts of the liver, spleen, and pancreas did not exhibit this hemolytic power.

H. W. BANKS, 3RD.

The modifications produced in the serum in hemolytic anemia by means of splenectomy during the course of the anemia. P. BASTAI. Institute of pathologic anatomy, Florence. *Lo sperimentale* 68, 357(1915).—Splenectomy has a favorable influence on the course of anemia produced in rabbits by specific hemolytic serum.

H. W. BANKS, 3RD.

Experimental vaccination against cholera vibrio with a vaccine sterilized by ether. H. VINCENT. *Compt. rend.* 160, 378-80(1915).—Ether sterilizes cholera cultures at once and may be used in prepg. cholera vaccines. The ether exts. unnecessary lipins and seems to diminish the ill effects of the vaccine. The bacteria are broken up in the sterilization and, being finely divided, favor rapid formation of antibody. The method seems to be generally applicable to the prep. of vaccines. E. M. FRANKEL.

The action of bacterial filtrates on fixed tissues. R. BRITZOLFF. Univ. Heidelberg. *Beitr. path. Anal.* 60, 337-46(1915).—Pieces of kidney, liver, lung and spleen from freshly killed guinea pigs were fixed by boiling or with CH_3O and put into sterile filtrates of bouillon cultures of different bacteria. The changes produced in the tissues were studied microscopically. They were similar to those seen in post-mortem autolysis. The leucocytes and cells of the myocardium were affected less than the liver and kidney cells, and the connective tissue cells least of all. The substance in the filtrates that produces the changes is of an enzyme nature because it is destroyed upon boiling and only those filtrates that liquefy gelatin act on the tissues. The strongest action was observed with *B. proteus vulgaris* which produces a large amt. of protease in its growth.

JULIAN H. LEWIS.

The influence of an oxidizing substance (sodium iodoxybenzoate) on immune reactions. A. ARKIN. *J. Infect. Dis.* 16, 349-60(1915).—Na iodoxybenzoate, which stimulates physiological oxidations, also stimulates the production of hemolysin and agglutinin in rabbits when injected intravenously shortly after immunization. The action of this substance is probably on the tissues of the body, because it inhibits also the local tuberculin reaction in tuberculous animals.

JULIAN H. LEWIS.

Natural hemolysins in human serum. JOHN A. KOLMER AND ARTHUR J. CASSELMAN. *J. Infect. Dis.* 16, 441-7(1915).—The sheep hemolytic system is the one commonly used in complement fixation work with human serum although the latter contains a large amt. of antihemolysin. With the purpose of finding a more desirable hemolytic system, K. and C. detd. the amt. of natural hemolysins for different animals in human

serum. The amt. of hemolysis indicates the amt. of antihemolysis. A table is given showing the number of sera tested and the amt. of hemolysis of different corpuscles produced. As far as the presence of natural hemolysins is concerned, the following is the order of preferability of hemolytic systems: guinea pig, rabbit, horse, chicken, rat, hog, goat, ox, dog, sheep. JULIAN H. LEWIS.

The ferment activity of blood in infectious diseases. FREDERICK HOWARD FALLS. Univ. Ill. *J. Infect. Dis.* 16, 466-78(1915).—The serum in lobar pneumonia, malaria, acute articular rheumatism, typhoid, meningitis, tuberculosis, tabes dorsalis and paresis gives a positive Abderhalden reaction with placental tissue. Pregnancy and the puerperal state give responses that cannot be differentiated from these reactions. The source of the ferment is probably not to be found in the leucocytes, because the reaction was often strongly positive in cases with a low leucocyte count and frequently weak in conditions in which the leucocyte count was high. JULIAN H. LEWIS.

Serum diagnosis of Rous's chicken sarcoma, based on chemical methods. CASIMIR FUNK. *Biochem. Bull.* 4, 24-9(1915).—Expts. were performed with serum of chickens inoculated with very malignant, Rous chicken sarcoma. Tumor serum was as a rule poorer in N, P and S and richer in amino N than normal. The mol. depression was greater in normal serum. Analysis in the case of Rous sarcoma gives much more reliable results than other diagnostic methods, but is open to the objections that Rous sarcoma differs in many respects from other tumors and that the same chem. differences may be found in other pathological conditions. It does not follow that analogous results can be obtained for human serum. The expts. are in progress. A. P. L.

Reaction of rabbits to intravenous injections of mold spores. A. F. BLAKESLEE AND R. A. GORTNER. Conn. Agr. College and Univ. Minn. *Biochem. Bull.* 4, 45-51 (1915).—The work was undertaken in connection with expts. on the detn. of the chem. differences which may exist between the 2 sexual races in the fungus group of mucors; it was thought that cytolytins might be developed for mold spores which would be sexually specific. Rabbits were injected intravenously with spores of "Mucor V." The injections failed to cause the development of cytolytic substances capable of dissolving the fungus spores but apparently stimulated the formation of antibodies causing agglutination. A. P. LOTHROP.

Comparisons of urinary and serum findings in the diagnosis of tuberculosis. J. BRONFENBRENNER, J. ROCKMAN AND W. J. MITCHELL, JR. West Penn. Hosp., Pittsburgh. *Biochem. Bull.* 4, 80-5(1915).—Urine was examd. by the Ehrlich diazo reaction and the Moritz Weiss test for neutral S, and the findings compared with those of the serum test in 100 cases clinically tuberculous and 100 non-tuberculous cases. The diazo or Weiss test is less const. than the serum reaction and, when positive, is of value only if typhoid is excluded. These tests are not sufficiently frequent in tuberculosis to be of diagnostic value. An increased amt. of neutral S in advanced stages of the disease is quite const. and of prognostic value, especially in connection with corresponding negative findings in the serum. A. P. LOTHROP.

Neutral-sulfur and colloidal-nitrogen tests in the diagnosis of cancer. FREDERIC G. GOODRIDGE AND MAX KAHN. Columbia Univ. and Beth Israel Hosp. *Biochem. Bull.* 4, 118-26(1915).—In cases other than cancer, positive results with the colloidal-N estn. were obtained in myocarditis, diabetes and syphilis; and positive Salomon and Saxl neutral-S reactions in tuberculosis, hemophilia, pernicious anemia and atrophic cirrhosis of the liver. "Positive results with either the colloidal-N or the neutral-S test, alone, are not indicative of carcinoma. When performed *conjointly* on urine of the same case, however, positive results with *both* methods are strongly indicative of malignancy." A. P. LOTHROP.

Active immunization to hay fever. MARK J. GOTTLIEB AND SEYMOUR OPPENHEIMER. New York. *Biochem. Bull.* 4, 127-35(1915).—The authors record the treatment of 11 cases of hay fever with vaccines prepared from ragweed or golden-rod pollen before and during the season for autumnal catarrh. The vaccines, which appeared to be free from protein, were obtained by extg. the pollen grains with salt soln. and pptg. with alc. the "active" material from such exts. There were 5 cures; 4 cases showed marked improvement; 9 cases reacted to ragweed pollen, 2 to that of both ragweed and golden-rod. While immunity may not have been successfully carried over to the succeeding year, recurrences were much milder and required less re-immunization. The investigation will be extended with vaccines from other pollens. A. P. L.

Studies on the theory of diabetes. V. A study of narcotic drugs in phlorhizin diabetes. W. D. SANSUM AND R. T. WOODYATT. Rush Medical College, Chicago. *J. Biol. Chem.* 21, 1-21(1915).—Doses of epinephrine supplementary to injections of phlorhizin remove all the glycogen from the body. This method should be employed in preparing animals for the study of *new sugar* formation following administrations of substances that may cause hyperglucemias in non-diabetic animals. The excretion of extra sugar which has been observed after Et_2O or N_2O narcosis in phlorhizinized dogs has its origin in glycogen as no extra sugar appears after dogs have been treated with phlorhizin plus epinephrine. AcH does not give rise to *new* formations of sugar as claimed by Ringer and Frankel (*C. A.* 8, 954). "The hypothesis that antiketogenesis and diabetic phenomena generally depend upon the occurrence or non-occurrence of glucoside-like unions between aldehydes and alcohol groups is also wholly untenable." The presence or absence of glycogen in diabetic dogs can be shown by subcutaneous injection of 0.25-1 mg. of epinephrine and is a convenient method to use as a check in all expts. on diabetic animals in which the mobilization of glycogen could lead to erroneous conclusions. A. P. LOTHROP.

The several factors of acid excretion in nephritis. LAWRENCE J. HENDERSON AND WALTER W. PALMER. Mass. General Hosp., Boston. *J. Biol. Chem.* 21, 37-55 (1915).—Studies have been made of 44 cases of nephritis involving analyses of the daily excretion for 311 days. Estimations were made of H ion conc., acid excretion, NH_3 and vol. The cases studied divide themselves into 2 groups, group I being characterized by large vol., intense acidity, and diminished total-acid excretion due to a deficit in urinary NH_3 . In group II the urinary vol. is normal, the acidity high and the total acid excretion low or normal, due to fluctuations in NH_3 ; these cases involve degrees of acidosis much milder than in the cases of group I, which consist of sharply defined cases of the same type functionally. A. P. LOTHROP.

The retention of alkali in nephritis. WALTER W. PALMER AND LAWRENCE J. HENDERSON. Mass. General Hosp., Boston. *J. Biol. Chem.* 21, 57-60(1915); cf. preceding abstr.—Acidosis appears to be invariably associated with the type of nephritis in which there is a condition of diminished NH_3 excretion, as in these cases real retention of alkali has been observed when NaHCO_3 was administered. It is frequently associated with other types. It is possible for a condition of acidosis to be accompanied by diminished NH_3 excretion as well as by an increase in the amt. of NH_3 . A. P. LOTHROP.

The effect of acid administration on parathyroid tetany. D. W. WILSON, THORNTON STEARNS AND J. H. JANNEY, JR. Johns Hopkins Univ. *J. Biol. Chem.* 21, 169-77 (1915).—The intravenous injections of 0.286 and 0.143 M HCl in 0.143 M NaCl relieves parathyroid tetany in dogs, the time elapsing before the return of the symptoms varying with the amt. of acid but in some cases extending over several days. NaCl alone has no apparent beneficial effect. The same effect is produced when the HCl is taken by mouth but this method of procedure is usually not efficient, owing to the difficulty with which material is retained in the stomachs of dogs in tetany. These

results suggest "the possibility of a beneficial action due to a variation in the acid-base equilibria in the body" and "that there may be a condition of or tendency towards an alkalosis after parathyroidectomy" which is relieved by the introduction of acid.

A. P. LOTHROP.

On starvation and obesity, with special reference to acidosis. OTTO FOLIN AND W. DENNIS. Harvard Med. School. *J. Biol. Chem.* 21, 183-92(1915).—"Obesity is not a predisposing or contributing factor in the onset or intensity of the acidosis of starvation. By repeated fasts of moderate duration the obese acquire an increased ability to starve without the production of acetone bodies. The obese lose less body protein than others in the course of moderate periods of starvation (4-6 days), and on repeating the fasts the losses of body protein become still smaller. Successive moderate periods of starvation constitute a perfectly safe, harmless, and effective method for reducing the wt. of those suffering from obesity."

A. P. LOTHROP.

Neutralizing power of saliva in its relation to dental caries. J. A. MARSHALL. *Am. J. Physiol.* 36, 260-79(1915).—The neutralizing power of the saliva of 104 persons was detd. by Henderson's method, *i. e.*, the sum of the titrations with 0.02 *N* HCl (*p*-nitrophenol indicator) and with 0.02 *N* NaOH (phenolph. indicator). The reaction of normal resting saliva shows no definite relationship to dental caries. The activated saliva (paraffin stimulus) shows a tendency toward greatly increased neutralizing power in persons immune to caries while in persons with carious teeth this increase is less marked or lacking.

J. F. L.

The cholesterol content of human blood serum. HUGO PRIBRAM. Prague. *Zentr. inn. Med.* 36, 325-8(1915).—The detn. of the cholesterol content of the blood serum throws much light on pathol. conditions. The detn. of total cholesterol is not sufficient. The amts. of cholesterol in the free and in the combined condition deserves greater attention.

JOHN T. MYERS.

The coefficient of Ambard in dementia praecox. A. OBREGIA, C. J. URECHIA AND A. POPEIA. *Compt. rend. soc. biol.* 76, 49-50(1914).—Excretion of N remained practically unchanged in 70% of the cases of *dementia praecox* under observation; retention of N was observed in 30% of these cases. No definite relation between the value of the Ambard coeff. and the condition of exaltation or depression of the patient was established.

H. S. PAINÉ.

Investigation of suprarenal antibodies during the course of suprarenal insufficiency. A. SÉZARY AND P. BOREL. *Compt. rend. soc. biol.* 76, 384-5(1914).—S. and B. attempted to ascertain by means of the method of complement deviation whether suprarenal antibodies analogous to those detected during the existence of lesions of certain other organs are present in the blood of subjects suffering from suprarenal insufficiency. Ox suprarenal ext. was employed as antigen and the expts. were controlled by means of the serum of a rabbit in which severe, exptl. lesions of 1 of the suprarenals had been produced. The results in all cases (7 subjects of which 4 were suffering from well defined Addison's disease) were negative. Positive results were obtained only with syphilitics (who showed no suprarenal lesion). It has already been shown that a suprarenal antigen may be substituted without disadvantage for the usual antigens in the Wassermann reaction. The authors attempted to verify the above results with rabbits the serum of which before the expt. did not produce deviation of complement in the presence of suprarenal antigen or syphilitic liver; only 1 rabbit survived and the serum of this animal did not produce deviation of complement in the presence of suprarenal antigen in 1 month after exptl. lesion of 1 suprarenal.

H. S. PAINÉ.

Action of oxidizing substances on antibodies. MARCEL BÉLIN. Tours. *Compt. rend. soc. biol.* 76, 520-2(1914).—B. has previously demonstrated that toxins are readily

oxidized *in vivo*, thus checking the progress of certain infectious diseases; he has now attempted to ascertain if antibodies in general and antitoxins in particular are likewise affected by energetic oxidizing agents. Guinea pigs were immunized to a colon bacillus by means of a subcutaneous injection of 9.5 cc. culture followed, 8 days afterward, by a 2nd injection (intraperitoneal) of 0.25 cc. culture; at the end of a week all the animals received an intraperitoneal injection of 2 cc. culture per kg., this amt. being sufficient to kill untreated controls in 10-15 hrs. As a result of several subcutaneous injections of NaClO_2 (0.08 g. per kg. in a soln. containing 0.04 g. per cc.) a number of the animals succumbed and the remainder were severely affected; the controls readily withstood the treatment. It is, therefore, concluded that the antibodies were oxidized. B.'s observations regarding the facility of oxidation of toxins *in vivo* emphasize the therapeutic value (especially in acute stages) of this principle, provided a satisfactory oxidizing agent can be found; the latter should be stable, easily handled, quite rich in O and capable of being injected subcutaneously.

H. S. PAINE.

Influence of blood transfusion on hyperglucemia and glucosuria of pancreatic diabetes in the dog. A. J. CARLSON AND H. GINSBURG. *Am. J. Physiol.* 36, 280-93 (1915).—Transfusion of normal blood into dogs in complete pancreatic diabetes caused a reduction in blood sugar and a marked decrease in sugar elimination. The results indicate an increased oxidation of sugar following the transfusion of normal blood.

J. F. LYMAN.

Concentration of sodium chloride in the plasma and its relation to the rate of excretion in normal and diabetic man. F. C. McLEAN. *Proc. Am. Physiol. Soc.; Am. J. Physiol.* 36, 357-8 (1915).—When the conc. of NaCl in plasma falls below 5.62 g. per l. excretion no longer occurs. Of 18 diabetics half had a normal excretion; the others (one exception complicated with severe nephritis) excreted NaCl on a marked-ly diminished threshold.

J. F. LYMAN.

Production of bile pigment outside the liver. A. A. H. VAN DEN BERGH AND J. SNAPPER. *Nederlandsch Tijdschrift Geneeskunde* March 20 and April 3, 1915; *J. Am. Med. Assoc.* 64, 1538, 1624; cf. *C. A.* 9, 1491.—Extravasated blood left undisturbed in tissues, or in some cavity, in time yields a small amt. of bile pigment. If the bilirubin content is greater than that of the blood serum, the indication is that the accumulation is not of recent occurrence. In pernicious anemia blood from the splenic vein was found to contain much more bilirubin than the peripheral blood, and the splenic system was much darker in color, both indicating that the bilirubin in question had been formed in the spleen.

L. W. RIGGS.

Endemic goiter (CLARK) 14.

H. PHARMACOLOGY.

ALFRED N. RICHARDS.

Influence of hypodermic injections of organic and inorganic preparations of iron in experimental anemia. A. CHISTONI. Univ. Naples. *Lo sperimentale* 68, 53-68 (1915).—The effect of the injections was studied upon rabbits in which anemia had been produced by daily injections of $\text{PhHNNH}_2\cdot\text{HCl}$ (1.25-7 mg. per day). The iron preps. studied were "protoferrina", ammoniacal citrate of iron, and green ammoniacal citrate of iron (2 mg. Fe per day). With organic Fe the hemoglobin is rapidly increased as is the hemoglobin index. At the same time the diminution of erythrocytes is stopped, and eventually the erythrocytes increase in number. Other pathol. indications of anemia disappear or greatly diminish. With the inorg. preps. erythrocytes increase and the hemoglobin increases somewhat; but the pathol. indications of anemia do not disappear or diminish.

H. W. BANKS, 3RD.

Phosphorus in the wounds made by German artillery projectiles. V. HENRI. *Compt. rend.* 160, 82-3(1915).—Shrapnel and shells carry a purple powder containing 97% of P. Wounds caused by them may heal slowly due to the action of such P.

E. M. FRANKEL.

Pneumoconiosis of metal polishers. A. LAFONT, DESMOULINS AND F. HEDM. *Compt. rend.* 160, 328-30(1915).—Clinical observations. Pewter polishers often have lead poisoning.

E. M. FRANKEL.

Comparative pharmacodynamic action of gold in the colloidal form and as soluble salts. H. BUSQUET. *Compt. rend.* 160, 404-6(1915).—Colloidal Au causes marked improvement in the action of the *isolated* heart of a rabbit; similar doses of Au in sol. form diminish coronary flow and cause general depression of activity. In the *intact animal* (dog), 3-5 mg. per kg. of colloidal Au cause diminution of rate, increase in amplitude of the heart and a rise in blood pressure, whereas the sol. Au salts, in similar doses have just the opposite effects and are often toxic.

E. M. FRANKEL.

Effect of alkali water on dairy cows. C. LARSEN AND D. E. BAILEY. S. Dakota Sta., *Bull.* 147, 300-25; *Exp. Sta. Record*, 30, 775.—Cows watered with alkaline H₂O showed nothing abnormal. The principal mineral constituent, Na₂SO₄, was eliminated by the kidneys and caused increased H₂O output over that of the fore-period, despite a diminished intake.

E. M. FRANKEL.

Action of diuretics of the methylxanthine group on normal individuals on different diets. R. WIDMER. Bern. *Z. Biol.* 64, 315-72(1914).—Theophylline in doses of 0.5 g. has a marked diuretic effect when the diet is high (meat) or low (milk) in salts and protein. The absolute increase in the output of H₂O and chlorides, as well as the f. p. depression, is greater on a meat diet though, in relation to the normal urine, there is a greater diuretic effect on the milk diet. Under the influence of the diuretic, the output of salts is relatively smaller than that of water, causing a diminished f. p. depression. On a milk diet, the urinary H₂O output is only about half the intake, while on a meat diet it is about 80% of the intake, due probably to the diuretic action of the extractives in the meat.

E. M. FRANKEL.

Influence of quinine on metabolism. F. SILBERSTEIN. Vienna. *Zentr. Physiol.* 29, 413-21(1915).—Quinine-HCl (0.5-2.0 g.), given *per os* or subcutaneously to dogs, causes very marked increase in blood-sugar content and glucosuria. Doses under 1 g. have little effect on the body temp., but those over 1 g. cause a preliminary rise followed by a fall. Three explanations are offered.

E. M. FRANKEL.

Effects of drugs upon the vessels of the pia mater and retina. ARTHUR D. HIRSCHFELDER. Univ. Minn. *J. Pharmacol.* 6, 597(1915).—Epinephrine, strychnine, cocaine, quinine and ethylhydrocuprein were found to constrict the cerebral and retinal vessels of rabbits and cats, while acetanilide, antipyrine, amyl nitrite, caffeine and alc. dilated them. After digitalis or strophanthin, the caliber of the pial vessels seemed to follow the general blood pressure.

P. J. H.

Effects of digitalis in experimental auricular fibrillation. ARTHUR D. HIRSCHFELDER. Univ. Minn. *J. Pharmacol.* 6, 597-8(1915).—The irregularly beating heart under conditions of continual elec. stimulation was very markedly slowed by digitalis, and also was promptly returned to rapid arrhythmia by paralyzing the vagi with atropine. Section of the vagus was not as effective as atropine.

P. J. H.

A study of the relative importance in the nephritic kidney of a responsive vascular mechanism, as compared with a functionally responsive epithelium in determining the efficiency of various diuretics. WM. DEB. MACNIDER. Univ. N. Carolina. *J. Pharmacol.* 6, 599-601(1915).—With morphine-Et₂O anesthesia, the animals nephritic from 4 mg. U showed a marked diuretic effect from theocine, caffeine, theobromine,

pituitrin, 0.9% urea, 20% glucose, but not with duodenal ext. With Gréhan's anesthetic, the animals nephritic with 6.7 mg. U showed no diuretic effects from any of the substances, although the renal vascular dilatation here often exceeded that of the other animals. Diuretic animals exhibited uninjured renal epithelium, while the nondiuretic animals exhibited cells in various stages of degeneration. The substances here employed are only of diuretic value with uninjured renal epithelium. P. J. H.

Note on the absence of morphine from the liver in a case of chronic laudanum addiction. JACOB ROSENBLOOM. West Penn. Hosp., Pittsburgh. *Biochem. Bull.* 4, 90-3(1915).—The liver of a woman, addicted to the use of large amts. of laudanum for 5 years, was obtained 3 hrs. after death and examd. for morphine according to Dragendorff's process. "The morphine was so changed in the organism, under conditions as yet unknown, that it was impossible to detect morphine; and such a change is marked in cases of habituation to the alkaloid." A. P. LOTHEROP.

Detoxicating effect of the liver of *Cathartes aura* upon solutions of β -imidazolylythylamine. ALLAN C. EUSTIS. Tulane Univ. *Biochem. Bull.* 4, 97-9(1915).—The liver of the common turkey buzzard was chosen because of the fondness of this bird for carrion, on which it thrives. The liver was removed under sterile conditions, ground to a pulp and incubated at 37° for 24 hrs. with 0.1% saline soln. of β -imidazolylythylamine. The filtrate was used for injections into guinea pigs, on a basis of 0.5 mg. of the compd. per 300 g. of wt. No effects were observed with solns. that had been incubated with liver but the usual fatal symptoms appeared with a control soln. The action is apparently due to some enzyme, as heating to boiling inhibits the detoxicating action. A. P. LOTHEROP.

Toxicity of oil of chenopodium. W. SALANT AND E. K. NELSON. *Am. J. Physiol.* 36, 440-63(1915).—Symptoms in cats, dogs, rabbits and guinea pigs after administration of the drug are described. The minimal fatal dose for the cat is about 0.4 cc. per kg. *per os* or 0.2 cc. subcutaneous. The other animals tried have a higher resistance. Simultaneous administration of fixed oils as olive oil, etc., also carbohydrates, have a protective action due to the solubility of the drug in the fixed oil or to the detoxification by glucuronic acid derived from glycogen and glycerides. Ascaridole, the active principle of chenopodium, is 30% more toxic than the oil. A rearrangement product of ascaridole in which the position of the 2 O atoms is changed was less than half as toxic as the oil. Successive small doses showed a cumulative effect. J. F. L.

The movements of the isolated small intestine and the action of various drugs and extracts upon them. A. W. YOUNG. Edinburgh. *Quart. J. Exper. Physiol.* 8, 347-75(1915).—For the expts. a modification of the method of Magnus was employed on the isolated small intestine of the cat. NaHCO_3 in conc. of 0.01-0.04% increases the tone of the intestine without altering the pendulum movements; with higher conc. the movements are inhibited. HCl inhibits both the tone and the movements of the intestine; inhibition is seen with 0.0005%. CO_2 has an inhibitory action on both the tone and movements of the intestine. Hyoscyamine has a stimulating action and can initiate the movements when they are absent. The action of hyoscyne is similar to that of hyoscyamine but weaker, stimulation being produced by 0.02% conc. of the former and by 0.001% conc. of the latter. Both drugs inhibit the stimulation produced by pilocarpine. Cocaine has a stimulating action in strengths from 0.001 to 0.01%; with higher conc. no stimulation is seen, but a marked regularizing effect then appears; with 0.2% paralysis of the intestine occurs. Choline produces a marked rise of tone which occurs with conc. of 0.002%; with higher conc. the pendulum movements are obliterated; atropine inhibits the action; choline and epinephrine are mutually antagonistic. Neurine in its action resembles choline, but is more powerful, acting in 0.001% conc. Aq. ext. of the pituitary in high conc. raises the tone and causes the

development of large tonus oscillations. Hemisine causes inhibition of the movements and lowering of the tone of the intestine even in conc. of 0.00001%. Exts. of spleen, thyroid, thymus, pancreas, liver, kidney and brain give no definite results. Stomach contents inhibit the movements by their acidity alone. The contents of the small intestine have often a marked stimulating effect apart from, but to a considerable degree influenced by, their reaction. Pancreatic secretion increases the tone. Indole inhibits the movements and lowers the tone. Bile has a similar action. V. C. M.

Paradoxical effect of atropine. M. PETZETAKIS. *Compt. rend. soc. biol.* 76, 522-3 (1914).—After injection of 0.002 mg. atropine the pulse of a human subject decreased gradually to a minimum of 54 (reached after 40 sec.), the normal pulse of 78 being regained after 3 hrs. This result is in accord with similar observations of various investigators (particularly Morat) and may be interpreted as being due to increased excitability of the cardio-inhibitory centers or a decrease in the excitability of the cardio-accelerative centers. H. S. PAINE.

Physiological action of proteoses. R. B. GIBSON. *Philippine J. Sci.* 9B, 499-502(1914).—Witte peptone, after repeated treatment with 80-85% hot alc., yielded 20% of semicrystalline alc.-sol. proteoses. These, after intravenous injection into dogs, produced the typical fall in blood pressure and inhibition of blood-clotting that have also been repeatedly ascribed to other proteose preps. Since his expts. showed that the amt. of alc.-sol. proteoses necessary to produce the above effects (0.4 g. per kg. body-wt.) does not depend upon the degree of purification of the material, G. concludes that the action must be ascribed to the proteoses themselves, and not to an alc.-sol. impurity. W. A. PERLZWEIG.

Lymphagogic action of the Philippine mango, *Mangifera indica* Linnaeus. R. B. GIBSON AND I. CONCEPCION. *Philippine J. Sci.* 9B, 503-8(1914).—The rash-producing effects of ingestion of the fruit of the mango among the Philippine natives led to this investigation. G. and C. found the exts. of the dried pulp less effective than the strained and centrifuged raw juice. This was injected into anesthetized dogs. There was increased flow of lymph (almost 3 times normal), which was richer in solids than that before injection. Invariable fall in blood pressure and frequent inhibition of blood-clotting were produced. These facts place the mango juice in Heidenhain's lymphagogs of the first class (see *Arch. ges. Physiol.* 49, 209(1891)). W. A. P.

Fuller's earth; its adsorptive power, and its antidotal value for alkaloids. BERNARD FANTUS. Univ. Ill., Chicago. *J. Am. Med. Assoc.* 64, 1838-45(1915); cf. C. A. 7, 2663; 8, 3868; 9, 225.—"Alkaloidal fuller's earth compds. do not act on the stomach; but are gradually dissociated in the intestines, producing a delayed and milder general action. It has an antidotal value in morphine, cocaine, nicotine, and ipecac poisoning. It has less value in strychnine and aconitine poisoning, though even in these conditions it is capable of saving life, when combined with NaH_2PO_4 . The power of adsorbing alkaloids is strongly developed in some fuller's earths and very feeble in others. Lloyd's reagent possesses this power to the highest degree. Fuller's earth is not synonymous with kaolin, as the U. S. and National Dispensatories would lead one to infer." L. W. RIGGS.

Action of animal charcoal on peptic digestion. M. DIVELLA. *Polidinicco* 22, No. 4(1915); *J. Am. Med. Assoc.* 64, 1883.—D. exptd. with bone charcoal mixed with the mucosa taken fresh from the stomach of a pig or dog, and ground in a mortar. Digestion was materially accelerated by the charcoal admixt. in a proportion of 22%. Larger or smaller proportions were far less effectual. In the presence of poisons (strychnine, As, etc.) digestion proceeded much more effectually with the charcoal than without. L. W. RIGGS.

Diuresis induced by intravenous injection of hypertonic sugar solutions. G. TURRETTINI. *Revue méd. de la Suisse Romande* 35, No. 4(1915); *J. Am. Med. Assoc.* 64, 1947.—T. gives details of several cases of acute nephritis resulting from HgCl_2 poisoning or otherwise, in which the kidneys had ceased to act. From 300 to 500 cc. of a 25-40% soln. of glucose were injected resulting in the establishment of diuresis.

L. W. RIGGS.

Sodium fluoride poisoning. J. N. STANTON AND MAX KAHN. Pittsburgh. *J. Am. Med. Assoc.* 64, 1985(1915).—This appears to be the first case of poisoning by NaF on record. The toxic effects of the F ion are similar to those of the oxalate ion. Intravenous injections of from 0.05 to 0.1 g. NaF per kg. of dog are fatal. A 0.03% soln. of NaF will destroy epithelium. The history of a case is given. L. W. R.

Allylmorphine sulfate (enormorphone) and its pharmacodynamic effects. A. MAJOR AND WIKI. *Rev. méd. de la Suisse Romande* 1915, No. 1; *Pharm. J.* 94, 32. (1915); *Schweis. Apoth. Ztg.* 53, 119-21(1915).—Its chem. comp. is: $(\text{C}_{17}\text{H}_{17}\text{NO}(\text{OH})-(\text{OC}_2\text{H}_5)_2)_2\text{H}_2\text{SO}_4$, forms white needles, m. 173-175°, sol. in H_2O , sparingly sol. in CHCl_3 . Its pharmacological action is individual and different from that of morphine. It depresses the central nervous system, producing moderate somnolence. The local analgesic effect resembles that of morphine. It does not retard respiratory rhythm, and in medium or strong doses rather accelerates it. The compd. is a convulsant for animals in doses similar to codeine. It strongly depresses the blood pressure in the dog, due to an active vasodilatation of peripheral origin. The toxic doses for hypodermic injections are for frog, av. wt., 0.025-0.03 g.; guinea pig, per kg., 0.10-0.11 g.; rabbit per kg., 0.09-0.10 g. It is deduced that therapeutic doses of allylmorphine can have no ill effects on the human heart. It could be used as a sedative hypotensor, and moderate doses are very probably well tolerated by man. S. WALDBOTT.

Metabolic influences of bathing in the great salt lake. HELEN I. MATTILL AND H. A. MATTILL. *Am. J. Physiol.* 36, 488-500(1915).—Two subjects on a uniform diet eliminated in the urine during the bathing periods (lake water contained 19.2% solids, 93% of which were chlorides as NaCl) total N 7 and 5% resp., in excess of that of the fore period. Creatinine elimination was slightly increased while chlorides showed a rise of 21% and 27%. The latter suggests an absorption of chloride through the skin.

J. F. LYMAN.

Biological researches on combinations of amino acids with formaldehyde. A. AZZI. University of Naples. *Lo sperimentale* 69, 1-27(1915).—Expts. on dogs and chickens show that compounds of NH_2 acids with HCHO introduced into the gastrointestinal canal are easily absorbed. This is most evident in the expts. on dogs, in which the increase of total N in the urine on the day of the administration of the substance (and also on the next day) corresponds very nearly to the N introduced. There is an increase in uric acid N in chickens, and in urea-ammonia N in the dogs, and this increase, at least in the dogs, is parallel to that of the total N. In the substances used, the special properties which the NH_2 group acquires are not such as to impede physiological deamidation; and the HCHO compounds, although for many reasons different from the pure amino acids, can still serve in metabolism of the higher animals.

H. W. BANKS, 3RD.

LEGUICIC, H. AND TURLAIS, C.: Researches sur la toxicité du pétrole et quelques-unes de ses actions physiologiques. Paris: Baillière et fils. 120 pp. 3 fr.

I. ZOÖLOGY.

R. A. GORTNER.

Further experiments on the relative effect of weak and strong bases on the rate of oxidations in the egg of the sea urchin. JACQUES LOEB AND HARDOLPH WASTENEYS.

Rockefeller Inst. *J. Biol. Chem.* 21, 153-8(1915).—Fertilized eggs of *Arbacia* were suspended in neutral 0.5 *M* NaCl + KCl + CaCl₂ soln. and to portions varying amts. of NaOH and NH₄OH were added, and the rate of oxidations for 1 hr. detd. The effects of both are closely parallel, that of NH₄OH being considerably greater than would be expected if both NaOH and NH₄OH acted only through their OH-ion conc. This might be explained on the assumption that the weak base diffuses into the egg and accelerates the rate of oxidation, both at the surface and beneath the surface layer, while the action of the strong base is confined to the surface, accounting thus for the relatively excessive efficiency of NH₄OH. If this conclusion is correct, not only the surface but also the layers adjacent to the surface must be considered the seats of cell oxidations, the greater rate of oxidation at the surface being due to the fact that most of the available O is used up at the surface so that comparatively little can diffuse into the cell. A. P. L.

Perca globulin. OTTO FOLIN AND W. DENIS. Harvard Med. School. *J. Biol. Chem.* 21, 193-4(1915).—Perca globulin, discovered by Möerner (*Z. physiol. Chem.* 40, 429(1903)) in the eggs of the ordinary European perch (*Perca fluviatilis* L.), has been found in the roe of the American perch, *Perca flavescens* and *P. sorbuscedion*.

A. P. LOTHROP.

Simplest constituents required for growth and completion of the life cycle in an insect (drosophila). JACQUES LOEB. New York. *Science* 41, 169-70(1915).—Drosophila eggs laid upon sterile culture medium, consisting of sucrose or glucose soln. to which certain salts and a little filter paper were added, developed into larvae. Their growth stopped after a few days and, after a time, they died in the larvae stage. If a small quantity of one or two NH₂-acids, *e. g.*, alanine or glutamic acid, or certain NH₄ salts, *e. g.*, paratartrate, or succinate, or a combination of one NH₄ salt and one NH₂-acid was added, the larvae grew to full size, metamorphosed into pupae and normal flies. Although the filter paper contd. only 0.008% N or 1/2000 to 1/1000 of the N in the medium, the substitution of glass beads for it, to prevent the drowning of the flies, led to decidedly poorer results. The author proposes to investigate this point. W. A. PERLZWEIG.

The adaptability of amphibia to the external liquid media, by means of the regulation of the osmotic pressure of their internal liquids. III. Chemical and physico-chemical properties of the internal liquids of animals kept in distilled water and in hypertonic Ringer solutions. BRUNO BRUNACCI. *Atti accad. Lincei* 23, II, 645-51 (1914); cf. *C. A.* 8, 3475.—In continuing the expts. described previously, B. tested out the effect of keeping frogs in distd. H₂O and Ringer solns. on the f. p., cond., dry residue, ash and organic matter in the blood and lymph. In series (a) *Rana esculenta* were kept in distd. H₂O; in series (b) they were kept a short time in max. hypertonic Ringer soln. (1.0% NaCl and all other salts in proportion); in series (c) they were kept a short time in ultramaximum hypertonic Ringer soln. (0.1% NaCl, etc.); in series (d) they were kept a long time in (1) slightly hypertonic and (2) still more hypertonic Ringer solns. The analytical data are given in 5 tables. In general it was found that the frog adapts itself to the increased conc. of the external liquid media by raising the conc. of its internal liquids. This increase at first takes place at the expense of the surrounding electrolytes but later it is more at the expense of the osmotically active organic material that is obtained from the organism. A comparison of the elec. cond. of the lymph and of the blood shows that the osmotic pressure of both tends to remain at a level higher than that of the external media. Another fact that was clearly observed is the succession with which lymph and urine are formed. At first lymph is formed and then urine. The former increases rapidly in the 1st hr. and remains at a high level for the 1st 8-10 days; then it diminishes gradually and finally disappears altogether. The urine is formed later from the lymph but its elimination into the medium is continuous.

E. J. WITZEMANN.

12. FOODS.

W. D. BIGELOW AND F. F. FITZGERALD.

The training of food chemists. A. JUCKENACK. *Z. Nahr.-Genussm.* 28, 472-80 (1914).—Changes in the practice in vogue in Germany are proposed. A. F. SEEKER.

Chicory and its substitutes. E. COLLIN. *Ann. fals.* 8, 63-79(1915).—Since the beginning of the war the price of chicory has trebled and is still going up. The principal supply of chicory used to come from Flanders and those parts of France now controlled by Germany. The macroscopic characteristics of chicory and its substitutes are described, and numerous cuts showing the microscopic appearance and histological characteristics given. Powdered chicory, beets, carrots, artichokes, figs, barley, apples, pears, leguminous seeds, *Cassia occidentalis*, acorns, grape seeds, browned bread, peat, coffee marc and date seeds, are treated in detail. Peanut, cacao, bean, almond and other shells, and even sawdust are sometimes found in chicory mixts. H. S. BAILY.

Heather tea, a substitute for black tea. SCHNEIDER. *Pharm. Zentralhalle* 1914, Nos. 49-51; *Schweis. Apoth. Ztg.* 53, 173-4 (1915).—The infusion of the flowering branches of *Calluna vulgaris* is pale yellow, has a faint odor and a feebly astringent taste. It is recommended as a substitute for tea which is becoming scarce in Germany. As the flowers are visited by bees, the herb may be gathered after flowering. The infusion is said to have faint diaphoretic properties. S. WALDBOTT.

The structure of pepper. Some new features. T. E. WALLIS. *Analyst* 40, 190-197 (1915).—Illustrated description of previously unnoted microscopical features. P. B. DUNBAR.

Chemical analysis of spices. CH. ARRAGON. Lausanne. *Schweis. Apoth. Ztg.* 53, 220-5(1915).—The methods of the Swiss Food Code for exam. of spices require modification. For detn. of H_2O distil 10 g. of substance with 60 cc. of oil of turpentine (b. 140-160°) in a special app. and centrifuge the receiving vessel. The H_2O collects at the bottom of a narrow 2 cc. tube graduated into 0.05 cc. Results on materials free from volatile matter agree well with those obtained by direct drying. For detn. of fatty matter and essential oils, dry 10 g. of material over H_2SO_4 for 6 hrs., ext. with dry Et_2O for 8 hrs., distil off the Et_2O at the rate of 1 drop per sec., remove traces of Et_2O by air current, cool and weigh. This detn. fat + essential oil. Distil off the latter by steam to a vol. of about 250 cc. Take up residue with 40 cc. Et_2O , evap. Et_2O in tared flask, dry for 1 hr. and weigh the fat. By difference the essential oil is detd. For detn. of starch, the method of Sachse is followed, modified by 1½ hrs. instead of 3 hrs. boiling, and use of HCl , $d = 1.125$. Cellulose is detd. by König's method. Of 33 authentic specimens of various spices, results of detns. of H_2O , ash, fat, essential oils, protein, cellulose and reducing substances (from starch test) are given. Numbers from the same spice are rather constant. Examn. of 50 com. samples gave results close to those for genuine samples. S. WALDBOTT.

The adulteration of marjoram. R. SEEGER. Innsbruck. *Z. Nahr.-Genussm.* 29, 156-58 (1915).—Out of many samples of marjoram purchased in different cities in Austria, 83% were found adulterated, the poisonous *Coriaria myrtifolia* L., *Cistus* and *Alibaea* being the main adulterants. These adulterants ran as high as 80% in some of the samples. The method of detg. the *Coriaria* is as follows: Boil a 2 cc. sample 1 min. in a test tube with alc. to expel the air from the interior of the leaf particles, heat in 10% KOH for 2 min. to clarify and differentiate the particles, as the different species of leaves will turn different colors, the marjoram remaining light brown or yellow, while the *Cistus* becomes black, and the *Coriaria* brown. Wash out the KOH with H_2O , and then sep. the leaf particles mechanically under a lens. An approximate

quant. sepn. can be made by suspending a little of the sample in water. *Coriaria* being heavier, sinks to the bottom, while the marjoram floats on the water. By sepg., drying and weighing, the % comp. may be detd. Most of the adulterated samples were imported from Southern France.

HELEN N. ELLIOTT.

The seeds of the *Chenopodium album* L. T. F. HANAUSEK. *Z. Nahr.-Genussm.* 29, 17-26(1915).—A study of the microscopic detection of the seeds of this weed in coarse meals occasioned the investigation of the plant. This, or similar plants, has been used since early times as an emergency food, especially as "famine bread" in Russia in 1891-2. A detailed morphological and anatomical description of the seed is given. An appendix of the article deals with the so-called "red-grass" of Russia, a name which seems to be applied to different plants in different districts.

L. D. ELLIOTT.

Acidity and ash of vanilla extract. A. L. WINTON, A. R. ALBRIGT AND E. H. BERRY. *J. Ind. Eng. Chem.* 7, 516-9(1915).—In 77 samples examd. total acidity ranged from 30 to 52 cc. 0.1 *N* alkali per 100 cc., acidity other than vanillin 14-42 cc., total ash 0.220-0.432 g. per 100 cc., sol. ash 0.179-0.357 g. per 100 cc., alkalinity of total ash 30-54 cc. 0.1 *N* acid per 100 cc., alkalinity of sol. ash 22-40 cc. 0.1 *N* acid per 100 cc. The same values were found with and without sugar or glycerol in the menstruum. Ash was increased and acidity decreased by diminishing the strength of alc. in the menstruum.

ISADOR MILLER.

Modification of Wichmann's method for the detection of small amounts of coumarin, particularly in factitious vanilla extracts. J. R. DEAN. *J. Ind. Eng. Chem.* 7, 519 (1915).—The modification is independent of the presence of salicylic acid and saccharin. Render a de-alcoholized portion of the ext. alk. with 5 cc. NH_4OH and ext. with 15 cc. Et_2O . Transfer Et_2O to nickel or porcelain crucible and evap. Add 5 drops 50% KOH , dry and fuse at lowest possible temp. Avoid blackening. Dissolve mass in a few cc. H_2O , acidify with dil. H_2SO_4 and transfer to a test tube. Add 5 cc. CHCl_3 , shake vigorously, allow to settle and remove CHCl_3 with pipet. Filter CHCl_3 , add 1-2 cc. H_2O containing a drop FeCl_3 and shake. Coumarin is indicated by the formation of the purple color of ferric salicylate.

ISADOR MILLER.

The interpretation of the results of the analysis of fatty substances. Issued by the French Bureau for the Suppression of Adulteration, for the interpretation of analyses made by the official French methods. *Ann. fals.* 8, 81-9(1915).—Cow butter: av. consts. for pure butter; Crismer no. (EtOH = 0.7967 sp. gr.), 54; R. no. (by glycerol method), 28; Polenske no., 2.25; sapon no., 225; total sol. acids, 24. The figs. for oleomargarine, coconut butter, lard, tallow and vegetable oils used in margarine are given, together with a formula for calcg. % of some of these when found in butter; olive oil, walnut oil, lard and cacao butter are similarly treated.

H. S. BAILEY.

The examination of animal fats for phytosterol. M. FRITZSCHE. *Z. Nahr.-Genussm.* 29, 150-1(1915); cf. *C. A.* 8, 1315.—The official method of examg. animal fats for vegetable fats in Germany has consisted in detg. phytosterol by the Marcusson-Schilling-digitonin reaction (cf. *C. A.* 8, 1022). Klostermann has shown this method to be faulty (*C. A.* 8, 3246), by proving that all the phytosterol in fats is not in the free form, but partly present as an ester, and therefore not all sapond. in the above method. F. has made comparative detns. by the original method and by the modification proposed by Klostermann and finds the latter to be more sensitive.

HELEN N. ELLIOTT.

Cholesterol content of egg fat. P. BERG AND J. ANGERHAUSEN. *Hamburg. Z. Nahr.-Genussm.* 29, 9-10(1915).—Tests for cholesterol by the digitalin method of sepn. were made on 6 samples of egg yolk; (1) a sample of yolk from an oleomargarine factory; (2) and (3) 2 samples of Chinese hen yolk; (4) a domestic hen yolk; (5) and (6) 2 Chinese duck yolks. The yolk after drying with sand was extd. with ether, the

ext. evapd., filtered and dried. Five g. of the resulting fat were sapond. with alc. potash and the unsapon. matter taken up with ether, according to the "meat inspection methods," shaking out 6 times with ether instead of four. The total unsapon. matter obtained from the egg fats was: (1) 3.37%, (2) 4.84%, (3) 4.96%, (4) 5.08%, (5) 4.22%, (6) 4.22%. The value of $[\alpha]$ in (1) was -32° , corresponding closely to that of pure cholesterol. The alc. soln. of the unsapon. constituents was pptd. with digitalin (cf. C. A. 9, 249). The cholesterol contents corresponding to the digitalin ppt. obtained for the 6 samples were: (1) 3.0%, (2) 4.34%, (3) 4.44%, (4) 4.44%, (5) 3.84%, (6) 3.94%. Should further expts. show no more variation in the cholesterol content of egg fats, the detn. of cholesterol in egg noodles, egg cognacs, etc. should be of value. The large wt. of the digitonide ppt. makes the quant. estn. of small amts. of the latter a simple matter.

L. D. ELLIOTT.

The pasteurization of milk. BORDAS. *Ann. fals.* 8, 89-93(1915).—A discussion of the relative merits of various pasteurization methods as applied to milk.

H. S. BAILEY.

The titration of milk with alcohol of various concentrations. W. D. KOOPER. *Molkerei Ztg. Hildesheim* 28, 715(1914); *Biedermanns Zentr.* 44, 129(1915).—K. investigated the method recommended by Löhnis (cf. C. A. 9, 492) with a view to making the test more accurate. From the results of his expts. he is led to doubt whether this can be looked upon as a quick method for detg. the bacterial content of milk, even if it could be carried out practically. "If such large variations occur in mixed milks, to what extent can this be the case in single milks which are subject to much larger variations in their chem. and biol. nature?"

C. F. MILLER.

The bacteriology of cheese of the Emmenthaler type. E. E. ELDRIDGE and L. A. ROGERS. U. S. Dept. Agr., Bur. An. Ind. *Centr. Bakt. Parasitenk., Abt. II* 40, 5-21 (1914).—The problems involved in the ripening of Cheddar and Emmenthaler cheeses are discussed and a review of the literature is given. A whey agar gave the most satisfactory results for a systematic study of the bacteria of Emmenthaler cheese. Cultures of *B. bulgaricus* form good sized colonies on this medium in 4 or 5 days at 30° . Quant. and qual. bacteriological analyses of 3 domestic Emmenthaler cheeses were made through a nearly complete ripening period. The organisms isolated were divided into 3 groups: A coccus, a very short slender rod and a long rod. Most of the cultures grew scantily or not at all in ordinary broth. The fermentation tests with a special broth failed to differentiate the cultures into distinct groups. None of the organisms fermented starch. As some of the cultures formed gas, a special medium was prepared to favor this characteristic. The CO_2 produced was absorbed by a standard soln. of $\text{Ba}(\text{OH})_2$ in a special fermentation tube designed for this work. Thirty % of all the cultures produced less than 1 cc. of CO_2 ; 4.7% produced over 5 cc. The bacterial counts showed that young cheese contained short rods almost exclusively and that the max. number of these organisms occurred in from 6 to 10 weeks. The cocci appeared at intervals during the ripening process. The short and long rods were about equal in number after 6 or 8 weeks while the max. of the latter group occurred in from 9 to 23 weeks. Towards the end of the ripening period the long rods were usually the only ones present. The propionic bacteria of Freudenreich and Jensen were found only once in small numbers in a special cheese. Preliminary inoculation expts. have indicated that normal cheese of excellent quality may be made by adding pure cultures to the milk.

F. M. SCALES.

Chemical viewpoints in the preparation of Grana cheese. G. FASCETTI. *Staz. sper. agrar. ital.* 47, 541-68 (1914); through *Chem. Zentr.* 1915, I, 387.—The acid content of the milk is of great influence on the cheese formation, during which process the ash content of the serum increases. This increase takes place at the expense of

the CaO and P_2O_5 content. In natural souring an equil. between the ash constituents of the serum and the casein mass is gradually approached and a special fermentative equil. among the bacteria, different for various cheeses, is reached. L. J. G.

A method for the estimation of chlorides in cheese. ELFREIDA C. V. CORNISH AND JOHN GOLDING. *Analyst* 40, 197-203 (1915).—The method is as follows: Weigh 1 g. of cheese on a Cl-free filter paper and place in a Kjeldahl flask with 20-30 cc. concd. N-free H_2SO_4 and a few small pieces of pumice. Connect the flask with an absorption bottle containing a known amt. of 0.1 N AgNO_3 and 50% of concd. HNO_3 . Connect the bottle in turn with a control wash bottle and an aspirator. To avoid the use of a rubber or cork stopper the Kjeldahl flask is connected with the absorption bottle by means of a bent soda-lime tube the tubular end of which is large enough to just fill the neck of the flask. After the addition of the H_2SO_4 and a little distd. water connect the app. and begin the aspiration. Mix the contents of the flask well by rotating; then heat gently at first and finally to boiling. In order to prevent condensation of HCl in the neck of the flask heat the neck with a movable Bunsen burner or by means of a specially fitted steam bath. When the reaction is completed (detd. by inserting another absorption bottle with fresh AgNO_3 soln.) filter off the AgCl , wash the ppt. free from AgNO_3 and add the washings to the filtrate. Det. the residual AgNO_3 by the Volhard method. The soln. remaining in the Kjeldahl flask may be utilized for the detn. of N. P. B. DUNBAR.

The determination of the meat extract content of bouillon cubes. T. SUDENDORF AND O. LAHRMANN. Hamburg. *Z. Nahr.-Genussm.* 29, 1-8 (1915).—This detn. being based upon the creatinine content of the cubes renders an exact detn. of this constituent essential. Some materials, not containing creatinine, that are at times employed in the prep. of bouillon cubes react with alkaline picrates to produce colors which vitiate detns. conducted by the Folin method. Such materials are yeast ext., caramel, and tomato juice. All of these, particularly the last, when used in amts. that might be employed in bouillon cubes were found to produce a coloration equiv. to notable amts. of creatinine. Similar results were obtained with acetone, Et acetoacetate, H_2S , hydroquinone and semi-carbazide, which might be used to simulate the reaction for the purpose of deceiving analysts, though such a contingency is regarded as unlikely, due consideration being given to the fact that the first three would be eliminated in the process of inversion. Expts. showed that bone charcoal is not suitable as an agent for removing any of these substances since it also removes some of the creatinine. Complete success was obtained by preliminary treatment with KMnO_4 according to the Lendrich and Nottbohm method for purifying caffeine exts. (cf. *C. A.* 3, 1429), exptl. evidence given showing that in the presence of NaCl the interfering substances are completely eliminated without affecting the creatinine. The complete method follows: Prepare an aq. soln. of the bouillon cubes of known strength (about 10%) and filter to remove fat. Introduce an aliquot portion of the filtrate (10-20 cc.) into a porcelain (75 cc.) capsule, add 10 cc. of N HCl and evap. to dryness on a steam bath, allowing 2 hrs. for the evapn. Dissolve the residue in water, exactly neutralize to litmus with 0.5 N NaOH , rinse into an Erlenmeyer flask and dil. to about 75 cc. with water. Add KMnO_4 soln. (1% KMnO_4 containing 2.5% NaCl) drop by drop with const. shaking until the reddish color of KMnO_4 persists for several min. If the mixt. becomes thick, dil. with a little water. Then add H_2O_2 soln. (3% H_2O_2 containing 1 cc. glacial acetic acid per 100 cc.) drop by drop until excess of KMnO_4 is destroyed, and heat on a steam bath for 5-10 min. or until the Mn oxides flocculate. Filter by means of suction and wash the ppt. until the Cl reaction disappears. Evap. the almost colorless filtrate to small vol., rinse into a 500 cc. graduated flask, make up to about 20 cc., cool, and treat with 10 cc. of 10% NaOH and 20 cc. of satd. picric acid

soln. After standing 5 min. make up to the 500 cc. mark with water and compare the color in a Duboscq colorimeter against 0.5 N $K_2Cr_2O_7$ of which a column of 8 mm. corresponds to 10 mg. of creatinine.

A. F. SEEKER.

Investigation and examination of sausage. D. SCHENK AND H. BURMEISTER. Hyg.-chem. Investigation Sta. of the 21st Army Corps. *Z. Nahr.-Genussm.* 29, 146-50 (1915).—The convenience of sausages in transportation is bringing this form of food into general use in the army. E. Feder found that in meats the ratio of H_2O to organic non-fats is about 3-1 and should not be over 4-1 (cf. *C. A.* 7, 3170; 8, 3601). S. and B. applied this method to the analysis of a large number of samples of fresh sausages which were to be examd. for adulteration. In the case of smoked sausages the salt content of the sample affords one of the best means of detg. the value of the sausage, since the presence of an excessive amt. of NaCl is common in this product.

LOUIS D. ELLIOTT.

Sardines in olive oil. G. BLANC. *Ann. fals.* 8, 79-80(1915).—The French law requires that "Sardines a l'huile d'olive pure, vierge, extra," etc., be both cooked and packed in pure olive oil. As a special provision "Sardines a l'huile d'olive" may be cooked in oils other than olive, but must be packed in pure olive oil. The oil present in the fish effects the const. of the olive oil as drained from the canned sardines. B. concludes from his expts. that all olive oils from French-canned sardines which have an I no. above 90 and an oleorefractometer reading greater than plus (eleven) are adulterated.

H. S. BAILEY.

Effect of the mineral content of water on canned foods. H. L. HUENINK AND E. BARTOW. *J. Ind. Eng. Chem.* 7, 495-6(1915).—H. and B. describe results of expts. on canning beans, using distd. H_2O , and H_2O containing definite amts. of $CaCl_2$, $MgCl_2$, Na_2CO_3 as well as mixts. of $CaCl_2$, $CaSO_4$, $Ca(HCO_3)_2$, $MgCl_2$, $MgSO_4$, $Mg(HCO_3)_2$, Na_2CO_3 and $NaHCO_3$.

ISADOR MILLER.

Investigation of commercial fruit jellies. LEON A. CONGDON. *North Dakota Special Bull.* 3, No. 8, 112-24 (1914).—Detailed analyses of nineteen jellies are presented in tables.

R. C. ROARK.

Notes on the hydrocyanic acid content of sorghum. J. J. WILLAMAN AND R. M. WHEAT. *J. Agr. Res.* 4, 179-85(1915).—When sorghum is grown on poor, infertile soil, added N may slightly increase the amt. of HCN in the plant. With a fertile soil and abundant N this effect may not be produced. During the first 3 or 4 weeks of the plant's life the HCN is concd. in the stalks. Then it rapidly decreases and disappears from there but apparently persists in the leaves in decreasing % until maturity. Climate and variety may be more important factors than soil N in detg. the amt. of the acid in the plant. Complete hydrolysis of the glucoside (dhurrin) is obtained by digesting the macerated tissue for 2 hrs. at 40-45°.

M. X. S.

Hydrocyanic acid from haricot beans. HERBERT BLAIR. *Pharm. J.* 94, 586 (1915).—Some haricot beans (*Phaseolus lunatus*) were steeped overnight in a covered pan. On opening the pan, a strong odor of HCN was noticed. The beans were then boiled and eaten without ill effect. Their comp. was as follows: H_2O , 12.8; ash, 3.75; fat, 1.86; fiber, 4.58; albumin, 19.05; carbohydrates (by difference), 57.96%. To det. the amt. of HCN formed, 1 g. of ground beans was macerated in H_2O at 45°, and the HCN conducted into dil. KOH soln. by a current of pure H passing through the liquid at the rate of 10 l. per hr. After 27, 49, 87, 117, 198, 358 min., the following amts. of HCN in fractions of a mg. were absorbed: 0.025, 0.050, 0.080, 0.100, 0.120, 0.160 mg. resp.

S. WALDBOTT.

What purpose is achieved by treating pearl barley with sulfur dioxide and talc? W. FLÜCKER AND R. FLEBBE. *Z. Nahr.-Genussm.* 28, 549-70(1914).—A compre-

hensive review of the literature is given upon the occurrence and favorable conditions for the growth of microorganisms upon food grains of various kinds. The contention of millers that the use of SO_2 and talc is required to preserve pearl barley properly was subjected to exptl. investigation, the conclusion being that when the grain is properly dried to a moisture content of 12% or less and suitably cleaned and decorticated the product will keep as well without sulfuring. Numerous bacteriological tests showed that in general crude barley gave a total bacterial count exceeding 1,000,000 per g.; after washing this was reduced to 100,000, and after decortivating to less than 50,000. Comparative counts in decorticated barley of heat-resisting bacteria showed between 60 and 1280 for the untreated product, and between 20 and 300 for sulfured barley, the corresponding figures for mold spores being 20 to 5920 and 10 to 975, resp., and for total bacteria 4,600 to 65,350 and 100 to 2680. The authors consider that these differences are practically insignificant insofar as the actual keeping qualities of the grain are concerned. The efficiency of talc as a preservative was tested by storing samples coated with 0.2 to 1.38% as well as untreated barley in a moist atm. No difference in keeping quality was observed. The authors conclude that SO_2 and talc are employed primarily to bleach the grain and to secure a uniformity of appearance that makes inferior Russian barley resemble the more expensive German grain. Incidentally it permits a higher moisture content without danger of spoiling. A. F. SEEKER.

Microscopic detection of potato starch in bread. G. SCHÜTZ AND L. WEIN. Kgl. Hygien. Inst., Beuthen. *Chem. Ztg.* 39, 143(1915).—A few crumbs of bread are softened with a little H_2O on a watch-glass, mixed, a small portion placed between 2 cover-glasses and carefully pressed and rubbed thin and uniform and the glasses sepd. and completely air-dried and fixed in the usual way by passing through a flame 3 times. A few drops of strong soln. of neutral red are added and left 1–1.5 min. in the cold, then carefully washed off, and the substance in the H_2O examd. with low power. Rye and wheat starch are colorless, potato starch a transient rose-red. Similar treatment with a strong soln. of methylene blue dild. with 9 parts H_2O , allowing 1 min. to color, gives a deep blue to potato starch and produces no color in rye and wheat. Treated with vesuvin (1 part strong soln. + 9 parts H_2O , time 1.5–2.0 min.), then with methylene blue (not the reverse), colors potato starch olive green; the others remain colorless. The best results are obtained by treating with a strong soln. of thionine + 2 parts H_2O , allowing 2.5–3 min. to color. Potato starch is transient lilac; the others are colorless. In cases where freshly cooked potatoes, instead of the meal, have been added the starch grains may have been destroyed by the above method, and if few are visible several crumbs are taken from different parts of the bread, placed on an object glass, moistened with H_2O , carefully pressed without rubbing with a spatula, excess H_2O removed with blotting paper, a few drops thionine soln. added and removed with blotting paper after 2–3 min. A few drops H_2O are added and sucked off with blotting paper. This washing is repeated and the coloring removed as completely as possible, a cover-glass laid on and pressed down carefully and the sample examd. with a low power. The so-called paste cells are now easily distinguished by a red color. J. H. MOORE.

Crude fiber estimation by the "Weender" method. R. FANTO AND W. NIKOLITSCH. Vienna. *Z. anal. Chem.* 54, 73–6(1915).—The ordinary method for crude fiber is modified by using paper extn. thimbles in place of linen or glass wool filters. The washing is carried out by dipping the thimble in a beaker of distd. H_2O , which in passing through the walls into the thimble washes off the fine fibers and keeps the walls clean and fast-filtering. Results given agree with those obtained by the usual method. G. W. M.

A further study of the variation in weight of a fifty pound sack of flour during storage. T. SANDERSON. *North Dakota Special Bull.* 3, No. 15, 250–9(1915).—The

normal moisture content of flour in N. Dakota is about 11.0%, and of wheat, about 13.0%. S. concludes that wheat with normal moisture 13.0% with not to exceed 2.0% added moisture in tempering will produce a flour with moisture content of about 11.0%, that will not vary in storage more than 2.0% and that the variation is as likely to be above as below the original wt., owing to atm. conditions.

R. C. ROARK.

Minnesota wheat investigations. III. Composition and quality of spring and winter wheats, crops of 1912 and 1913. C. H. BAILEY. Minn. Agr. Expt. Sta., *Bull.* 143, 5-58(1914).

R. C. ROARK.

Hard red spring wheats from the demonstration farms. Studies of wheat quality under North Dakota conditions. W. L. STOCKMAN. *North Dakota Special Bull.* 3, No. 9, 129-40(1914).

R. C. ROARK.

Shall we bake with yeast? WA. OSTWALD. *Chem. Ztg.* 39, 121(1915).—To avoid about 3% loss from the action of yeast O. advises Germans to use NaHCO_3 and HCl.

J. H. MOORE.

The use of sugar beets for human food and for fodder. A. HERZFELD AND FOX. *Deut. Zuckerind.* 39, 885(1914); through *Wochschr. Zentr. Rübensuckerind.* 52, 882(1914).—Cut the beets to hazelnut size, cover with H_2O , add 1 g. cryst. Na_2CO_3 per 100 g. beets, and boil 20-30 min. This softens them and removes the biting taste completely. Pour off half the H_2O , acidify with vinegar, and finish as desired. For fodder, use only 0.25 g. Na_2CO_3 and acidify cautiously with As-free HCl.

W. L. BADGER.

Blood bread. R. KOBERT. *Chem. Ztg.* 39, 69(1915).—K. recommends mixing 10% swine blood with all meal during the war.

J. H. MOORE.

Composition and digestibility of chloroform extract of hays and fodders. G. S. FRAPS AND J. B. RATHER. Texas Agr. Expt. Sta., *Bull.* 162, 20 pp.(1913).— CHCl_3 extracts considerable amts. of substance from hays and fodders which have previously been extd. with Et_2O . The CHCl_3 ext. contains wax alcs., fatty acids, chlorophyll and unknown substances; it contains less unsaponifiable and more saponifiable matter than the Et_2O ext. and also contains a high % of substances similar to chlorophyll. The saponifiable matter of the CHCl_3 ext. is more digestible than the saponifiable matter of the Et_2O ext. A detailed method of analysis of the CHCl_3 ext. is given.

E. H.

Comparative feeding experiments with different kinds of hay from low moor, high moor, marsh and mineral soils. BR. TACKER. *Ber. Landw. Reichs. Intern.* 32(1914); *Biedermanns Zentr.* 43, 714-8.—Chem. studies as to albumin, fat, N-free ext., crude fiber, and starch values are given.

W. H. FRY.

Does butter fat contain nitrogen and phosphorus (OSBORNE) 11A. Detection of rape oil (KREIS) 27. Detection of methyl alcohol (FELLENBERG) 7.

FIGER, J.: Ueber neuere Methoden der Honiguntersuchung. Leipzig: Akadem. Verlagsges. 2 M.

KERP, W.: Nahrungsmittelchemie in Vortragen. Leipzig: Akadem. Verlagsges. 579 ss. 28 M.

Nahrungs-u. Genussmitteln sowie Gebrauchsgegenständen f. das Deutsche Reich; Experimentelle u. kritische Beiträge zur Neubearbeitung der Vereinbarungen zur einheitlichen Untersuchung und Beurteilung von. 2 Bd. Hrg. vom Kaiserl. Gesundheitsamte. Berlin: J. Springer. 5 M.

PAUL, T.: *Nahrungsmittelchemie mit besonderer Berücksicht. der modernen physikalisch-chemischen Lehren.* Leipzig: Akadem. Verlagsges. 4.50 M.

U. S., 1,141,238-9, June 1. W. B. FENN. Apparatus and method for sterilizing and canning food products.

U. S., 1,141,240-1-2, June 1. W. B. FENN. Apparatus and method of sterilizing foods by treatment with jets of steam preparatory to hermetically sealing in cans.

U. S., 1,141,458, June 1. H. C. GORE. Preparing sirup from apple juice or other fruit juice by adding milk of lime to the juice in amt. sufficient to neutralize about 90% of the acid present, heating to 100°, filtering, evapg. until crystals of Ca malate are formed and sepg. the crystals by a filter-press.

U. S., 1,141,566, June 1. J. F. LESTER. Pasteurizing milk by heating to a pasteurizing temp., filtering without allowing the temp. to fall below the pasteurizing point and continuing the heating after filtration to complete the pasteurization.

U. S., 1,141,622, June 1. E. C. EMERY. Forming a stable stock food from various waste unspoilied remnant foods from table or kitchen by treating with steam under pressure to sterilize and mix the fats and other constituents.

U. S., 1,141,816, June 1. E. J. MOOKLAR. Algaroba fruit is prepd. for use as food by drying the entire fruit, including the pods, to the point of crystn. of the sugar in the fruit, at about 205°, grinding, roasting to a brown color, forming an ext. from the roasted meal by percolation with H₂O and evapg. the ext. to dryness after filtering it. The product is used to make a beverage.

U. S., 1,141,879, June 1. I. S. MERRELL and O. E. MERRELL. Desiccating milk, eggs or other liquids in a whirling current of air into which the liquid is introduced as a fine mist.

U. S., 1,142,243, June 8. J. G. FALLS. Preparing foods from cottonseed meats, meal or flour, by heating to about 120° to remove the unpleasant taste and odor and then mixing with other foods if desired.

U. S., 1,142,346, June 8. G. P. MARINER. Pasty food formed of roasted peanuts 6, roasted cocoa 1 and sugar 1 part.

Brit., 1,874, Jan. 23, 1914. J. J. M. M. BALÉS. Cocoa preparations are made by mixing together cocoa, dried yolk of eggs, dried milk, agar-agar, and sugar.

14. WATER, SEWAGE AND SANITATION.

EDWARD BARTOW.

Rapid method for determining magnesium in water. F. J. ANDREW. *Chem. Analyst* 12, 18-20(1915).—Det. Ca by pptg. as CaC₂O₄ and titrating with KMnO₄. Estimate total hardness with soda reagent. Express both as p. p. m. CaCO₃, and express the difference, which is due to Mg, in terms of CaCO₃. The result multiplied by 0.8432 gives true MgCO₃. Gravimetric method (Mg₂P₂O₇) on 3 natural waters gave 14.88, 36.00 and 37.50 p. p. m. MgCO₃. Corresponding values by above method are 14.82, 38.60, 38.20.

H. M. LANCASTER.

Tables for the calculation of the magnesium chloride content of river waters. H. FISCHER. *Pharm. Zentralhalle* 56, 73-5(1915); through *Chem. Zentr.* 1915, I, 705.—F. employs Zink and Hollandt's modification of Hyer's method for the detn. of MgCl₂ (*C. A.* 8, 973, 2436, 3335); evap. 200 cc. H₂O to dryness on water bath, dry 2½ hr. at 105°, ext. residue with abs. alc. 3 times, filter, wash, evap. on water bath,

add hot H_2O to residue, then add NH_4Cl and proceed as in sepn. of Ca and Mg. A table gives the amts. of Mg and $MgCl_2$ corresponding to the different amts. of $Mg_2P_2O_7$ found.

C. O. EWING.

Water analysis and the nitrogen content of water. WILLIAM M. BOOTH. *J. Am. Water Works Assoc.* 2, 61-4(1915).—Supplement to and correction of a previous paper (C. A. 8, 3335). From 129 analyses tabulated in the previous paper the author concludes: "Many natural waters of central New York contain N in all of the forms reported in the analytical scheme," (free and albuminoid NH_3 , NO_2 , NO_3 .) "Water containing sewage is in a highly unstable condition as regards the form in which the N is found. Records should be kept showing the N content of potable waters, and weekly, if possible daily, tests should be made. No quant. relationship exists between the N of water and the bacterial content. The presence of NO_3 in water ordinarily free from this form of N must be regarded with suspicion. If nitrates are present in water above 1 part per mil., it may have an unwholesome source." W. D. COLLINS.

Stripping water works reservoirs. ALLEN HAZEN AND G. C. WHIPPLE. *Eng. News* 73, 858-60(1915).—Logarithmic probability paper has been used to plot the growth of organisms in stripped and unstripped reservoirs. The stripped reservoirs show no advantage over the unstripped. The methods of study are outlined with data on the Boston and New York water systems.

LANGDON PEARSE.

Is it possible to infect water supplies artificially? VON WASSERMANN. *Das Wasser* 10, 724-5(1914); *Wasser u. Abwasser* 9, 221-2(1915).—The possibility of causing extensive epidemics by infecting water supplies artificially with cultures of cholera and typhoid bacilli should not be over-estimated. The multiplication of these bacteria in pure water is limited on account of the presence of the saprophytes. The filtration of surface water provides an additional safeguard.

ARTHUR LEDERER.

Damages for water-borne typhoid fever. *Eng. News* 73, 897-8(1915); *Eng. Contr.* 43, 423-4(1915).—In the Supreme Court of N. J. in the case of H. B. Jones vs. Mount Holly Water Company, the verdict of \$750 to H. B. Jones was upheld for expense and loss of time of 3 children sick with typhoid. The court held the company had a contractual duty to supply pure wholesome water.

LANGDON PEARSE.

Water supply and typhoid fever at Cumberland, Md. A. G. FOWLER AND MAX J. COULTON. *Eng. News* 73, 969-70(1915).—Abandoning the polluted Potomac river and securing a filtered chlorinated water supply from a sparsely populated drainage area, subject to sanitary inspection, has in conjunction with a reorganized health department reduced typhoid from a high record of 568 cases in 1910 to 61 cases in 1914. Five lbs. $Ca(OCl)_2$ per mil. gal. is used. The population in 1914 was 25,054.

L. P.

Endemic goiter, possible relationship to water supply. T. C. CLARK AND C. C. PIERCE. *Pub. Health Reports* 29, 939-48(1914).—All races are subject to goiter, but the people living in regions overlain by Silurian, Carboniferous, and Permian systems are most susceptible, while those living over eruptive or cryst. rocks of the Archean group, the Jurassic, Cretaceous, and post-Tertiary seas as well as all fresh-water deposits are comparatively free from goiter. Chemistry has failed to show the relationship between the dissolved salts and goiter, it being found in both hard and soft water regions. It is also thought that goitrous waters give a higher bacterial count than non-goitrous waters.

J. GAUB.

Lead poisoning. RAMBOUSEK. *Z. Kommunal-Hygiene* 5, 8-9(1914); *Wasser u. Abwasser* 9, 228(1915).—Pb poisoning is contracted through the use of snuffing tobacco, enamelled household containers, and drinking water. It is essential that the practicing physician familiarize himself with the characteristics of Pb poisoning.

ARTHUR LEDERER.

The removal of acid from water. H. MILDNER. *Das Wasser. Heft 22*, 637-41 (1914); *Wasser u. Abwasser* 9, 214 (1915).—The elimination of the CO_2 from the water is a necessity for practical, economic and hygienic reasons. The procedure of removal can be classified into two groups, the chemical and the mechanical. The chemicals employed are Na_2CO_3 , NaOH and $\text{Ca}(\text{OH})_2$. Scheelchase recommends percolation through broken marble. ARTHUR LEDERER.

The removal of oil from condensation water. H. W. KALI 8, 337 (1914); *Wasser u. Abwasser* 9, 302-3 (1915).—The condensed water is valuable for boiler feed purposes on account of its lack of incrustants and its high temp. It always contains, however, more or less mineral oil. An electrolytic method for the removal of oil is described. The water is permitted to pass among a number of electrodes. A small quantity of hard water or soda soln. is added in order to make the water conductive. The oil emulsion coagulates in the form of a fine floc. The water is then subjected to rapid filtration, resulting in a perfectly clear effluent. It is advisable to employ the process while the water is still warm. The consumption of direct current varies between 0.15 and 0.20 kw. per cu. m. of water. The cost of purification is approx. 1 pf. per cu. m. ARTHUR LEDERER.

Misbranding of Allouez mineral water. U. S. Dept. of Agr., Bur. of Chem., *Service and Regulatory Announcement, Supplement 2*, 102. *Notice of Judgment* 3583. The water was found by analysis to contain added NaCl and was therefore misbranded. A fine was imposed. E. BARTOW.

Ground water in southeastern Nevada. EVERETT CARPENTER. U. S. Geol. Survey, *Water Supply Paper* 365 (1915).—Wells, springs and other sources are described in detail. Analyses of 42 samples by S. C. Dinsmore show variations in solids from 132 to 7,355 parts per mil. The waters are classified in regard to hardness, scaling and foaming ingredients, probability of corrosion, and alkali coefficient. W. D. C.

Geology and water resources of Tularosa Basin, New Mexico. O. E. MEINZER AND R. F. HARR. Prepared in cooperation with the New Mexico Agr. Exp. Sta. U. S. Geol. Survey, *Water Supply Paper* 343, 311 pp. (1915).—Supplies for irrigation, railroad and public use, and the watering places on routes of travel are described in great detail. Of 103 samples of water from the valley fill, only 6 contained less than 500 parts of solids per mil., while 23 had more than 5000 parts. W. D. COLLINS.

Geology and underground waters of the southeastern part of the Texas coastal plain. ALEXANDER DEUSSEN. U. S. Geol. Survey, *Water Supply Paper* No. 335, 365 pp. (1915).—Analyses of 78 spring and well waters are classified by R. B. Dole according to principles discussed (pp. 100-106), as to mineral content (high or low), chemical character, suitability for boilers, for irrigation, for domestic use and the possibility of improvement by softening. Geology, hydrology, and well data, with many well logs and figures for amount of supply, are given in full for each county. W. D. C.

Use of liquid chlorine at Buffalo water works intake. H. F. WAGNER. *Eng. News* 73, 856-7 (1915).—Liquid Cl applied in doses less than 0.36 p. p. m. reduces bacterial count to numbers between 5 and 56 per cc. The method of application is described, including heating coils and absorption towers. LANGDON PEARSE.

The Cincinnati water works. JOHN W. HILL. *J. Am. Water Works Assoc.* 2, 42-60 (1915).—Historical sketch from 1799 up to the present time. W. D. C.

Brass screen between sand and gravel eliminated in Cincinnati filter reconstruction. J. W. ELLMS. *Eng. Record* 71, 581-2 (1915).—Breaks caused by corrosion of brass screen between sand and gravel necessitated frequent and costly repairs. New plan uses graded layer of heavier gravel without screen. FRANK BACHMANN.

Operations of the Cincinnati water filtration plant in 1914. J. W. ELLMS. *Eng. News* 73, 855-6(1915).—The settling basins removed 74.1% of the turbidity, which averaged 120 p. p. m. The coagulating basins received a turbidity of 31 and delivered 5 p. p. m. to the filters. 20.4 p. p. m. of FeSO_4 were used with 11.4 p. p. m. of CaO . The wash water averaged 2.24% with an av. period of filter service of 19.5 hrs. The filtered water contained an average of 36 bacteria per cc.; this was reduced 83.6% by liquid Cl applied at the rate of 0.1 p. p. m. The typhoid death rate was 5.71 per 100,000. Seventy % of the cases were contracted outside the city. The cost of operation and maintenance of filter plant was \$3.31 per gal. LANGDON PEARSE.

Dry-feed apparatus solves Ithaca's coagulant problem. HENRY N. OGDEN. *Eng. Record* 71, 586-7(1915).—On account of operating difficulties, dry-feed coagulant app. was substituted for the equipment which applied the chemical soln. F. B.

New sedimentation basin will halve costs of sand cleaning at Philadelphia filters. FRANCIS D. WEST. *Eng. Record* 71, 591-3(1915).—The sedimentation basin will have a capacity of 100 million gal. It will greatly relieve the turbidity load, prevent algae growths, and increase the output of filtered water. Alum will be used when the turbidity of the raw water reaches 50. The use of alum will reduce the number of bacteria applied to the pre-filters by 50%. The basin will be operated on a fill and draw plan. FRANK BACHMANN.

Water coagulation, sedimentation and aeration plant at Norristown, Pa. S. C. CORSON. *Eng. News* 73, 853(1915).—Aeration is secured by inclined planes, with projections 4 in. above surface. LANGDON PEARSE.

The Alliance water filters. THOMAS FLEMING, JR. *Eng. News* 73, 812-4(1915).—This is a rapid filter plant supplying 4.5 mil. gal. daily to 16,000 population. The raw water varies in turbidity from a few to several thousand parts per mil. The novel feature is a complete false bottom under the strainer system in the filters. L. P.

Chemical and bacterial control of the water supply of Breslau (Germany). LÜHRIG. *Intern. Z. Wasserversorgung* 1, 291-3(1914); *Wasser u. Abwasser* 9, 202(1915).—A chemical analysis of the Oder water is made quarterly. A branch lab. was installed at the pumping plant for daily tests, since the compn. of the ground water is subject to sudden fluctuations. ARTHUR LEDERER.

Iron removal plant of the waterworks at Flensburg (Germany). G. OESTEN. *Wasser u. Gas, Heft* 1-2(1914-15); *Wasser u. Abwasser* 9, 211-2(1915).—The Fe in the water supply is removed in the open type of plants (Oesten type). A. LEDERER.

An extraordinary growth of algae in the drinking water of Dublin, Ireland. JOHNSON. *Intern. Z. Wasserversorgung* 1, 187-9(1914).—Oscillatoria appeared in the Dublin water supply; they imparted a bad taste and odor to the water. J. tried CuSO_4 , after Moore and Kellermann and found that it, in amts. which were harmless, was an active destroyer of these organisms. F. W. TANNER.

The elimination of algae from the Dublin reservoirs and filters. JOHNSON. *Intern. Z. Wasserversorg.* 1, 216-8(1914); *Wasser u. Abwasser* 9, 295(1915).— CuSO_4 in dilns. of 1:100,000 up to 1:1,000,000 has been employed. For a time the decaying algae gave rise to a disagreeable taste and odor. Fish life has not been harmed. A. LEDERER.

The water supply of Rome (Italy). TITO GIARDI. *Intern. Z. Wasserversorg.* 1, 307-8(1914); *Wasser u. Abwasser* 9, 298(1915).—Rome has 4 well-water conduits, the Aqua vergine, Felice, Paolo, and Pia Marcia. The water of the 2nd conduit is bacterially less satisfactory than that of the 1st. The water of the Paolo conduit is even less satisfactory. The conduit Pia Marcia is the most modern of the 4. A. L.

Ozonization of the Pregel River water at Koenigsberg (East Prussia). KARL KISSKALT. *Gesundh. Ing.* 38, 195-9(1915); *J. Gasbel.* 58, 155-7(1915).—The water is first coagulated with alum and then ozonized. The ozonization app. (de Frise system) was furnished by the Ozongesellschaft in Berlin. The results were excellent. The resulting water is sparkling, tasteless, and nearly sterile. If no alum is applied, the amount of O_3 must be increased as the water is somewhat turbid. A. LEDERER.

The water supply of Annecy in Upper Savoy. G. THIEM. *Intern. Z. Wasserversorg.* 1, 255(1914); *Wasser u. Abwasser* 9, 297(1915).—The city has a population of 13,000. It is supplied by well and lake water. The latter is purified in Jewell filters.

ARTHUR LEDERER.

Royal commission on sewage disposal. Ninth and Final Reports. *Surveyor* 47, Supplement, Apr. 2, 1915; No. 1211, 12 pp.—The final report, given practically *in extenso*, consists of summaries made by the commission of each of the 9 reports published from 1901 to 1915. W. D. C.

Determination of the biochemical oxygen demand by the saltpeter method in stockyards, tannery and corn products wastes. A. LEDERER. *J. Ind. Eng. Chem.* 7, 514-6(1915).—The method can be used without modification with packing house waste mixed with domestic sewage but must be modified for corn products wastes. The method is not readily applicable to tannery wastes. ISADOR MILLER.

The determination of dissolved oxygen in polluted waters. L. W. WINKLER. Budapest. *Z. Nahr.-Genussm.* 29, 121-8(1915); cf. *C. A.* 9, 674.—W. has modified his original method so that the presence of nitrites and moderate amts. of organic matter do not interfere with its accuracy. The modification consists in the addition of a soln. of chlorinated lime and dil. H_2SO_4 to the water at the time of sampling, the excess of $CaOCl_2$ being destroyed immediately before titration by means of $KCNS$. Fill a 250 cc. sample bottle almost completely with the water and add 10 drops (0.5 cc.) each of $CaOCl_2$ soln. and 50% H_2SO_4 , stopper and shake. The sample may then be reserved until any convenient time within 24 hrs. for analysis. The $CaOCl_2$ soln. is prepd. by rubbing 1 g. of fresh chlorinated lime (about 30% available Cl) with 100 cc. of $Na_2SO_4 \cdot 10H_2O$ (25 g. per 100 cc.) and filtering the mixt. If the $CaOCl_2$ treatment is performed in the lab., at least 10 min. must be allowed before proceeding with the detn. Then add 2 cc. $KCNS$ (1 g. c. p. *white* $KCNS$ in 200 cc. 25% $Na_2SO_4 \cdot 10H_2O$), shake, and allow the mixt. to stand for 10 min. Add 1 cc. $MnSO_4$ soln. (1 part $MnSO_4 \cdot 4H_2O$ and 2 parts water) and 2 cc. of KI - $NaOH$ soln. (2 parts $NaOH$, 1 part KI and 4 parts water) and 5 cc. of 50% H_2SO_4 , or, if the water is very cold use 10 cc. of the last reagent. When much Fe is present in the water use 5 cc. of 50% H_3PO_4 instead of the H_2SO_4 . Titrate with 0.01 N $Na_2S_2O_3$. For the sake of uniformity this method can be applied to all kinds of waters except those heavily polluted with organic matter. In such cases only the gasometric method can be used. Introduce 10 g. of granulated marble, that has previously been freed from dust by sifting, into a 500 cc. bottle, and cover with a little acidified (HCl) water. When active evolution of gas begins pour off the dil. acid and then allow the water under exam. to flow through the bottle until the interior, including the marble fragments, is thoroughly washed. Then fill to the neck with the water and close with a one-hole stopper fitted with a cylindrical bulb (of 20 cc. capacity) the lower end of which communicates through the stopper with the contents of the bottle and the upper end of which bears an opening which may be fitted with a stopper and a capillary delivery tube for conducting the dissolved gases into a eudiometer. The stopper and bulb tube are fitted into the bottle containing the water in such a way that no air space remains below the stopper and the water rises to a height of about 8 mm. in the bulb tube. If the amt. of water in the bottle is insufficient for this purpose, add enough satd. $CaCl_2$ soln. (air-free) to accomplish it. Then fill the

bulb tube to the neck with concd. HCl, add a layer (1-2 cc.) of water and fit a capillary delivery tube into the neck of the bulb. Place the large bottle in a capacious vessel containing water at 15°, since this is the best temp. for controlling the evolution of CO₂. In a short time the HCl reaches the marble and CO₂ is generated; this carries with it the dissolved air in the water. Collect the gas in a eudiometer over 20% NaOH, and when the vol. of gas ceases to increase measure in the usual way. Det. the O by absorption in alk. pyrogallol or alk. Na₂S₂O₄. Deduct 0.192 cc. N and 0.083 cc. O as a correction for the gases dissolved in the concd. HCl employed. For temps. between 0 and 30° W. has found the % of O in air dissolved in water to be $n = 34.91 - 0.0438t$, in which n = % of O in the air, and t = temp. A. F. SEEKER.

The treatment of waste waters from tin and lead mines, gut factories, and piggeries. G. BERTRAM KERSHAW. *Surveyor* 47, 404-5(1915).—Waters from tin and lead mines are successfully treated by sedimentation. Solid wastes from cleaning of sheep and pig intestines are generally fed to pigs. Liquid wastes are absorbed in the ground without much preliminary treatment. Solid manure from piggeries is easily disposed of by sale or gift. Dry weather liquid sewage (4-5 gal. per pig per day) is best treated with lime, the liquid filtered through deep percolating filters and then through shallow sand filters. It is better to dilute the tank effluent with 2 or 3 times its vol. of water and filter at a rate of 75 gal. per cu. yd. per day. W. D. C.

The action of electrolytes on effluents containing organic waste. P. ROHLAND. Stuttgart. *Kolloid-Z.* 16, 58-60(1915).—Effluents from sewers or from certain mfg. processes such as sugar refining, breweries, tanneries, dye works, etc., may be freed from their colloidal content by mixing with effluents containing inorganic salts, as from K works, when coagulation and sedimentation occurs. This at the same time removes the plankton, but not the dissolved materials. This method should be applied only after detg. the electro-positive or -negative nature of the colloid, and applying the proper electrolyte to cause coagulation. H. I. MATTILL.

Remodeling of septic tanks into Imhoff tanks eliminates odors from land irrigation. CHARLES GILMAN HYDE. *Eng. Rec.* 71, 747-8(1915).—Irrigation of lands at Orange, Cal., with septic tank sewage caused complaints of odors; these were eliminated when the tanks were converted into Imhoff tanks. Odors were due to the H₂S liberated from the septicized sewage after it had been spread out over the farms.

FRANK BACHMANN.

Electrolytic sewage purification. E. O. RASSER. *Staedtereinigung* 1914, 153; *Wasser u. Abwasser* 9, 295(1915).—The article deals with the disinfection of sewage with hypochlorites, electrolytically prepd. from NaCl. The expts. proved the deodorizing and disinfecting value of these compds. ARTHUR LEDERER.

More recent English sewage purification plants. A. H. OP TEN NOORD. *Ingenieur* No. 52(1914); *Gesundh. Ing.* 38, 185-90(1915).—The plants at Wakefield, Huddersfield and Bradford are described. Wakefield is a town of approx. 50,000. The dry weather flow is 9000 cu. m. per day, 60% of which consists of wool-dyeing, wool-washing, brewery and chem. factory waste. The sewage passes first through a grit chamber. Lime is added as a coagulant and the settled liquid is biologically treated on filters of the Dunbar type. Secondary settling basins are provided for. The final effluent reaches the Calder river. The sludge is dried on land. This has led to a nuisance. 50% of the Huddersfield sewage is contributed by the textile and metal industries. The total dry weather flow is 13,630 cu. m. per day. One of the disposal plants is in Deighton, the other in Cooper-Bridge. In Deighton the sewage is screened and settled. The settled sewage is pumped to the Cooper-Bridge plant for biological treatment. The results obtained with the fat extn. from the sludge at Deighton are

not made public. The sewage of Bradford contains unusually large quantities of wool fat. There are 2 plants at Bradford. At Frizinghall the sewage is treated with H_2SO_4 and the liquid, freed from sludge and scum, is permitted to reach the Aire river. In Esholt the sewage passes a grit chamber and self-cleaning screen. A max. of 136,000 cu. m. is treated daily with H_2SO_4 . It is planned to treat this effluent biologically. The sludge is heated to 100° and the fat separates. The residual sludge is mixed with lime and pressed into briquets. The fat is further purified with H_2SO_4 and filled into barrels.

ARTHUR LEDERER.

Sewage disposal in Chilliwack. D. P. DUNN. *Munic. J.* 38, 687-9(1915).—The plant handles 2500 population. The novel feature is a settling tank with 20 weirs in each compartment, skimming the effluent.

LANGDON PEARSE.

Sewage treatment for Philadelphia. *Eng. Contrg.* 43, 460(1915); *Munic. J.* 38, 695(1915).—The plans proposed divide the city into 3 drainage areas. For 2 areas, treatment is recommended with coarse screens, grit chamber and 2-story tanks. For the third area, fine screening is substituted for the tanks. The project will cost \$500,000 annually for the next 5 yrs. The operation and maintenance will cost \$500,000 per year, and \$2,000,000 will be required for new sewers annually. The purpose is to provide a clean sanitary harbor and protect the public health.

LANGDON PEARSE.

Sewage treatment plant at Calvert, Texas. T. L. FOUNTAIN. *Eng. News* 73, 930-4(1915).—This small plant serving 1500 population cost \$5,000. It comprises bar screens, 2-story settling tanks (2-hr. period with sludge storage 560 cu. ft.), sludge bed (1144 sq. ft.), sprinkling filter (5 ft. deep) with splash plate distribution, a final sedimentation basin (2-hr. period) holding 150 cu. ft. sludge and disinfection rig. No odor is noted 20 ft. away. One man spends 45 min. a day at the plant. The sludge dries readily.

LANGDON PEARSE.

Design and operation of small municipal refuse incinerator at International Falls, Minn. E. W. KIBBY. *Proc. Minnesota Surveyor and Engineer*; *Eng. Contrg.* 43, 477-8 (1915).—Mixed refuse is burned. The cost was \$1600, to serve 4000 population.

LANGDON PEARSE.

The degree of purification desirable and practicable in sewage treatment plants in Iowa. L. HIGGINS. *Iowa Eng. Soc.* 1915; *Eng. Contrg.* 43, 479-80(1915).—H. recommends a non-putrescible effluent, with disinfection if circumstances demand. Various methods of detg. putrescibility are discussed.

LANGDON PEARSE.

Municipal garbage reduction plant, Schenectady, N. Y. S. GERTZ. *Eng. News* 73, 820-2(1915).—The reduction plant is on the Chamberlain system and handles 20 tons of garbage daily from 90,000 population. The pressing is accomplished in the digesters immediately after cooking. The tankage is washed with naphtha, dried and shipped.

LANGDON PEARSE.

Imhoff tanks and sprinklers for sewage of Brighton District, Rochester, New York. ANON. *Eng. Rec.* 71, 679-82(1915).—The present population is 3,000. Screens and grit chambers are to be built for the final max. population 25,000, but Imhoff tanks, sludge-drying beds and sprinkling filters and secondary sedn. tanks are to be large enough for only 10,000 people. The remaining units will be built when required. Plans of the disposal works and an engineering description accompany the article.

FRANK BACHMANN.

The technical equipment of the emigration quarters of the Hamburg American Line at Hamburg. ENDRIS. *Gesundh. Ing.* 38, 133-41(1915).—A detailed discussion of the general layout, the machinery and boiler equipment, the disinfection plant, the kitchen and the sewage disposal plant. The sewage is settled and disinfected.

ARTHUR LEDERER.

The use of copper sulfate in the purification of swimming pools. S. J. THOMAS. *J. Ind. Eng. Chem.* 7, 496-9(1915).—T. advocates the use of CuSO_4 . It has the advantage over $\text{Ca}(\text{OCl})_2$ that it does not undergo chem. change which destroys efficiency. It is not irritating to eyes and mucous membranes, is cheaper and is odorless.

ISADOR MILLER.

The necessity of ventilation. MEYER J. STURM. Chicago. *J. West. Soc. Eng.* 19, 233-58(1914).—Expts. by the Chicago Comm. on Ventilation show that CO_2 does not settle out of expired air. The allowable amt. is given by the expression $\text{CO}_2 = (6000/A) + 4$, where A is the number of cu. ft. of air per hr. per cap. Relative humidity, supplied when necessary as steam, should be maintained between 40% and 75%. The "Comfort Zone" is between 64° F. with relative humidity 55% and 70° F. with relative humidity 30%; 64° F. with relative humidity 30% seemed best. The better death rate showing of the more northern cities as compared with the southern is thought to depend largely on the outdoor life in the southern climate and the better ventilation of the southern buildings.

W. B. JOHNSON.

An experiment with ozone as an adjunct to artificial ventilation. A. M. FELDNER. *Heating Vent. Mag.*, March, 1915, 35-6.—Ozone eliminated odors in hospital room containing patients being treated for gastro-enteritis.

H. V. MAIN.

The use of ozone for disinfection of air. B. GALLI-VALERIO. *Centr. Bakt. Parasitenk., Abt. I* 75, 93-6(1914).—G. gives results obtained by using O_3 to sterilize the air in a small room. The temp. was 15-16° and the humidity 60-15. G. exposed cultures of *B. coli* and *M. pyogenes albus* dried on pieces of glass for 5, 6 and 9 hrs. No killing nor inhibition of the bacteria was obtained. The expt. was repeated and in each case the same results obtained. G. warns against the use of ozonators to sterilize air in rooms.

FRED W. TANNER.

The new disinfection plant of the Fortress Cracow. F. A. EBERT. *Gesundh. Ing.* 38, 182-5(1915).—The disinfection app. which is to be installed permits alternating disinfection with steam under pressure and HCOH in *vacuo*. A. LEDERER.

State laws on removal of dust. H. C. ESTEP. *Iron Trade Rev.* 56, 415-22(1915).—Discussion and abstracts of laws prescribing effective dust removal systems.

H. V. MAIN.

Effect of the mineral content of water on canned foods (HURNINK) 12. Saline springs of Manitoba (COLE) 8.

COURMONT, J., LESIEM, CH. AND ROCHAIX: *Précis d'hygiène*. Paris: Masson et Cie. 810 pp. 12 fr.

GRASSBERGER, R.: *Der gegenwärtige Stand der Desinfektion im Rahmen der Seuchenbekämpfung*. Berlin: Verlag f. Fachliteratur. 1 M.

MATTHEWS, E. R.: *Refuse Disposal*. London: C. Griffin & Co. 160 pp. 6s.

SWAIN, G. F.: *Conservation of Water by Storage*. New Haven: Yale University Press. 84 pp. \$3.00.

U. S., 1,139,778, May 18. C. P. LANDRETH. Sewage or other liquid carrying putrescible matter is rendered alk. with $\text{Ca}(\text{OH})_2$ and electrolyzed. The O generated by electrolysis and the flocculent ppt. formed from the $\text{Ca}(\text{OH})_2$ clarifies the liquid and renders it non-putrescible. The $\text{Ca}(\text{OH})_2$ is used in sufficient amt. to render the effluent alk. Cf. C. A. 9, 1647.

U. S., 1,141,744, June 1. H. WOODS. Water filter.

U. S., 1,141,959, June 8. H. HERZBRUCH. Filter for clarifying water. Cf. C. A. 8, 3610.

U. S., 1,141,961, June 8. J. G. HILL. Germicide and insecticide formed of nicotine sulfate 1 lb., soap 25 lbs. and H_2O 100 gals.

U. S., 1,142,270, June 8. H. REISERT. Filter bed for purifying water.

U. S., 1,142,361, June 8. G. ORNSTEIN. Method of sterilizing water in a main by the action of Cl_2 . The latter is first brought into contact with a film of H_2O in a treating chamber outside the main and then the treated H_2O is led into the main to mingle with and sterilize the H_2O in the latter.

Brit., 2,150, Jan. 27, 1914. F. L. E. M. SIGNORET. In fumigating casks, etc., S to be burned is made into blocks by mixing powdered S with Na or K silicate soln.

Brit., 2,626, Jan. 31, 1914. C. P. LANDRETH. App. for purifying river or waste water or other liquids is provided with means for agitating the liquid between stationary electrodes and maintaining these free from bubbles or deposits. A part only of the liquid may, after addition of a salt, be passed through the app., and subsequently mixed with the main body of liquid. Softening agents may be added after electrolysis; 1 set of electrodes may be cut out of circuit so as to act merely as baffles for distributing these agents through the liquid. An elec. motor may drive both the agitator and 1 or more dynamos feeding the electrolyzer through an adjustable resistance. Superposed a. c. and d. c., the former predominating, may be used; the dynamos may be in parallel or series, and protected respectively by a series condenser and series inductance in the former case, and by a shunt inductance and shunt condenser in the latter case. The current may be periodically reversed.

15. SOILS AND FERTILIZERS.

M. X. SULLIVAN.

The absorption of ultraviolet and infra-red rays by arable soil. J. F. TRISTAN AND G. MICHAUD. *Arch. sci. phys. nat.* 39, 270-3 (1915).—The absorptive power of soils for the ultraviolet and infra-red rays was detd. by means of photographs with the use of appropriate filters. For the infra-red the wet soils have a greater absorption than the dry soils. This difference is less for the ultraviolet. Dry clay soils in ultraviolet light appear black while in infra-red they appear white.

M. X. S.

Absorption of cations and anions by the soil. A. DE DOMINICIS. *Stas. sper. agrar. ital.* 47, 449-73 (1914); through *Chem. Zentr.* 1915, I, 391-2.—Cations are without exception absorbed by the soil, as are also the anions. In certain expts. negative absorption of Cl^- and NO_3^- was observed, yet other expts. showed that also these were absorbed as much or more than the cations. Anion absorption is a case of formation of insol. substances, and indeed anions are absorbed by positively charged, cations by negatively charged, amorphous soil constituents. The degree of absorption increases with the valence of the ions. The absorption of the cations and that of anions is the same for all soils, whereas the total absorption varies, and depends on the nature of the soil colloids and the soil soln.

L. J. GILLESPIE.

The determination of nitric nitrogen in soils. E. R. ALLEN. *J. Ind. Eng. Chem.* 7, 521-9 (1915).—Reduction with Devarda's alloy in MgO solns. and the Al reduction method do not give reliable results in the presence of much org. matter. With the former method reliable results are obtained in solns. 0.1 N in NaOH even in the

presence of much org. matter. This is the best concn. The Mitscherlich app. is the best distn. app. for this method.

ISADOR MILLER.

Loss of nitrogen and organic matter in cultivated Kansas soils and the effect of this loss on the crop-producing power of the soil. C. O. SWANSON. *J. Ind. Eng. Chem.* 7, 329-32 (1915).—Analyses of cultivated and uncultivated soils show that the former have lost 1200-1800 lbs. N and 32,400-49,600 lbs. org. matter per acre in the surface soil. This is 22.6-43.5% N and 23.3-51.3% org. matter. By "loss" is meant the difference in wt. of N or org. matter, over an area of 1 acre and to a depth of 7 in., found in virgin soil and in cultivated soil.

ISADOR MILLER.

Investigation of the content of mineral soils in acid and alkaline substances. A. STUTZER AND W. HAUPT. *J. Landw.* 63, 33-45 (1915).—The qual. test of Baumann and Gully (*Naturw. Z. Land- u. Forstwirtschaft* 1908, 1) has been developed into the following quant. method for the detn. of acids: Dry 40 g. soil, at 100°, pulverize, sieve, put into a glass-stoppered $\frac{1}{2}$ l. flask, add 50 cc. of 2% KI and 50 cc. of 0.5% KIO₃ (in CO₂-free water), shake 15 minutes, dil. the contents with 300 cc. CO₂-free H₂O, mix and filter through a Gooch. Discard the first 50 cc. and titrate 300 cc. with 0.01 N Na₂S₂O₄ with starch indicator. 1 cc. of thiosulfate = 0.00001 g. H⁺. In a test of the method on 11 soils, no relation was found between the acidity and the CaCO₃ content. The content of sol. alk. substances can be detd. by titrating 300 cc. of a 10% aq. ext. of soil to which 25 cc. of KI and KIO₃ solns. and 25 cc. 0.01 N H₂SO₄ have been added.

L. J. GILLESPIE.

The number and growth of protozoa in soil. J. M. SHERMAN. *Centr. Bakt. Parasitenk., Abt. II* 41, 625-30 (1914); *Bull. Agr. Intelligence* 5, 1165-6.—By examg. 16 soils it was detd. that normal fertile soils contain approx. 10,000 protozoa per g. Flagellates constitute the principle protozoa fauna of the soil.

J. J. S.

Studies on the influence of the condition of the soil on bacterial life and the exchanges of material produced by the latter. H. R. CHRISTENSEN. *Centr. Bakt. Parasitenk., Abt. II* 43, 1-166 (1915).

JULIAN H. LEWIS.

Soils of the cut- and burned-over areas of North Idaho. J. S. JONES AND C. W. COLVER. Idaho Agr. Expt. Sta., *Bull.* 81, 20 pp. (1915).—Analyses of a number of soils are given showing the amts. of N, Ca, Mg, P, K and S in the first 9 inches of soil. Data are also given showing the effect of lime and N-carriers on crop growth.

B. E. B.

Studies on the agricultural value of silt carried from streams of the Alps and Pyrenees. A. MÜNTZ AND E. LAINE. *Compt. rend.* 160, 491-5 (1915).—Physical and chem. analyses of the deposits of the different sections bordering the irrigation canals are given.

J. J. SKINNER.

The antizymotic action of a harmful soil constituent: Salicylic aldehyde and mannitol. J. J. SKINNER. *Plant World* 18, 162-8 (1915); cf. *C. A.* 9, 115.—The simultaneous occurrence of mannitol and salicylic aldehyde in a soil is pointed out. In a nutrient soln. growing wheat seedlings mannitol was harmful in solns. where decompn. took place and was slightly beneficial in the solns. where there was no decompn. Salicylic aldehyde in a culture soln. with mannitol prevented any decompn. It is pointed out that the existence of mannitol in a soil is made possible by the simultaneous presence of salicylic aldehyde. Without the presence of an antiseptic agent mannitol could not exist in soils.

J. J. S.

Method of determining the lime requirement of soils. C. H. JONES. *Am. Fertilizer* 39, No. 11, 28-29 (1913).—Add 0.5 g. Ca acetate (tested reagent) to 5.6 g. of soil, place in a 3 in. mortar, and mix. Add sufficient water (room temp.) to make

a fairly stiff paste. Pestle for 20 secs., add 30 cc. water, and continue mixing for 30 secs. Wash into a 200 cc. flask and keep bulk down to about 160 cc. Let stand, with occasional shaking, for 15 min. Make up to bulk of 200 cc., mix, and filter through a dry filter. Discard first 10 to 15 cc., which may be cloudy. Titrate 100 cc. of the clear filtrate, using phenolphthalein with 0.1 *N* NaOH. This reading, multiplied by 2 gives the number of cc. of 0.1 *N* alkali required to neutralize the acetic acid in 200 cc. of the soln. This figure times the factor 1.8 times 1000 equals the lbs. of CaO required per 2,000,000 lbs. of soil. Or multiply the number of cc. of 0.1 *N* NaOH by 3600. "The factor 1.8 is a tentative one only, having been secured on a relatively small number of samples representing Rhode Island, Mass., Vermont and New Jersey soils. The method is extremely rapid, one man easily making 50 detns. in a day."

B. E. B.

Injurious nitrogen transformations in bog soils as a result of the action of large lime applications. T. ARND. *Landw. Jahrb.* 47, 371-442(1915); *Chem. Zentr.* 1915, I, 701-2.—Expts. carried out with numerous bog soils lead to the following conclusions: In consequence of the unfavorable conditions for microorganisms found in untreated acid peats, no bacterial decompn. of saltpeter takes place, but in peats neutralized or rendered alk. by lime an energetic reduction of nitrates takes place with considerable loss of nitrate and total N. The N losses are dependent on the amt. of lime applied. The fact that small temp. differences produce large variations in the denitrifying reaction is looked upon as a proof that the reaction is biological in its nature. In each class of bog soils, the microbiological reduction of nitrates increases with the state of decompn. and the action is stronger in low-lying peats than in the higher ones. The results obtained support the assertion of Tackes that the injurious action of strong liming is caused by unfavorable bacterial N decompns. Liming greatly improves the soil as a medium for microorganisms. When bog soils which have not been treated with N fertilizers are limed, some of the soil N is removed and when a peat fertilized with NaNO_3 is limed, part of the N is lost through reduction to nitrite and another part through denitrification. In either case a decrease in the crop yields will result.

C. F. MILLER.

Analyses of guanos. Pozzi-Escot. *Ann. chim. anal.* 20, 99-101(1915).—Discussion of a paper by Hutin (cf. *C. A.* 9, 684). Contrary to the impression given by H., the Peruvian guanos are in general use in Peru, the results being successful from an economic viewpoint. The richest guanos (of recent formation) contain 12-13% N, the older, 3 to 7% N; guanos of less than 3% are not exploited in Peru, but are exported when high in P_2O_5 , and contain less than 50% of insol. matter (SiO_2). The low-grade guanos are high in NaCl (up to 21%). All guanos containing over 30% of insol. matter (sand) are classed as poor or low grade. The H_2O content is generally 7-9%, only rarely as low as 4%.

F. W. SMITHER.

Germany's provision with fertilizers. B. RASSOW. *Z. angew. Chem.* 28, 196-201 (1915).—The author gives statistics on the consumption of each of the important fertilizer materials used for agricultural purposes in Germany in recent years, and the prospects of the demands being supplied during the war. There is plenty of K_2O . By making extensive use of Thomas slag-meal cyanamide and $(\text{NH}_4)_2\text{SO}_4$, R. believes that Germany can satisfy her fertilizer needs.

C. F. MILLER.

The influence of calcium cyanamide on the germination of barley and wheat. R. TRNKA AND B. MYSIK. *Z. landw. Versw.* 18, 58-63(1915).—Tests were made with various quantities of CaCN_2 on a sandy loam of moderate humus content, applied various lengths of time before sowing. In the quantity usually applied, CaCN_2 exerted no lasting injurious effects, even when applied on the day of sowing.

L. J. GILLESPIE.

Experiments on the action of certain humus preparations, especially the so-called humus-silicic acid, on vegetation. E. HASELHOFF. *Landw. Jahrb.* 47, 345-69(1915); *Chem. Zentr.* 1915, I, 702-3.—The humus preps. exert a fertilizing action by virtue of the plant food contained in them, but the humus-forming substances as such do not play a significant role.

C. F. MILLER.

Experiments on the influence of potassium ferrocyanide on vegetation. E. HASELHOFF. *Landw. Jahrb.* 47, 338-44(1915); *Chem. Zentr.* 1915, I, 702.—Expts. showed that the injurious action begins at a concn. of 0.1 g. of $K_4Fe(CN)_6$ per l. and that it is very pronounced when a nutrient soln. contg. 0.5 g. per l. is used.

C. F. MILLER.

The valuation of commercial arsenate of lead. R. H. ROBINSON AND H. V. TARTAR. *J. Ind. Eng. Chem.* 7, 499-502(1915).—Detns. were made on 6 samples of com. arsenate of lead of moisture, total As_2O_3 , total PbO , $PbHAsO_4$, H_2O -sol. As_2O_3 and PbO , $PbCO_3$, H_2O -sol. impurities, chlorides, sulfates, acetates and acid-insol. impurities. New methods were devised for detg. $PbHAsO_4$ in the presence of mixed salts, and for detg. $PbCO_3$, H_2O -sol. As_2O_3 and H_2O -sol. impurities, acid-insol. impurities and chlorides; also for the detection of acetates.

ISADOR MILLER.

"Perocid" as a substitute for copper sulfate in combating *Peronospora* of the vine. FR. GVOZDENOVIC. *Z. landw. Versw.* 18, 11-28(1915).—"Perocid I" or simply "Perocid" is a by-product of gas-mantle manuf. It is a mixt. of sulfates of the rare earth metals (chiefly Ce, Nd and La) together with small quantities of Yt, CaO, Fe_2O_3 and SiO_2 , as impurities. The earth-metal sulfates make up (as oxides) 50%, the SO_3 36.5%, H_2O 12.5%, and the rest is the impurities named. For use it is dissolved in H_2O and made alk. to phenolphthalein with $Ca(OH)_2$. The soln. keeps for months, cannot clog up spraying machines, and does not require agitation during spraying. A 3% soln. is recommended, and this is expected to be 15% cheaper than 2% Bordeaux mixt.; the tests here reported show it is more effective than the latter. Perocid II and III are already neutralized preps. and were found of no practical use.

L. J. GILLESPIE.

Copper sprays. H. FONZES-DIACON. *Compt. rend.* 160, 528-30(1915); see C. A. 9, 565.

J. J. S.

Effect of cyanide of potassium on trees. C. H. SHATTUCK. Univ. Idaho. *Science* 41, 324(1915).—KCN is recommended as an insecticide, and the charge that it causes the death of trees, when used for the above purpose, is denied.

W. A. PERLZWEIG.

Hydrocyanic acid content of sorghum (WILLAMAN) 12.

GANS, R.: Die Charakterisierung des Bodens nach der molekularen Zusammensetzung des durch Salzsäure zersetzlichen silikatischen Anteiles. Berlin: Königl. Geol. Landes. 1 M.

MAKINEN, E.: Die Bestimmung des Oxydationsgrades v. Eisenverbindungen in humushaltigen Lösungen. Berlin: Verlag f. Fachliteratur. 75 Pf.

ROHLAND, P.: Die Absorptionsfähigkeit der Boden. Berlin: Verlag f. Fachliteratur. 1 M.

SIGMOND, A. v.: Beiträge zur ausführlichen chemischen Analyse des Bodens. Berlin: Verlag f. Fachliteratur. 28 ss. 1.50 M.

SUTTON, M. H. F.: Effects of Radioactive Ores and Residues on Plant Life, Reading, Eng.: Author. 2s, 6d.

Brit., 2,998, Feb. 5, 1914. G. BECCARI. Addition to 7,946, 1912 (C. A. 7, 3183). The incubation tower and manure chambers described in the principal patent are fitted with horizontal cooling pipes for the condensation of H_2O and salts of NH_4 . Lateral chambers are provided for the cooling medium which in the case of the upper set of cooling pipes may be H_2O . The heat of the fermenting mass in the chambers may be used to heat pipes leading to buildings, fowl houses, drying app., etc., or by direct contact, to heat boilers, saucepans, etc. The heating pipes referred to may be led to a drying shed having a perforated floor. Lead boxes containing dil. H_2SO_4 or HCl may be placed on the diaphragm of the tower. One overflows into another, and finally the liquid is discharged into a funnel. In cold places, the tower may be replaced by horizontal passages having openings with covers and leading to a vertical shaft furnished with condensers.

Brit., 3,074, Feb. 5, 1914. E. CISELET and C. DEGUIDE. Phosphate. See Fr., 468,042 (C. A. 9, 1364).

Ger., 281,296, Oct. 28, 1911. ACT.-GES. PEINER WALKWERK and H. KÜPPERS. Process of increasing the citric acid solubility of phosphatic slags by the addition of silicious matter. The known method of adding sand, in a stream, to the slag as it is being poured into the slag cars, is unsatisfactory, because a uniform mixt. of sand and slag does not result. According to the present process, the slag is discharged, with great care, i. e., slowly (8-10 mins.), to avoid admixt. of Fe, into the slag car. To an average slag charge of 7000 kg., from 400 to 600 kg. sand must be added during discharge. The car is run then to a stirring mechanism by which the sand and slag are intimately mixed. The stirring arms are forced through the solid crust of slag and the resulting pieces are thrown violently against the sides and bottom of the car, thereby aiding greatly in the mixing operation. After about $3\frac{1}{2}$ mins. constant stirring the mass solidifies to a tough, dough-like form, which is voluminous and contains numberless bubbles. The citric acid solubility is increased by this treatment up to 99%.

16. FERMENTED AND DISTILLED LIQUORS.

ROBERT WAHL.

The present status of the chemical examination of wine. T. PAUL. Munchen. *Z. Nahr.-Genussm.* 28, 509-47(1914).—P. indicates the unsatisfactory nature of the present official method for detg. total acidity of wines, pointing out the discrepancies sometimes found between the relative acidities as detd. by titration and by taste. This discrepancy is due to the fact that in titration total replaceable H is detd., whereas the sense of taste is influenced solely by the concn. of H ions in the wine. The well-known laws controlling the dissociation of acids are given and explained, it being shown that not only the identity of the acids present but their relative proportions as well as those of the salts present in the wine operate to alter the concn. of H ions. The work of Quartaroli, Dutoit and Duboux, and v. d. Heide and Baragiola (C. A. 8, 2023) is freely cited upon the physico-chem. exam. of wines (see also Baragiola and Boller, C. A. 8, 535) illustrating by examples how a complete analysis by these means explains differences in taste upon which customary analysis throws no light. The degree of dissociation of various acids and bases, both organic and inorganic, for different dilns. and in the presence of salts are given showing the effect of these upon the H ion concn. of wine. P. urges that the latter should be included among the regular detns. of a wine analysis expressing the result as "degree of acidity" given in mg. of H ions per l. of wine, and recommending for this purpose the method involving measurement of the speed of sucrose inversion at 76° . Destroy inverting enzymes in a sufficient amt.

of wine by heating at 76° for 30 min. Introduce 10 g. of pure, dry loaf sugar into a 100 cc. flask, dissolve it in a small amt. of the treated wine and then fill to the mark with the sterilized wine. Det. the polarization of the soln., pour into a 250 cc. Erlenmeyer flask, close the flask with a 2-holed rubber stopper in which one hole is fitted with a bent capillary tube left open during the subsequent heating to prevent development of pressure within the flask, and the other hole fitted with a short straight wide-bore tube through which the stem of a pipet may be inserted from time to time for withdrawing samples for polarization, this tube being closed with a small stopper during the heating. Fasten the flask in a suitable holder and immerse in a thermostat bath maintained at a temp. const. to 0.1° and which is in the neighborhood of 76° . Withdraw samples and polarize every 100 min. and calc. the sucrose concn. from the readings. Obtain the inversion const. from the formula $k = \log C_0 - \log C_t / 0.4343t$, in which C_0 = concn. of sucrose before inversion, C_t = concn. of sucrose after t min. inversion, and t = elapsed time in min. during which the wine has been heated with the sugar. If the temp. of the thermostat bath is not exactly 76° correct the const. so obtained by deducting 0.9% of the value of k for each 0.1° above 76° and adding the same correction for each 0.1° below 76° . To convert to mg. of H ions per l. ("degrees of acidity") divide the corrected value for k by the factor 0.00374. The degrees of acidity of 79 German white wines detd. by this method ranged between 0.17 and 1.61. A suitable thermostat for this work is described and illustrated. Methods with illustrations of app. are also given for detg. acidity by means of measurements of electromotive force and by speed of hydrolysis of ethyl acetate, these methods not being recommended for general use though applicable for control purposes. The advantages of a detn. and balancing of all anions and cations present in wine are mentioned together with the combined titration and cond. method of v. d. Heide and Baragiola (l. c.) for detg. replaceable H. Other unusual detns. (besides those of the common bases Fe, Al, Ca, Mg, K and Na) which P. considers should be made in wine are: succinic and malic acid, Zn, As, N and glycerol (propyl iodide method), together with the detection of citric, benzoic, boric, formic, and cinnamic acid, as well as F.

A. F. SEEKER.

Analysis and judgment of vermouth wine. A. VERDA. *Schweiz. Apoth. Ztg.* 53, 248-51, 260-4 (1915).—The amt. of white wine contained in this prepn. is uncertain; the minimum should be 70%. The results of analyses of 21 vermouth wines by Behre and Frerichs (*C. A.* 7, 2281), and by Jeanprêtre are recorded, sp. gr., EtOH % by vol., ext., total acid, ash, sulfates and total sugar being detd. In another table, V. reports his analyses of 7 wines and of 4 by H. Enz. Detn. of total sugar is omitted as unreliable; acids are detd. as volatile and fixed acids. The nos. for ash may be of service in judging the % of white wine added. On the basis of 1.3 g. ash per l. in white wine, an amt. less than 1 g. per l. would indicate diln. below 70%. The difference ash minus sulfates calcd. as K_2SO_4 might also furnish a limit.

S. WALDBOTT.

The certification of dessert wines. L. GRÜNHUT. Wiesbaden. *Z. Nahr.-Genussm.* 28, 586-617 (1914).—A discussion upon 2nd reading before a general meeting of German food chemists of a draught of proposed regulations embracing proper modes of production, comp. and branding of these products, the first draught having already been reported (cf. *C. A.* 8, 1184). The subject of the degree of fermentation to be required before a fortified product is entitled to the designation "wine" was fully discussed, the conclusion and decision of the assembly being that at least 6% by wt. of EtOH must be derived by fermentation. Upon this basis products containing less than 0.36% of glycerol (ratio EtOH:glycerol::100:6) are not regarded as wine. The designation of a product as "medicinal wine" or in any way indicating special curative or nutritive properties is deemed misbranding, a similar decision being made regarding

indirect references to geographical names ("Port Type," "formerly called Port," etc.) when applied to imitations of such wines as port. The amt. of 90% EtOH (cc. per l.) employed for fortifying may be calcd. from the formulas: $1.4a - 23g$ (least amt.), $1.4a - 17g$ (probable av. amt.), and $1.4a - 14g$ (greatest amt.) in which $a = g$. EtOH per l. and $g = g$. glycerol per l. The original amt. of solids (g. per l.)—least, av. and greatest—may be calcd. from the formulas:
$$\left[\frac{1000(e + 20g)}{(1000 - 1.4a + 14g)} \right] + 10,$$
$$\left[\frac{1000(e + 25g)}{(1000 - 1.4a + 17g)} \right] + 10 \text{ and } \left[\frac{1000(e + 33g)}{(1000 - 1.4a + 23g)} \right] + 10,$$
 a and g having the same values as above and $e = g$. of solids per l. of finished wine. An original solid content exceeding 300 g. per l. indicates the use of a substance of higher concn. than grape juice, while original solids exceeding 460 g. per l. indicates the use of raisins or similar substances, the absence of cane sugar or glucose being assumed in all cases. The presence of more levulose than dextrose indicates a wine in which fermentation has been checked by addition of spirits, whereas equal proportions of these sugars indicates practically complete fermentation of the original must or the use of fortified grape juice.

A. F. SEEKER.

Calculation of invert sugar contents of wine from weighed cuprous oxide or copper. J. PRITZKER. *Schweis. Apoth. Ztg.* 53, 286-8(1915).—To find the amt. of invert sugar (g. per l.) in wine according to the method of the Swiss Food Code, multiply g. of Cu_2O obtained by 0.18, or g. of Cu obtained by 0.20. This calcn. is of advantage when the table of von Fellenberg (*C. A.* 8, 835) is not available. If sugar is detd. in the sample in which ext. was previously detd. by the sp. gr. (distn. method), the process involves diln. of 10:11. The above factors will then be 0.20 for Cu_2O and 0.22 for Cu.

S. WALDBOTT.

De-acidifying of hyperacid wines. G. DE ASTIS. Arezzo. *Ann. chim. applicata* 3, 245-54(1915).—The substances employed for these expts. were KOH, K_2CO_3 , $KHCO_3$, neutral K tartrate and $CaCO_3$. The author concludes: (1) The correction of the excessive acidity in white wine by addition of a neutralizing substance, as a rule, improves the taste and the com. value of the wine. (2) The acidity, cream of tartar, ext., and d. are decreased in value, but KOH increases the amt. of sol. cream of tartar. The variations downward of the ext. corresponded to the quantities of tartaric acid removed. The ash and alkalinity were highest on addition of KOH and the other K neutralizers, but lowest with $CaCO_3$. (3) The action of each neutralizer was exerted principally upon the fixed acids, but to some extent on the volatile acids. Tartaric acid is pptd. in large part; the remaining acids are neutralized in whole or in part. (4) The K neutralizers ppt. the cream of tartar in a cryst. form, while $CaCO_3$ ppts. the neutral Ca tartrate; both ppts. may be recovered on decanting the wines. (5) The crystals of tartar from the same neutralized wine present different and characteristic forms for each neutralizer, which fact permits of the detection microscopically of the neutralizer employed. (6) $CaCO_3$ is the best neutralizer, on account of its greater economy, and because it least alters the chem. comp. of the wine. Then come $KHCO_3$, K_2CO_3 , KOH, and neutral K tartrate in order of decreasing value.

S. LEVY.

The improvement of wines of unusually poor vintages within the bounds of the existing wine law. P. KULISCH. Colmar. *Z. Nahr.-Genussm.* 28, 482-505(1914).—The vintages of the past few years having been unusually poor and a movement having been instituted to amend the existing German wine law so that 25% instead of 20% of sugar soln. can be used to improve the wine, K. discusses the probable efficacy of the proposed change in accomplishing the desired results. The cause of such defective wines lies in the high acidity (2.0-2.2%) of the musts. A potable wine should not

have an acidity greater than 0.6 to 0.8%, the addition of sugar soln. being designed to reduce the acidity of the musts by diln. and at the same time secure an EtOH strength sufficient to mask still further the defect. K. shows both by his own work and that of others that this assumption is false, the procedure to a great extent tending to defeat its purpose. The greater part of the acid of musts is destroyed during fermentation, particularly in the second stage, by a process of degradation (cf. C. A. 8, 347). This process is retarded by a high EtOH content and also by a high initial content of acid. In the light of this knowledge the rational way to correct defective wines is by removal of part of the acid by CaCO_3 treatment and by producing conditions of secondary fermentation favorable to the acid degradation process. Treatment with CaCO_3 in no way injures the quality of the product but the process must be conducted with amts. calcd. to produce the desired effect and suitable for the particular type of wine treated. Exptl. evidence showing the advantages of this treatment over diln. with sugar soln. is given.

A. F. SEEKER.

Wine preparation experiments in the presence of sulfur dioxide with selected yeasts. P. ZANETTINI. *Staz. sper. agrar. ital.* 47, 506-30(1914); through *Chem. Zentr.* 1915, I, 337.—The presence of SO_2 with or without selected yeasts, in the fermentation hindered the decompn. of acids. As advantages are to be considered: better keeping qualities, quicker clearing, and increase of ext. and glycerol.

L. J. GILLESPIE.

Methods of examination of potable spirits. K. v. BUCHKA. Berlin. *Z. Nahr.-Genussm.* 29, 152-5(1915); cf. C. A. 8, 1186.—A discussion and criticism of the present standards and regulations for potable spirits in Germany.

L. D. ELLIOTT.

The action of the enzyme of malt on the insoluble cell-substance of the beet. A. HERZFELD AND O. SCHREFELD. *Z. Ver. Zuckerind.* 65, 135-8(1915).—In fermenting sugar beets for alc. in the same way that potatoes are handled, a strong foaming occurs that is not easily controlled. K. Windisch (*Z. Spiritusind.* 37, No. 52) claimed that the addition of malt during the cook partly removes the difficulty, due to liquefaction of the beet structure. H. and S. question the liquefying action of diastase. Samples of beet pulp were fermented with and without malt ext. On 10 g. samples the av. dry substance left in the pulp after fermentation was 8.15 g. when cooked with malt, and 8.075 g. without malt, showing that the malt has no liquefying effect.

W. L. BADGER.

A new method of yeast production from sugar and mineral salts. A. MARBACH. *Oesterr. Chem. Ztg.* 18, 62-3(1915).—The Fermentologic Institute in Berlin has discovered a method of converting inorganic N into organic N in the form of yeast protein. M. claims that this in reality is an Austrian discovery. $(\text{NH}_4)_2\text{SO}_4$ served as the N source in place of malt extract.

ARTHUR LEDERER.

Measurement of yeast fermentation by means of the liquid interferometer. OTTOMAR WOLFF. Univ. Jena. *Chem. Ztg.* 39, 197-8(1915).—The instrument was calibrated on 10% sugar (by wt.) and 10% alc. (by vol.) solns. with the 0.5 cm. cell and found to be correct. The work with yeasts on the sugar soln. was in a 1 cm. cell. Com. dry yeasts were used and the H_2O content ignored except in the white beer yeast, which was received as a paste and sucked as dry as possible. Ten g. were suspended in 200 cc. distd. H_2O and 10 cc. (equal to 0.5 g. yeast) added to 100 cc. 10% sugar soln., half of which was heated to 60° to sterilize. The other half was fermented at 28.5°, samples taken at regular intervals, heated to sterilize, and compared with the original sterilized soln. The interferometer readings for top-ferment yeast, bottom-ferment yeast and white beer yeast, resp., after 1 hr. were 67, 67, 19 divisions; after 2 hrs. 90, 80, 30; 3 hrs. 129, 125, 57; 4 hrs. 203, 177, 120; 5 hrs. 295, 235, 178; 6 hrs. 365, 280,

224. The plotted results show the rate of fermentation to be uniform after 3 hrs. and the lines practically straight. Irregularities at the start may be due to exptl. errors or to differences in rates. The 3 yeasts were kept in closed flasks 3 days and the tests repeated under the same conditions except that 10 cc. of a 10% yeast suspension was used; the results this time for top-ferment, bottom-ferment and white beer yeasts, resp., were: after 1 hr. 25, 50, 138 divisions; after 2 hrs. 103, 100, 229; 3.5 hrs. 246, 204, 350; 4 hrs. 275, 230, 397; 5 hrs. 370, 297, 475; 6 hrs. 442, 353, 550. Only the white beer yeast remained practically unchanged, but the plotted results give nearly straight lines. Results are also given on 4 com. samples of unknown origin, 2 samples being tested frequently to show the irregularities during the first 3 hrs. W. concludes that the rate may be accurately measured after the first 3 hrs., and that after further improvement the method will be of wide application. J. H. MOORE.

Estimation of methyl alcohol in presence of ethyl alcohol (JONES) 7. Detection of methyl alcohol (FELLENBERG) 7.

ROSSI-CADTOLDI, —: *Manual del licorista con 2,000 recetas y procedimientos para la fabricacion de licores.* 2a ed. Madrid: 845 pp. 8 pesetas.

U. S., 1,141,491, June 1. J. SCHAEFER. Method of extracting wort from brewers' grains by forming them into trapezoidal cakes and treating them with H₂O. Cf. C. A. 9, 1658.

17. PHARMACEUTICAL CHEMISTRY.

M. I. WILBERT.

Action of molds on the amount of alkaloid in opium. OSCAR VON FRIEDRICH. *Z. physiol. Chem.* 93, 276-82 (1914).—*Penicillium viridicatum* and *Citromyces glaber* do not attack the opium alkaloids. *Aspergillus niger* attacks narcotine and codeine, but not morphine. *A. ostianus*, which is found on Levant opium, apparently destroys morphine slightly, as well as narcotine and codeine. E. J. C.

Evaluation of opium tinctures. P. BOHRISCH AND F. KUERSCHNER. *Apoth. Ztg.* 30, 213-4, 219-20, 226-7, 232-4 (1915).—A discussion is given of the prevailing pharm. methods with suggestions for their betterment. W. O. E.

Surface tension and testing of medicaments. P. W. DANCKWORTT. Univ. Breslau. *Arch. Pharm.* 252, 502-13 (1914).—Exts. of digitalis, cinchona, valerian, soap bark and senega were prepd. and the resulting solns. (as also one of pure saponin) tested according to Traube's stalagmometric method (cf. C. A. 4, 1765; 5, 2047, 2495, 2867), as the result of which it is believed that measurement of the drop number in combination with the action on both color solns. may be advantageously employed in drug testing. In the case of digitalis, the observed variations in surface tension appear to be due to the presence of substances other than those in which toxicity is inherent. W. O. E.

Investigation of official copaiba balsam. ERNST DEUSSEN. Univ. Leipzig. *Arch. Pharm.* 252, 590-600 (1914).—Turner's color test as prescribed in the Ger. Pharm. fails in the majority of cases, giving results only in the coarsest kind of sophistication. The procedure employed by D. is as follows: Det. the solubility of the sample in CHCl₃, abs. alc. and petroleum ether, and ascertain the d. and non-volatile residue at 100°. The most important factor in the whole investigation being the sepn. of vol.

oil, subject 30–100 g. balsam to steam distn. until practically all the oil has been driven over. For the distn. of 40 g. balsam about 5 hrs. are required. Det. the optical rotation in a 100 mm. tube; the limits for α are -2.5 and -14° . Balsams whose oils have a higher levorotatory power are suspicious, while oils showing more or less rotation toward the right are sure indicators of adulteration. The values found for d_{15} in the past are 0.900–0.905; those for α and d . are the results obtained with freshly distd. oils. In many cases a detn. of α for the volatile oil will suffice in the evaluation of the balsam. In certain instances, Turner's test as modified by Deussen-Eger may be advantageously applied and, in the event of an uncertain outcome, the volatile oil should be fractionated in vacuum and the test be made not only on the several fractions but also on the residue. In applying Turner's test, use the volatile oil, not the balsam. Test each sample twice and note that in both cases both the tone and intensity of color are the same. Should a cherry-red (violet) color develop in the course of 5 min., the presence of gurjan balsam is reasonably certain. Should the color fail to appear, take 2 drops of oil and to the AcOH soln. add 2–3 drops of freshly prepd. 1% NaNO₂ soln. In detg. the non-volatile residue, use a flat-bottomed crystg. dish of 7–12 cm. diam. D. gives the results obtained with 12 samples from the retail trade.

W. O. E.

Strophanthus oil. H. MATTHES AND L. RATH. Univ. Jena. *Arch. Pharm.* 252, 683–92 (1914).—Both the crude and the steam-treated product occurred as a greenish salve-like mass having a narcotic odor. The consts. of the crude oil were: d_{15} 0.8995, solidification pt. $11.5-12^\circ$, n_D^{40} 1.4569, acid no. 13.64, I no. 83.55; of the purified oil: d_{15} 0.9252, solidification pt. $16-7^\circ$, n_D^{40} 1.4615, acid no. 17.61, sapon no. 189.99, ester no. 172.38, I no. 94.97, R.-M. no. 1.31, Polenske no. 0.59, Hehner no. 93.9. The oil gave the elaidin reaction, was optically inactive and consisted of 73% unsatd. and 21% satd. fatty acids. The solid acids consisted of palmitic 70% and stearic 30%; arachinic acid could not be detected. The liquid fatty acids consisted of oleic 80% and linoleic 20%. The unsaponifiable portion (1.37%) contained 60% cryst. constituents, among which phytosterol and sitosterol (m. 137° , acetate m. $127-8^\circ$) were identified.

W. O. E.

The value of the digitonin method for sterols in strophanthus oil. H. MATTHES AND L. RATH. Univ. Jena. *Arch. Pharm.* 252, 694–9 (1914).—From the fact that phytosterols occur largely as esters in vegetable oils, a preliminary saponification becomes practically indispensable now that isolation of the sterols is almost always for the purpose of detg. the amt. of vegetable in animal fats. In practice, this method is tedious and hence of questionable value. Equally unsuited are the methods of Marcussen and Schelling, Fritsche, as also the more recent one of Kuehn and Wewerinke as modified by Klostermann, for the reason that on account of its cost too little digitonin is applied to effect complete pptn., which to be quant. requires more than 3 times the amt. of digitonin. The old method of extg. the soap with Et₂O gives the same yield as the dearer digitonin procedure. *Phytosterol diglonide*, C₂₈H₄₄O₁₀, crystd. from dil. MeOH, decompd. 245° without melting, is converted into the acetates of its 2 components on heating with Ac₂O in a tube at 125° . Liebermann-Burchard reaction gives rose-violet-blue. Chugaev reaction gives yellow-red with green fluorescence. Udranski reaction gives red greenish yellow-brown.

W. O. E.

Separation of dihydroxy- and tetrahydroxystearic acids. HERMANN MATTHES AND LUDWIG RATH. Univ. Jena. *Arch. Pharm.* 252, 699–703 (1914).—On oxidizing 20 g. fatty acids from strophanthus oil with KMnO₄ according to Hazura's method, 18.5 g. oxidized product was obtained after elimination of the non-oxidized portion with benzene in a Soxhlet app. This mixt. treated 24 hrs. with 100 times the quantity of cold Et₂O yielded 5 g. and, on second treatment with Et₂O, 0.5 g. The residue was

not uniform as shown by the m. p. (135–60°). A quant. sepn. was effected by extg. the acid mixt. in a Soxhlet with Et_2O , whereby 80% dihydroxystearic acid and 20% tetrahydroxystearic acid resulted, thereby showing fair agreement with the Br method. The presence of hexahydroxystearic acid could not be detected. W. O. E.

Unsaponifiable constituents of strophanthus oil. A. HEIDUSCHKA AND R. WALLENREUTER. Univ. Munich. *Arch. Pharm.* 252, 704–8(1914).—The heavy, dark green and bitter-tasting oil yielded the const.: Completely sol. in benzene, CHCl_3 , partially so in Et_2O , petroleum ether, CS_2 , and alc.; d_{15}^4 0.915, sapon. no. 178.6, R.-M. no. 3.8, Polenske no. 0.5, Hehner no. 90.2, acid no. 42.3, acidity 75.42, I no. after 3 hrs. 88.13, 18 hrs. 91.95, Br heating no. 11.1. The unsaponifiable portion amounted to 1.12%. The digitonin method gave 0.504% phytosterol, $\text{C}_{27}\text{H}_{46}\text{O} + \frac{1}{2}\text{H}_2\text{O}$, m. 140°, acetate m. 130°, propionate m. 111°, identical with sitosterol. The *diglignide*, $\text{C}_{28}\text{H}_{46}\text{O}_2$, crystals softening about 195°, m. about 212°. Salkowski-Hesse reaction with CHCl_3 light red, H_2SO_4 yellowish red with green fluorescence; Liebermann-Burchard reaction: dark green. No appreciable amt. of paraffin could be detected in the unsaponifiable portion. W. O. E.

New method of extracting lemon oil. ANON. *Chem. Eng.* 21, 166(1915).—The lemons are mashed in a large receptacle and an acid, the nature of which is a secret, is added. This causes the oil to sep. and rise to the surface, from which it is withdrawn. Subsequent treatment of the acid mixt. with a chemical permits recovery of the acid. The residual juice, pulp, peel and foreign matter are disposed of to citrate manufacturers. About 2.5% more oil is saved by this process than by the old hand procedure, the cost of extn. being only 2.3 cts. per 1000 lemons and the time involved, 22 min., may eventually be reduced to 12 min. on further perfection and under com. operation. W. O. E.

Thymol, its melting and solidifying point. ROBERT MELDRUM. *Chem. News* 111, 193–5(1915).—The m. p. detd. by the thermometer bulb method was 48.7–49.2°; by opacity method, 50–50.1°; by floating on H_2O method, 42–3°. In the latter case it is clear that H_2O lowers the m. p., due doubtless to hydration. The solidifying p. of thymol varies between 48.2 and 49.2°, the variations being due to bore of tube and absorption of moisture. The higher figure is to be accepted since it approaches more closely the m. p. W. O. E.

Menthol, its melting and solidifying point. ROBERT MELDRUM. *Chem. News* 111, 229–31(1915).—Menthol solidifies below its normal solidifying point, due to assuming the colloidal condition previous to crystn. The solidifying point varies with the colloidal condition. Its m. p. is const. at 42° but the solidifying point varies 3.3° when detd. by good methods. W. O. E.

Bulgarian rose oil. P. SIEDLER. *Pharm. Ztg.* 60, 179–80(1915).—A sample of authentic oil of rose (harvest 1914), was examd. and the resulting const. compared with those obtained (given in parenthesis) with a sample of *Ol. geranii turticum*, a common adulterant of rose oil. The oil in question was clear and yellowish in color and began to deposit crystals at 22°. d_{20}^{25} 0.857 (0.893), d_{24} 0.8565 (0.8925), d_{28} 0.856 (0.8925), d_{32} 0.855 (0.892), d_{37} 0.8545 (0.891), d_{41} 0.853 (0.8901), d_{45} 0.852 (0.8901), d_{49} 0.850 (0.8901); acid. no. 2.93 (1.13); sapon. no. 9.99 (20.64); ester no. 7.06 (17.71); I no. 169.06 (215.01); n_D^{18} 80 (42), n_D^{20} 78 (41), n_D^{28} 75 (36), n_D^{30} 74 (34), n_D^{32} 73 (33), n_D^{35} 70 (32), n_D^{40} 68 (28). W. O. E.

The therapeutic application of synthetic camphor. A. HEFFTER. *Vierteljschr. Med. oeffentl. Sanitaetsw.* 49, 5 pp. No tangible reason appears to exist why synthetic camphor should not be employed in the prep. of spiritus camphorae. Inner medica-

tion of synthetic camphor, however, must be regarded unfavorably until clinical experience has shown its beneficial utility. W. O. E.

Is wild digitalis preferable to the cultivated? J. W. HAMNER. *Pharm. Zentralhalle* 56, 165-7(1915); see C. A. 9, 510. C. O. EWING.

Wheat flour as a skin application and its substitutes. P. G. UNNA. *Pharm. Zentralhalle* 56, 183-7(1915).—In the prep. of dusting powders and ointments, U. recommends that wheat flour be replaced wherever possible by kieselguhr, CaCO_3 , MgCO_3 , kaolin, or talcum. Typical formulas are given. C. O. EWING.

The estimation of free acid and of oxychloride solution. G. ROMIJN. 'S Hertogenbosch, Holland. *Am. J. Pharm.* 87, 245-8(1915).—R. found that the test of the U. S. P. could not be employed to det. the acidity of FeCl_3 soln. when applied to a soln. containing free HCl , since the liberated $\text{H}_2\text{S}_2\text{O}_8$ decomposes in the hot soln. into free S , SO_2 and H_2O . At ordinary temp. the conversion of ferric thiosulfate into ferrous tetrathionate proceeds very slowly; this reaction is very much accelerated by the addition of a few drops of a CuCl_2 soln. The soln. decolorizes almost instantly, and becomes turbid in a very short time. The free acid may be approx. detd. by titration (Me orange indicator). The estn. is not exact, as the deposition of ferro-ferric hydroxide begins early in the operation, covering the change of color and deflecting a portion of the base from the titration. This fault may be largely overcome by adding a starch soln. as protecting colloid. The titration is effected as follows: To the cooled soln. of 0.5 g. CuCl_2 starch (1 g. CuCl_2 mixed with 49 g. sol. starch previously dried at 100°), in 50 cc. H_2O , add 2 cc. of the FeCl_3 soln. to be tested. Normal $\text{Na}_2\text{S}_2\text{O}_3$ soln. is added, 5.3 cc. for the U. S. P. FeCl_3 soln. and 9 cc. for that of the Netherlands Pharm. IV. The decolorized liquid is colored fairly strongly with Me orange soln. If the reaction of the mixt. is acid, it is titrated drop by drop with 0.1 N $\text{Na}_2\text{S}_2\text{O}_3$. If the liquid is alk., it is rejected and the operation repeated after adding 1 cc. or as much as may be required, of 0.1 N HCl before adding the other reagents. W. G. GAESSLER.

The rapid determination of small quantities of heroine. REGINALD MILLER. *Am. J. Pharm.* 87, 248-50(1915).—In the absence of morphine or other interfering substances, a weighed amt. of the powder representing from $1/100$ to $1/20$ grain of heroine is placed in a Nessler tube, 1 cc. of 1% soln. of H_2SO_4 added, and then 3 cc. of a soln. consisting of 600 cc. com. H_2SO_4 , 300 cc. H_2O and 25 cc. 40% HCHO soln. This reagent produces a coloration varying from a yellowish straw for $1/100$ grain to a deep cherry-red for $1/20$ grain of heroine, depending upon the length of time the reaction is allowed to proceed and the amt. of heroine present. A series of standard tubes is prepared at the same time as the sample and the reaction is allowed to proceed for 10 or 15 min., when the color comparison is made. In case of a mixt. of cocaine and heroine, the substance is extd. in the regular manner by immiscible solvents, the residue of heroine and cocaine is weighed, and dissolved in a known amt. of 1% H_2SO_4 so that 1 cc. of the soln. will contain between $1/100$ and $1/20$ grain of heroine. One cc. of this soln. is put into a Nessler tube and treated as described above. The standard tube containing the same intensity of color is used as the basis for computing the amt. of heroine in the weighed residue, and the difference between the heroine and wt. of residue obtained by the immiscible solvent represents the cocaine. W. G. GAESSLER.

Studies of some compounds of cinchona alkaloids, certain metals and phosphoric acid. EDWIN D. WATKINS. Univ. Tenn. *Biochem. Bull.* 4, 94-5(1915).—A compd. was made by dissolving Ag phosphate in sirupy H_3PO_4 and adding quinine until no more was taken up. All attempts to obtain crystals met with failure but 2 complex crystals were found in a flask containing a concd. soln. which had stood in the dark for 15 months. It was possible to demonstrate the presence of Ag, quinine and H_3PO_4 in the dark yellow

crystal. The soln. is useful clinically in the treatment of gonorrhea. Solns. have also been prepared of Cu and Zn phosphates with quinine, quinidine, cinchonine and cinchonidine, but no crystals of these compds., if such they be, have been obtained.

A. P. LOTHROP.

Studies in synthetic drug analysis. III. Estimation of caffeine and antipyrine in admixture. W. O. EMERY AND S. PALKIN. *J. Ind. Eng. Chem.* 7, 519-21(1915).—Transfer 0.25 g. of the caffeine antipyrine mixt. to a 150 cc. separatory funnel by means of two 5 cc. portions of alc.-free CHCl_3 , followed by 10 cc. H_2O , add 1 g. NaHCO_3 and 10-15 cc. 0.2 *N* I in successive small portions, shaking vigorously. A decided excess of I should be apparent. Discharge the uncombined I by means of a small crystal of $\text{Na}_2\text{S}_2\text{O}_8$, add 15 cc. CHCl_3 and shake vigorously 1 min. After clearing, draw off the solvent into a second separator containing 5 cc. H_2O , shake and after clearing pass the CHCl_3 through a small, dry filter into a tared 50 cc. beaker and evap. to apparent dryness on the steam bath. Repeat the extrn. with two 25 cc. portions CHCl_3 , using the same procedure. Dry the nearly cryst. residue of caffeine and iodoantipyrine $1\frac{1}{2}$ hr. at 105° , cool and weigh. This is weight "A." Dissolve this weighed residue in 5 cc. glacial AcOH , add 10 cc. satd. aq. soln. of SO_2 and transfer with hot H_2O to 400-500 cc. beaker, making the final vol. about 200 cc. Add AgNO_3 soln. (about 0.3 g. AgNO_3), following with a few drops HNO_3 and heat nearly to boiling with stirring. Add 15 cc. concd. HNO_3 , cover the beaker and boil gently 5-6 min. The AgI is then detd. The wt. of $\text{AgI} \times 0.8012$ = amt. antipyrine. The amt. of caffeine is detd. by subtracting the product obtained by multiplying the wt. of AgI by the factor 1.3374 from the wt. of the composite residue "A."

ISADOR MILLER.

Characteristic reactions of chrysophanic acid and chrysarobin. LEGER. *Boll. chim. farm.* 53, 71(1914).—If a trace of chrysophanic acid is treated in a porcelain dish with 1 cc. concd. H_2SO_4 a pronounced strawberry-red color is produced. Chrysarobin yields a yellowish orange coloration under the same conditions. When triturated with alc. and treated in a test tube with 20 cc. distd. H_2O to which 5 drops NaOH soln. (35°Bé.) have been added, chrysophanic acid dissolves immediately and gives a strawberry-red coloration. Chrysarobin dissolves only slowly under the same conditions and yields a pale rose color; the red coloration becomes perceptible only after a longer time.

H. S. PAINE.

Stable tincture of iodine free from hydriodic acid. G. GAGLIO. *Boll. chim. farm.* 53, 72(1914).—Tincture of I which has been prepd. a few days contains HI which renders the prepn. irritating. HI may be destroyed and its formation prevented by adding 1% cryst. HIO_3 to tincture of I, H_2O and I being formed by the reaction. Since HIO_3 is only slightly sol. in alc., the excess HIO_3 which is added assures the destruction of HI as the latter is formed. The excess HIO_3 in the tincture is not objectionable in view of the fact that it is antiseptic and is not caustic. The presence of HI in tincture of I may be readily demonstrated by diluting a small amt. (1 cc.) of tincture of I with H_2O (5-10 cc.), filtering from the abundant ppt. of I and adding HIO_3 to the filtrate which consists of a clear, yellow satd. aq. soln. of I containing HI; a ppt. of I corresponding in amt. to the amt. of HI originally present is thus formed.

H. S. PAINE.

Stable sulfite solutions. R. NAMIAS. *Boll. chim. farm.* 53, 140(1914).—The stability of a 5% Na_2SO_3 soln. may be considerably increased by adding 4% of mannitol. The stability of sulfite solns. is also increased in lesser degree by the addition of glycerol and isobutyl alc.

H. S. PAINE.

Solubility of benzaldehyde in cherry laurel water. ASTRUC AND JUILLET. *Giorn. farm. chim.* 64, 169-70(1915).—The authors have verified the assertion that

laurel cherry water dissolves PhCHO in a proportion which increases with the amt. of HCN present. Seven-tenths cc. pure PhCHO was added to each of 3 samples consisting of 50 cc. each of an aq. soln. of 0.9828, 1.944 and 2.4516 g. HCN resp. per l. After a period of contact of 24 hrs. with occasional shaking the undissolved aldehyde was sepd. and the dissolved aldehyde was detd. according to Herissey-Denigès by means of phenylhydrazine acetate with addition of NaHSO_4 . The av. wts. of hydrazone obtained from 10 cc. of the solns. were 0.122, 0.132 and 0.135 g., resp., indicating that the solubility of PhCHO increases slightly with the proportion of HCN present. H. S. PAINE.

Secretogen. AMERICAN MEDICAL ASSOCIATION. Report of the Council on Pharmacy and Chemistry. *J. Am. Med. Assoc.* 64, 1518-9(1915).—The report calls attention to the unfounded and extravagant claims made for "Secretogen Elixir" and "Secretogen Tablets." No evidence has been presented that the absence of secretin is a cause of gastrointestinal disorders, or that secretin in any form is physiologically active when taken by the mouth. L. W. RIGGS.

Iodine and vaccination. L. B. SCOTT. *Ind. Med. Gazette* March, 1915; *J. Am. Med. Assoc.* 64, 1797-8.—Expts. in the use of I as a preliminary disinfectant of the skin in vaccination, were carried out in the ordinary course of preparing calf vaccine. Twelve out of 59 calves were selected at random and prepd. with I instead of the usual method of cleansing the skin, and vaccinated with others under the same conditions. The av. yield of lymph of the iodine calves was 7.7 g. and of the others 26.6 g. Two iodine calves developed so few vesicles that no useful material could be removed. The other 10 yielded from 2.0 to 25.5 g. Of the 47 controls, one yielded none and the others from 9.5 to 62.8 g. The difference lay in the number of vesicles which developed and not in their size or quality. L. W. RIGGS.

Official magnesium citrate. E. LÉGER. *J. pharm. chim.* 11, 157-66(1915).—The directions of the French Codex for the prepn. of this compd. from citric acid 100 g., Mg hydrocarbonate 60 g., distd. H_2O 30 g., are ambiguous. L. employs the same amts., except H_2O 35 g. Add the cold H_2O soln. of the acid to the Mg hydrocarbonate, stir the pasty mass, divide into lumps of walnut size, allow to dry on glass in an oven at 45-50° for 2-3 hrs. Pulverize, expose to air for 2-3 days, then keep in dry bottles. This prepn. is sol. in twice its wt. of warm H_2O , as required by Codex, and shows very little effervescence. When the soln. is left for 6-12 hrs. it congeals, forming a crystal mass of the compn. $\text{Mg}_3(\text{C}_2\text{H}_4\text{OH}(\text{CO}_2)_3)_2 \cdot 13\text{H}_2\text{O}$, not 14 H_2O (Heldt). 11 H_2O are expelled at 110°, the last 2 at 150°. The official compd. is no doubt a mixt. of amorphous Mg₃ salt with amts. of Mg hydrocarbonate + citric acid equiv. to it. This is indicated by its % of H_2O and of MgO, also by the viscous pptn. by EtOH of the soln. of the cold-prepared salt (Ed. Robiquet) in H_2O . The ppt. becomes cryst. after several hrs. and is then no longer readily sol. in cold H_2O . The formula 4 H_2O in the Codex for Mg citrate should be changed to 13 H_2O . 1 g. of the salt should leave upon ignition 0.16-0.17 g. of MgO. To test the solubility of Mg citrate, the temp. of 70° is proposed instead of the vague term "warm H_2O ." S. WALDBOTT.

Herbicides with arsenical base. H. DUBIEF. *J. pharm. chim.* 11, 174-80(1915).—Five com. samples were examd., 4 contained 33-58% As_2O_3 , one consisted mostly of NaOH (94.8%). Sand swept together from 1 sq. m. of treated area, yielded over 2 g. As_2O_3 . The sale of these As-compds. used for tennis fields should be prohibited. Less harmful compds. suggested are: NaOH, FeSO_4 and H_2SO_4 , formol, Na_2CO_3 , cresyl, gas liquor. S. WALDBOTT.

New researches on surgical threads. A. ASTRUC. *J. pharm. chim.* 11, 213-8 (1915).—Results of expts. are recorded, giving the breaking stress and elastic limit for various diameters of linen threads with or without knots. The results are compared

with previous ones on catguts, silk and horsehair. Diameters of various ligature threads are also given. Standards along the lines indicated should be set up by the Codex.

S. WALDBOTT.

Assay of granules of arsenious acid and of sodium arsenate. M. FRANÇOIS AND E. LASAUSSE. *J. pharm. chim.* 11, 226-37(1915).—Detn. of As in granules of the French Codex is difficult when starch is added as excipient, because As_2S_3 cannot then be filtered. In this case, det. As in $KHCO_3$ soln. of As_2O_3 by titration with I soln. This involves no previous destruction of organic matter. The method is unreliable because small grains of As_2O_3 dissolve with great difficulty. A better method is to destroy organic matter by concd. HNO_3 and to convert As into $NH_4MgAsO_4 \cdot \frac{1}{2}H_2O$. This is weighed as such after drying the salt with 6 H_2O at 100° for 10 hrs. The salt is formed by direct pptn., not through the Mo compd. because the As-molybdate is not as completely pptd. by heat as the similar P compd. The As in granules of Na arsenate, $Na_2HASO_4 \cdot 7H_2O$ is detd. by the same method, except that about twice as many granules are used, owing to their smaller % of As.

S. WALDBOTT.

Liquid extract of kava. HAROLD DEANE. *Pharm. J.* 94, 622(1915).—The Brit. Pharm. directs percolating the drug with 90% EtOH, exhausting with 45% EtOH, evapg. the latter percolate to a soft ext., and dissolving this in the reserved 90% percolate. D. points out that the 45% ext. cannot be sol. in the 90% percolate.

S. WALDBOTT.

Medicine and pharmacy in France in the eleventh and twelfth centuries. L. REUTTER. Geneva. *Schweis. Apoth. Ztg.* 53, 276-80, 288-91(1915). S. W.

The use of digitalis purpurea in olden times. JUSTUS ANDERSON. *Tidskrift for Kemi, Farm. og Ter.* 1915, 9; *Schweis. Apoth. Ztg.* 53, 233-6(1915). S. W.

Device for sterilization (DEUSSEN) 1. Acidity and ash of vanilla extract (WINTON) 12. Detection of coumarin (DEAN) 12. Estimation of methyl alcohol in presence of ethyl alcohol (JONES) 7. Detection of methyl alcohol (FELLENBERG) 7.

BECKURTS, H., FRERICHS, H. UND BECK, O.: *Jahresberichte der Pharmazie*, hrsg. vom deutschen Apothekerverein. 48 Jahrg. 1913. Göttingen: Vandenhoeck & Ruprecht. 556 ss. 19 M.

BOCQUILLON-LIMOUSIN, H.: *Formulaire des médicaments nouveaux pour 1915*. Paris: Baillière et fils. 360 pp. 3 fr.

MERK, E.: *Jahresbericht über Neuerungen auf den Gebieten der Pharmakotherapie und Pharmazie*. 27 Jahrg. Berlin: J. Springer. 601 ss. 1.50 M.

MOELLER, J. AND THOMS, H.: *Real-Enzyklopädie der gesamten Pharmazie*. 2 Aufl. Wien: Urban & Schwarzenberg. 546 ss. 17.50 M.

Brit., 1,667, Jan. 21, 1914. C. F. BOEHRINGER & SOEHNE. Bismethylamino-tetraaminoarsenobenzene solns., probably containing a carbonate of the base, are prepd. by dissolving the compd. in aq. solns. of bicarbonates. The salts of the base may also be dissolved in solns. of carbonates, or the base may be suspended in H_2O , alkali added, and the liquid satd. with CO_2 . The solns. are suitable for intramuscular injection. Alc. and acetone ppt. the compd. from its soln. (cf. C. A. 8, 2035).

Brit., 1,837, Jan. 23, 1914. FARBW. v. M. L. & B. Medicinal compounds are prepd. by treating a salt of an organic base with an aurohydrocyanic acid or a salt thereof. Suitable bases are 1-Ph-2,3-dimethyl-4-amino-5-pyrazolone and its alkyl derivs. Cf. 17,693, 1913, (C. A. 9, 356).

Brit., 1,869, Jan. 23, 1914. FARBW. v. M. L. & B. Compounds for treating tuberculosis and syphilis are prepd. by treating an organic base or a salt thereof with aurothiosulfuric acid or a salt thereof. In an example, ethylenediamine hydrochloride is treated with Na aurothiosulfate. Reference is made to 17,693, 1913 (C. A. 9, 356), and 1,837, 1914 (*supra*).

Brit., 2,090, Jan. 26, 1914. FARBW. v. M. L. & B. Arsenazo compounds are obtained by reducing the corresponding azo dyes containing an arsonic or arsenoxide group by means of hypophosphorous acid. According to examples, the azo dyes from 3-diazo-4-hydroxy-phenyl-1-arsonic acid and phloroglucinol, *m*-diazophenylarsonic acid and 2-naphthylamine-3,6-disulfonic acid, and from diazotized atoxyl and 1,8,3,6-aminonaphtholdisulfonic acid, are reduced. The products have therapeutic properties.

Brit., 2,314, Jan. 28, 1914. FARBW. v. M. L. & B. Organomercuric compounds are prepd. by treating aromatic arsenoxides or the corresponding halogen compds. containing the group, As(HC)₂ with HgO or Hg salts, arsenic being thereby replaced by Hg. In examples, the prepn. is described of compds. from 4-aminophenylarsenoxide, 3-amino-4-hydroxyphenylarsenoxide, 3-acetyl-amino-4-hydroxyphenylarsenoxide, and the hydrochloride of phenylglycine arsenious chloride. The 3-acetyl-amino compd. described is also obtainable by acetylation of the corresponding 3-amino compd.

Brit., 2,610, Jan. 31, 1914. FARBW. v. M. L. & B. Tubercle bacilli are cultivated successively on nutrient media containing increasing proportions of a Au salt, such as the cyanide, thereby obtaining bacilli resistant to the action of Au salts and containing finely subdivided metallic Au. Therapeutic preparations such as tuberculin and emulsions of the bacilli in glycerol H₂O are prepd. from bacilli so cultivated.

Brit., 2,787, Feb. 3, 1914. H. S. WELLCOME and F. L. PYMAN. In mfg. phenylseleninic and selenonic acid derivatives, phenylseleninic acid or its nitrate is nitrated, and the nitrophenylseleninic acid resulting is reduced by means of bisulfite, whereby nitrophenyldiselenide is obtained. On reduction of this compd. with Na₂S, aminophenyldiselenide results, and this, by acetylation and subsequent oxidation by HNO₃, yields acetaminophenylseleninic acid. By oxidizing the last mentioned compd. with permanganate, acetaminoselenonic acid may be prepd., and on hydrolysis, aminophenylselenonic acid is obtained. This acid and its salts are useful in therapeutics. Salts of the above-mentioned acids may be prepd. according to the usual methods of salt formation.

Brit., 3,034, Feb. 5, 1914. C. R. LIDGEY. Use of fluorides as constituents of dentifrices. Preferably the fluorides of the alk. earths or NH₄ are employed; but mineral fluorides may be used if desired. One recipe for a paste is described as follows: CaF₂ 1500 g., KClO₃ 100 g., Ca₃(PO₄)₂ 1,000 g., NaF 50 g., NH₄F 50 g., glycerol 1,000 g., menthol 15 g., oil of cinnamon 15 g., and essence of peppermint 15 g.

Ger., 280,972, June 15, 1913. C. MANNICH. Mfg. alkoxymethyl ethers of morphine by the double decomp. of the alkali compds. of morphine with halomethyl alkyl ethers of the general formula HICH₂OR.

Ger., 280,974, Dec. 19, 1913. J. D. RIEDEL, AKT.-GES. Mfg. water-soluble chondroitin-sulfuric acid salts by dialyzing concd. solns. of equiv. amts. of the alkali salt and a heavy metal against H₂O, and sepg. from the resulting solns. the heavy metal salts of the acid by evapg. with moderate heating, or by pptg. with organic solvents, such as ether or alc., to get the solid product.

Ger., 281,009, Apr. 24, 1913. CHEM. FABRIK VON HEYDEN AKT.-GES. Mfg. mercurized aminoarylsulfonic acids by heating Hg aminoarylsulfonate, or mixts. of aminoarylsulfonic acids with substances which form the Hg salt, until the resulting Hg compd. has become sol. in alkali.

Ger., 281,099, May 8, 1914. KNOLL & Co. Mfg. pure, almost odorless *m*-hydroxyphenyl acetate by acetylizing resorcinol in the known manner and treating the resulting crude product with slightly superheated steam *in vacuo*.

Ger., 281,101, July 17, 1913. Addition to 268,220 (C. A. 8, 2034). FARBW. v. M. L. & B. In mfg. heavy metal addition compounds of aromatic arsenic compounds, aromatic compds. containing trivalent As may be employed other than the As compds. specified in 268,221 (C. A. 8, 2034), 270,253, 270,256, 270,257, 270,259 (C. A. 8, 2222), 275,216 (C. A. 9, 514), and in the principal patent.

Ger., 281,390, Sept. 24, 1912. T. SARTORIUS. Mfg. tasteless quinine salts, and the like by fusing the ordinary products with gelatin or the like to form an intermediate product not sensitive to resin and balsam solns., pulverizing this, treating the powder with resin and balsam solns., and finally drying it. *E. g.*, quinine-HCl is pulverized and warmed with pure gelatin, with suitable addition of H₂O, until complete soln. of the hydrochloride is effected. After cooling, a hard, stiff mass of quinine gelatin is obtained, which can be pulverized to any desired degree of fineness. The grains of suitable size are immersed for a short time in an alc.-ether soln. of tolu balsam, whereby the grains are coated with a fine layer of this resin. The prepn. is then spread out upon a large surface, whereupon it is ready for use. The tolu-balsam coating restrains the action of the saliva until the product is in the stomach, where it dissolves in short time, and liberates the medicinal prepn.

Ger., 281,538, Jan. 26, 1913. FARBW. v. M. L. & B. Mfg. an active specific for tuberculosis. Au salts are known to have a strong bactericidal and inhibiting action on the tubercle bacillus. Opposed to this is the observation that by gradual growth of the tubercle bacillus on auriferous substrata this organism loses its sensitiveness to Au salts. Considerable amts. of finely divided Au are taken up, during such cultivation, into the protoplasm of the organism, and in this manner tubercle bacillus prepn. can be made which have an increased therapeutic activity. *E. g.*, tubercle bacilli are cultivated on 1 bouillon which, besides the usual constituents, contains an addition of AuCN in the proportion of 1:10,000,000, and then the bacilli are transferred, after growth, to fresh media which contain AuCN in the proportion of 1:5,000,000. This process is carried on, by steps, to cultures in which the AuCN is present in the proportion of 1:10,000. Such cultures, in the mass, are killed or ground in a ball mill, worked up with glycerol H₂O to a fine emulsion, and used for the prepn. of tuberculin.

18. ACIDS, ALKALIES, SALTS AND SUNDRIES.

T. LYNTON BRIGGS.

Opportunity for extension of American chemical industries. BAXERES DE ALZUGARAY. *Mining Eng. World* 42, 1063-5(1915). E. J. C.

The education of the industrial chemist of the future. R. M. CAVEN. *J. Soc. Chem. Ind.* 34, 533-4(1915). E. J. C.

The education of the industrial chemist. E. B. R. PRIDEAUX. *J. Soc. Chem. Ind.* 34, 535-6(1915). E. J. C.

Some problems of chemical industry. R. F. BACON. *J. Ind. Eng. Chem.* 7, 535-8 (1915).—An address in which are suggested many research problems to be solved in the fields of metallurgy and industrial inorg. and org. chemistry. ISADOR MILLER.

Review of innovations in the inorganic chemical industry. v. HÖRLEBING. *Oesterr. Chem. Ztg.* 18, 27-9, 36-7, 44-6(1915); cf. C. A. 9, 514.—A discussion of patented processes pertaining to H, O, Os, Cl, S and N. ARTHUR LEBERER.

The potash problem and the utilization of the mother liquors of brines. ANGELO COPPADORO. Padova. *Ann. chim. applicata* 3, 225-35(1915).—The brines are generally air evapd. in summer to 35° Bé. to give ordinary sea-salt; then the mother liquors are run off into basins, and exposed to the winter cold, during which time MgSO_4 with a little MgCl_2 and some NaCl and Na_2SO_4 are deposited. C. suggests continuing the evapn. of the mother liquors during the summer following, up to 37° Bé, when $\text{K}_2\text{SO}_4 + \text{MgSO}_4$ will ppt. out, thus removing 50% of the K from the mother liquor. $\text{K}_2\text{SO}_4 + \text{MgSO}_4$ can be used as the double sulfate in agriculture. Continued treatment will remove the residue of K as $\text{MgCl}_2 \cdot \text{KCl}$ (carnallite). The final liquor may serve for extrn. of Br.

S. LEVY.

The manufacture of artificial hair. M. SCHALL. *Kunststoffe* 4, 361-3, 374-6 (1914).—A review and discussion of the patent literature. (Cf. C. A. 9, 128.)

F. W. SMITHER.

Application of spectrography to industrial chemistry (LEWIS) 7.

JOHNSTON, S. J.: *The Rare Earth Industry*. London: C. Lockwood.

U. S., reissue 13,924, June 8. L. E. SAUNDERS. Making barium oxide. See original patent 1,112,721, C. A. 8, 3841.

U. S., 1,141,136, June 1. W. J. MOELLER. Waterproofing asbestos mill-board and rendering it tough and hard, by satg. the sheet with heated candle-tar or stearin pitch, compressing to remove the excess tar and to compact the fibers and allowing the material to season by oxidation.

U. S., 1,141,265, June 1. F. RASCHIG. Continuous process of fractional distillation of petroleum, tar or other liquids. See Brit., 14,230, 1913 (C. A. 9, 147).

U. S., 1,141,371, June 1. G. VIRNEBURG. Abrasive sheet paper or cloth is coated with glue and sharp sand and the coating and backing fabric are impregnated with a mixt. formed of benzine, resin, PbO , Ni oxide and beeswax to render the sheet more durable.

U. S., 1,141,446, June 1. J. A. DECEW. Mixture for adding to ice in icing refrigerator-cars, etc., formed of crude NaCl 95% mixed with 5% of Na silicate, NaOH or Na_2CO_3 . The latter prevents corrosive action on metals by pptg. any hygroscopic Ca or Mg salts in the NaCl .

U. S., 1,141,482, June 1. S. R. OFFENHEIM. Charring dried kelp for recovery of potash and other values. A direct flame is applied to the top of a thick layer of kelp in the charring furnace, to ignite it, and after a considerable portion of the kelp near the flame is in a glowing condition the igniting flame is discontinued and a down draft maintained through the kelp until the whole layer is charred. The temp. of the furnace walls is maintained below 350° and care is taken not to incinerate the mass.

U. S., 1,141,639, June 1. J. H. HIRT. Making soda ash by granulating hot Na_2S by mixing it with wet sawdust, then adding an excess of raw limestone to the mixt. and heating to about red heat.

U. S., 1,141,920, June 8. E. O. BARSTOW. Making lead arsenate by adding PbO to a soln., containing both HCl and arsenic acid, in sufficient amt. to combine with the HCl and ppt. PbCl_2 , sepg. the ppt. and then adding an additional amt. of PbO somewhat less than required to combine with all the arsenic acid. (Cf. C. A. 8, 2784.)

U. S., 1,141,921, June 8. E. O. BARSTOW. Making bromine by reacting with Cl on a soln. of FeBr_2 and FeBr_3 of such strength that the Br is practically insol. and

seps. by gravity, sepg. the Br and agitating it with more of the FeBr_2 and FeBr_3 soln. to remove any traces of Cl.

U. S., 1,141,922, June 8. E. O. BARSTOW. **Making bromine** by reacting with H_2SO_4 on a strong soln. of bromide and bromate of K or Na (in the mol. proportions of 5:1). The Br seps. from the sulfate soln. in liquid form by gravity.

U. S., 1,141,944, June 8. E. S. DAWSON, JR. **Electrical insulation**; a mixed glycerol ester of phthalic and oleic acids mixed with castor oil; made by heating glycerol 92 with phthalic anhydride 148 parts to 200° , adding oleic acid 70.5, castor oil 70.5 and phthalic anhydride 37 parts and continuing the heating at slightly below 200° until a homogeneous product is obtained. It is a flexible, reddish, resinous material which on heating to 160° for 15 hrs. is rendered insol. and infusible. Cf. C. A. 8, 1215.

U. S., 1,141,947, June 8. F. W. DEJAHN. **Making ammonia** by passing a mixt. of H and N under a pressure of 80–90 atm. and at $520\text{--}540^\circ$ over a catalyst formed by impregnating pumice stone with $\text{Ni}(\text{NO}_3)_2$, igniting at 550° , heating in H for 8 hrs. at 550° , treating with metallic Na and heating to 450° in anhyd. NH_3 . Fe or Mo may replace Ni.

U. S., 1,141,948, June 8. F. W. DEJAHN. **Producing ammonia** by passing a mixt. of H and N under a pressure of 80–90 atm. and at $520\text{--}540^\circ$ over a catalyst formed by igniting a salt of Co, Mn, Ti, Ce, B, U or Si upon a carrier of pumice and heating the product (after reduction in H), with metallic Na and anhydrous NH_3 at 300° .

U. S., 1,141,994, June 8. C. UEBEL. **Making nitric acid**. See Fr., 461,452 (C. A. 8, 2464).

U. S., 1,141,999, June 8. C. L. WEIL. **Making salt from brine**. The brine is passed through a superheating system into a hooded evapg. pan, allowed to evap. in the pan and the size of grains of salt deposited is regulated by the application of jets of air to the surface of the brine. The hood of the evapg. pan is supplied with heated air by a blower. Cf. C. A. 8, 1857, 3222.

U. S., 1,142,068, June 8. F. S. WASHBURN. **Monoc ammonium phosphate** substantially free from diammonium phosphate is made by treating phosphate rock with H_2SO_4 to form a crude soln. of H_2PO_4 . This soln. is filtered and rendered slightly alk. with NH_3 and then slightly acidified with H_3PO_4 . Cf. C. A. 9, 129.

U. S., 1,142,371, June 8. F. C. SCHMITZ. **Making phosphoric acid**. A mixt. of phosphate rock, SiO_2 and C is heated in an elec. furnace and air is supplied to the gases thus formed, to produce P_2O_5 . The latter is sprayed with a dilute soln. of H_3PO_4 and the aq. acid collected after absorption in a checker-work tower working on the counter-current principle. Before entering the tower the gases are allowed to bubble up through the acid to remove impurities which might clog the tower.

U. S., 1,142,397, June 8. J. W. BURROUGHS. **Making phosphoric acid** by fusing together a mixt. of phosphate rock and SiO_2 and treating the gases formed with H_2O while they are at a temp. above $700\text{--}900^\circ$.

U. S., 1,142,619, June 8. G. PUM and A. GLAESSNER. **Artificial sponge** is made by mixing viscose and cotton or other fibrous material with granular NaCl (or other material which when dissolved will harden viscose) and the resulting pasty mass is formed into pieces of the desired size and treated with dil. HOAc to dissolve out the granular material and harden the viscose.

Brit., 1,766, Jan. 22, 1914. T. BOBERG, N. TESTRUP and TECHNO-CHEMICAL LABORATORIES. **Treating giant kelp** to ext. alkali salts. The treatment is similar to the treatment of peat as described in 10,834, 1903, 17,610, 1911 (C. A. 7, 411), 17,427, 1912 (C. A. 8, 416), and 24,639, 1912 (C. A. 8, 1498). The seaweed is pulped and forced

under pressure through a heater and heat recuperator, and then cooled and pressed. The temp. employed is about 170° . The expressed liquid is used for the extn. of alkali salts and I, and the residue, after further pressure and drying out by flue gases, if desired, may be used for solid fuel or distd. to form gaseous fuel, the final charred residue being suitable as a filtering or clarifying agent. In prepg. a pulp containing 6-10% by wt. of insol. solids, undue inclusion of air may be avoided by pulping in a partial vacuum or under H_2O , or by a combination of both these processes. In pulping fresh material, the expressed liquid obtained by pulping previous material, or the liquid used to wash the pulp cake, may be used. Reference is also made to 4,684, 1911 (C. A. 6, 2309), 12,462, 1911 (C. A. 6, 3039), and 24,748, 1911 (C. A. 7, 1601).

Brit., 2,841, Feb. 3, 1914. P. E. WILLIAMS. Ammonia is obtained from thiocyanates, as from a soln. of $Ca(SCN)_2$ obtained from NH_4SCN prepd. from gas as described in 23,624, 1909 (C. A. 5, 2718), by heating with an alkali or alk. earth in the presence of H_2O , and removing the COS which is also produced. The $Ca(SCN)_2$ soln. is evapd. nearly to dryness and mixed with slaked lime, and the mixt., covered with a layer of slaked lime (to absorb the COS), is heated to $500-600^{\circ}$ in an Fe vessel placed in an externally heated chamber. A vessel of H_2O may be placed in the chamber, or a jet of steam may be injected to maintain a moist atm. so as to provide H_2O for the reaction and assist in the removal of the NH_3 . The NH_3 may be directed into H_2SO_4 in a closed vessel, the upper part of which is connected with an air pump or gas exhauster.

Brit., 2,952, May 19, 1914. E. J. HUNT and W. T. GIDDEN. Zinc sulfate solution, which may be obtained by neutralizing with crude ZnO or $ZnCO_3$, the acid liquors produced in the electrolysis of $ZnSO_4$, is purified from ferrous Fe and Mn by treating with PbO_2 or Pb_2O_4 , preferably under the influence of heat. An alkali, a metallic oxide such as ZnO , or a carbonate such as $CaCO_3$ or $ZnCO_3$, may be added to complete the pptn., and the soln. may be further purified by Zn or Zn dust. Cf. C. A. 8, 3271.

Brit., 2,988, Feb. 5, 1914. INTERNATIONAL SALT CO., A. W. BROWN and J. H. WEBSTER. In a regenerative open-hearth furnace for melting and treating salt or like mineral substances, the regenerators extend under the whole furnace (which comprises a melting portion and a purifying portion), and are of special design; both portions of the furnace are connected up with the regenerators, and the purifying hearth is divided up into special baths.

Brit., 3,367, Feb. 9, 1914. H. LEVIN. A metal polish consists of a vehicle or vehicles such as gasoline, methylated spirits, oleic acid, and fat, and the ppt. (consisting of basic Fe sulfate combined with Na_2SO_4 and traces of sulfates of Cd, Cu, Cr, Ni, Zn, or Mn), obtained in the removal of Fe from solns. of the above metals by the process of 17,672, 1912 (C. A. 8, 407). Any well-known polishing material may be added such as $CaCO_3$, whiting, dolomite or hearthstone, calcined MgO , silicates of Al, pumice, Na_2CO_3 , Na_2SiO_4 , borax, and an alkali sulfate.

Brit., 3,388, Feb. 9, 1914. HENKEL ET CIE. Magnesium perborate. See Ger., 278,868 (C. A. 9, 1096).

Brit., 3,476, Feb. 10, 1914. HENKEL ET CIE. Magnesium perborate. See Ger., 278,868 (C. A. 9, 1096).

Brit., 3,477, Feb. 10, 1914. HENKEL ET CIE. Zinc perborate is obtained by m. a Zn salt such as $ZnSO_4$ with an alkali perborate. Cf. 3,388 (*supra*).

Fr., 468,349, Feb. 12, 1914. NITROGEN GHS. M. B. H. In the production of nitrogen and carbon dioxide, the sintering of the Cu and combination with CuO , incident to carrying out the process expressed by the equation— $Cu + \text{air (or combus-}$

tion gas) $\rightarrow$ $\text{CuO} + \text{N}(+\text{CO}_2)$ —at a high reaction temp. ($800-900^\circ$), is avoided by the addition of metal oxides which at first are oxidizing with loss of O and are then reducing (as alloys) and combine with the O. The temp. of the reaction is moderated thereby to 180° . Such oxides are $\text{Al}(\text{OH})_3$ and CaO , as well as SiO_2 .

Ger., 279,622, July 23, 1913. B. JIROTKA. Mfg. molded articles with smooth surfaces from wood fiber by beating the material up, in small amts., to a smooth product, and then projecting it against the form.

Ger., 280,548, July 25, 1913. A. PUCHAT. App. for mfg. gypsum articles.

Ger., 281,093, Mar. 11, 1914. J. BEHRENS. Separating vapor mixtures by bringing them into contact with mechanically adsorbent bodies, with the employment of suitable pressure. The period of contact with the wood charcoal, or other adsorbent material, is shorter than would be required for the adsorption of the whole amt. of the vapor mixt., and the temp. of adsorption is maintained above the vaporizing temp. of the liquid mixt. By such a partial adsorption the more readily adsorbed constituents of the vapor mixt. have the advantage. *E. g.*, with the aid of a current of vapor of 7% HOAc , suitably regulated, a 30% HOAc can be obtained, by driving out the adsorbed and condensed mixt. of HOAc and H_2O from the charcoal, by heating. The residual H_2O contains then but a fraction of 1% of HOAc . By raising the adsorption temp., by superheating the vapor mixt. and thereby simulating a gas mixt., the sepn. can be increased materially. In this manner, a 60-80% HOAc can be obtained from a 7% acid, while the residual H_2O contains but 2% HOAc . By too strong superheating of the vapor mixt., the effect is materially lessened, and finally is nil. An analogous property is exhibited by a mixt. of steam and HCO_2H vapor. The charcoal can be used repeatedly.

Ger., 281,169, July 23, 1913. O. HAASE. Preserving gypsum molds by treatment with a mixt. of H_2SiF_6 and ZnSiF_6 .

Ger., 281,211, Sept. 17, 1912. VEREIN CHEMISCHER FABRIKEN. Construction and operation of an app. for mfg. high percentage nitric acid (the mono-hydrate). Cf. C. A. 9, 697.

Ger., 281,255, Aug. 20, 1912. F. MENZEL. Construction and operation of a machine for cementing mica.

Ger., 281,305, Mar. 30, 1913. A. CLASSEN. Obtaining finely divided metals and alloys by reducing the metal salt solns. in the presence of gelatose, a colloid obtained by protracted boiling with H_2O of glue or gelatin. Preferably the metals or alloys or their compds., if necessary with the employment of an etching process, are comminuted and mixed with gelatose, adding indifferent substances to the mixt. The process is applicable for heavy metals which form colloids, such as Au, Ag, the various Pt metals, the earth metals, such as Ce, La, Di, Th, also W, Mo, U, Ti, and Nb. Preferably, gelatose is added to a boiling soln. of reducible metal salt solns.. The soln. can be employed directly, or may be evapd., whereby indifferent substances may be added as a vehicle for the colloid metals. *E. g.*, Pt 0.13 g. (as in the form of H_2PtCl_6), and boiling H_2O 100 g., are mixed with 2 g. gelatose and 1 drop of $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$ and evapd. to the desired concn. Before or during the evapn., asbestos, sawdust, or kieselguhr may be added. According to the material, the mass is dried and ignited, or allowed merely to dry. By this process contact bodies with the peculiar colloidal properties of the coating may be readily prepd., which are more active than Pt-asbestos. When the gelatose in the contact body is incinerated by ignition, the ash forms easily. The resulting contact bodies are free from admixts. such as Na_2CO_3 , HCOOH , HCHO , and similarly acting reducing agents may be employed also.

Ger., 281,354, Sept. 21, 1913. Addition to 262,235 (C. A. 7, 3398). G. SAUER-BREY, MASCHINENFABRIK AKT.-GES. App. for the continuous decomposition and solution of potassium salts, according to the principal process.

Ger., 281,355, Mar. 21, 1914. Addition to 262,235 (C. A. 7, 3398). G. SAUER-BREY MASCHINENFABRIK AKT.-GES. In an app. for the continuous decomposition and solution of potassium salts, and the like, the app. specified in the principal patent is modified with a view to securing a more advantageous circulation of the soln. Cf. C. A. 9, 1378.

Ger., 281,501, July 2, 1907. CONSOLIDIERTE ALKALIWERKE AKT.-GES. FÜR BERGBAU UND CHEM. In obtaining potassium chloride in coarsely granular form, the hot KCl soln. flows counter to the cooling liquid, which flows through a series of cooling chambers arranged in a trough, and comes in contact with the outer surfaces of these cooling chambers. The crystals collect on the cooling surfaces and are dislodged by shock, to collect upon a transporting band which removes them.

Ger., 281,537, Feb. 10, 1914. Addition to 281,005 (C. A. 9, 1538). Z. LITTMANN. The app. described in the principal patent for the manuf. of sulfuric acid is modified in that the several tubular towers are stepped, the series being connected by pipes from the lower wider towers to a cross pipe connecting the several series through the uppermost tower in each series. A damper is provided in the cross pipe next to each of the uppermost towers.

Ger., 281,584, Jan. 4, 1914. BADISCHE ANILIN- UND SODA-FABRIK. In a process of analyzing gas mixtures, 2 containers are filled with the gas mixt. under exam. and a gas for comparison, at the same temp. (being immersed in the same water bath). The gases are then simultaneously allowed to flow out of small openings at as nearly the same pressure as possible, until a certain vol. of the one gas has been delivered, whereupon the vol. of the other gas which has flowed out in the same time is employed for the analysis.

Ger., 281,723, May 14, 1914. C. BEINDL. Mfg. hydrocyanic acid and cyanogen compounds by the catalytic union of gaseous or volatile C compds. and N compds. If pure metals are employed as the contact bodies, high yields are not obtained. Under like conditions these yields are materially greater if the contact bodies contain, besides the metal, certain admixts. such as compds. of the alkalis, alk. earths, earth metals, compds. of Mo, U, W, Os, Ti, etc., or the corresponding ores. Only small amts. of these additions are necessary to secure the desired speed of reaction.

Ger., 281,831, June 1, 1913. C. BREITHAUPT and W. ZIERVOGEL. Separating salts from solutions with the aid of a current of air. The hot soln. is led through a drum through which is directed a current of air. The soln. is taken up by the walls of the drum as it is rotated, thereby presenting a thin film of the liquid to the action of the air.

19. GLASS AND CERAMICS.

G. E. BARTON, A. V. BLEININGER.

Scientific glass and glassware assured by the French manufacturers. BERLE-MONT. *Ann. fals.* 8, 54-62(1915).—A popular address before the French Soc. for the Encouragement of Home Industries. There is no doubt but that the French glass manufacturers will be able to supply all the scientific glassware needed at home.

H. S. BAILEY.

The use of Glauber's salt as a substitute for soda in bottle glass. ANON. *Glas-ind.* 26, No. 17/18(1915).—It is difficult to get good glass with this substitution even

with the addition of fluorspar. Four formulas are given. *Dark green bottle glass.* Sand, yellow 150, Glauber's salt 50, lime, crude 40, fluorspar 12; soda 7, iron oxide 3, MnO_2 9, coal 5; sand, yellow 100, Glauber's salt 26, lime 24, coal 3, iron oxide 3, MnO_2 7. *Semi-white bottle glass.* Sand, white 100, Glauber's salt 30, soda 3, lime 26, fluorspar 8, coal 3; sand, white 100, Glauber's salt 28, lime, crude 26, coal 3, MnO_2 (decolorizer) 0.01.

J. B. PATCH.

Fuel consumption. ANON. *Glasind.* 26, Nos. 9-14(1915).—Fuel consumption in glass factories is briefly discussed under the following heads: the heat value of the fuel, suitable furnace practice, the system, size and correct construction of the melting furnace, the m. p. of glass, the number of auxiliary ovens and leers, the need of careful attention to the whole system.

J. B. PATCH.

The lead question in the ceramic industries. A. BERGER. *Glasind.* 26, Nos. 3-6(1915).—Historical.

J. B. PATCH.

Majolica glazes and imitation ware of gypsum. B. *Diamant* 37, 49-50(1915).—An imitation of the English majolica glazes can be produced with the following recipe: feldspar 40, flint 32, chalk 30, white lead 27, H_3BO_3 26, SnO 15, $\text{Na}_2\text{B}_4\text{O}_7$ 5, Na_2CO_3 $1\frac{1}{4}$, and small amounts of Cr_2O_3 and UO_2 according to colors desired. The whole is finely ground together and gum tragacanth added as a binder. After applying the glaze the ware is heated in a muffle to Seger cone 1 or 2. If the glaze is applied to gypsum, first coat with linseed oil and lacquer.

J. B. PATCH.

Clay deposits near McMurray, Alberta. S. C. ELLS. Canada Dept. Mines, *Bull.* 10, 15 pp.(1915).—Clays overlying the Devonian limestone and beneath bituminous sand contain carbon derived from the sand. This carbon is a serious defect and renders the safe burning of wares made from them a difficult process. A description including burning test, absorption test and fire-shrinkage, of 25 different samples of clay is given.

R. L. SIBLEY.

The color of firebricks. ANON. *Brit. Clayworker* 24, 23(1915).—Color is no indication of the refractoriness. Harder burning which is desirable, usually harms the color.

C. H. KERR.

Sparkling plug insulators. ANON. *Brit. Clayworker* 24, 25(1915).—The requisites are: (1) must withstand sudden heating and cooling; (2) must withstand rough usage; (3) must form a gas-tight joint. Only 3 materials are widely used, porcelain, steatite and mica. Porcelain comes chiefly from Limoges, France. A typical compn. (very different from English porcelain) is china clay 40, feldspar 40, flint 10, steatite 6. French insulators are a one-fire product and are of lower coeff. of expansion than the English product.

C. H. KERR.

The thermal conductivity of refractory materials. G. DOUGILL, H. J. HODSMAN AND J. W. COBB. *J. Soc. Chem. Ind.* 34, 465-71(1915).—The infusibility required in refractories is largely dependent upon thermal cond. but the less the heat conducted away the greater is the thermal economy. Thermal cond. is of the greatest importance in all uses where heat is transferred through the refractory wall as in gas retorts, etc. A new app. for detg. thermal cond. is described. Bricks of ordinary size are tested in a gas furnace; the brick is heated on one side and the temp. of the bottom and top sides is measured; the quantity of heat transmitted through the brick is detd. by a H_2O calorimeter which is jacketed by a 2nd calorimeter at the same temp. on the "guard ring" principle. Detailed description is given. Thermal cond. is calcd. from the equation $k = [Qd/a(\Theta_2 - \Theta_1)t]$. k is thermal cond. (in C. G. S. units = cal. per sec. per 1° difference in temp. of faces of a 1 cm. cube). Q = quantity of heat transmitted in time t . a = area. $\Theta_2 - \Theta_1$ = temp. difference. d = thickness. The table shows the results obtained.

Specimen.	Temp. range.		Mean k .
	Lower surface.	Upper surface.	
Fire brick burned cone 10-11.....	825°	260°	0.0029
	970°	300°	0.0029
	1080°	330°	0.0036
	1440°	550°	0.0040
Same as above, 2nd sample.....	1100°	420°	0.0033
	1350°	510°	0.0039
Fire brick burned cone 8-9.....	1005°		0.00165
	1020°		0.00120
Fire brick silicious, many SiO ₂ grains.....	1300°	310°	0.0025
Silica brick.....	1240°	440°	0.0039
Silica brick, another specimen.....	995°	295°	0.0030
	1210°	370°	0.0035
	1395°	440°	0.0042
	380°	270°	0.0170
Magnesia brick.....	560°	325°	0.0151
	600°	400°	0.0148
	700°	450°	0.0132
	750°	470°	0.0116
	875°	525°	0.0110
	1025°	580°	0.0101
	1040°	590°	0.0098
	1370°	690°	0.0091

The above values of k have no meaning apart from the temp. limits given therewith. Equations for the true value of k for definite temps. are derived for MgO and fire-clay bricks. Thermal cond. of MgO bricks decreases with increase in temp., contrary to the behavior of fire bricks and most other refractories. At all temps. MgO is a better conductor than fire clay. Data on SiO₂ are not yet complete but they are much like fire brick (probably slightly higher). The fire brick data show clearly the necessity of hard burning for uses where rapid heat transmission is important. *Joints:* Preliminary expts. showed thermal cond. of joints to be of the order of $1/10$ that of the bricks. *Porosity:* Contrary to Mellor, the authors show that pore spaces in comm. refractories act as heat insulators under all ordinary conditions. Only at temps. far above the m. p. of refractories does the radiation through pores equal the conduction through the refractory grains. If the size of pore is of the order of 1 cm., the transmission by radiation becomes of the same magnitude as conduction across the solid. *Diffusivity:* During the heating up, before making thermal cond. detns., "diffusivity" or "thermo-metric cond." was noted. Diffusivity = k/CS , where C = sp. heat and S = sp. gr. In C. G. S. units diffusivity measures the rise in temp. produced in 1 cc. of the substance by 1 cal. flowing for one sec. through 1 sq. cm. of a layer 1 cm. thick and having a temp. difference of 1° between its faces. The following table shows the data:

Material of brick.	Thermal conductivity.	Temp.	Specific gravity.	Specific heat.	Temperature diffusivity.
Fireclay.....	0.0028	500° C.	1.95	0.23	0.0062
	0.0040	1000° C.		0.26	0.0079
Silica.....	0.0024	500° C.	1.74	0.26	0.0053
	0.0046	1000° C.		0.27	0.0098
Magnesia.....	0.0141	500° C.	2.40	0.26	0.0226
	0.0085	1000° C.		0.28	0.0126

C. H. KERR.

MÜLLER, C. G.: *Die Tonofenfabrikation*. Wien: A. Hartleben. 216 ss. 4.80 M.

WEBB, J. T.: *Pottery Making*. Chicago: Lewis Institute. 72 pp. \$1.00.

U. S., 1,141,497, June 1. H. G. SLINGLUFF. **Glass-drawing apparatus.**

U. S., 1,141,932, June 8. C. P. BYRNES. **Making wire glass** by simultaneously drawing 2 sheets of glass with a layer of wire fabric between them and pressing the sheets together as drawn.

U. S., 1,142,139, June 8. F. L. BISHOP. **Method of drawing hollow glass articles from a bath of molten glass** while venting gas supplied to the interior of the article, through an opening in its side.

Ger., 278,181, July 19, 1913. J. A. JEFFERY and B. A. JEFFERY. In mfg. porcelain articles, the initial material is allowed to dry and harden, and in this condition it is given the desired forms, whereupon they are burned.

Ger., 280,008, Nov. 26, 1912. TREUHAND-VEREINIGUNG AKT.-GES. **Automatic glass-blowing machine.**

Ger., 280,283, Feb. 22, 1914. A. WAGNER. App. for the uniform heating of iron used in glass.

Ger., 281,039, Apr. 27, 1913. UTZSCHNEIDER and E. JAUNEZ. A permanent rough surfacing is made by imbedding granules of carborundum in the mass of the ceramic sinter plates. Upon burning to sintering of the mass, the carborundum is completely enclosed without being attacked. After burning the plates have a rough surface which remains unaltered in the plate, and unaffected by acid.

Ger., 281,306, Apr. 24, 1913. J. MAINZER. **Automatic bottle-blowing machine.**

Ger., 281,349, Aug. 7, 1913. M. CHIAPPONI. Process of imitating majolica or other ceramic articles, in slag. Fr., 455,381 (C. A. 8, 2046).

Ger., 281,366, May 29, 1913. HERZOGENRATHER SIEGELGLAS- UND SIEGEL-FABRIK BICHEROUX, LAMBOTTE & Co. Corrugated metal table with depressions filled with a non-conductor of heat, used for rolling out glass.

20. CEMENT AND OTHER BUILDING MATERIALS.

C. N. WILEY.

Constitution determination and sintering of Portland cement clinkers. K. ENDELL. *Mitt. Deut. Port. Cement Ind.* 3, 283-4, 296-7(1914).—A review.

A. J. PHILLIPS.

Constitution of portland cement clinkers. E. JÄNECKE. *Mitt. deut. Port. Cement Ind.* 3, 309-10(1914).—A cooling-curve app. is described in which the circuit from the thermocouple contains a millivoltmeter where the temp. is read and the rate of cooling controlled. The current passes through a const. resistance of 30,000 ohms and a variable resistance to a mirror galvanometer. The latter is operated in a dark room with the light of a single-filament lamp reflected back to a registering app. which is so constructed that a piece of photographic paper moves across a slit into which is reflected the light from the mirror. The cooling curve is recorded as the paper unrolls. Lags in the cooling curves of Cu, Zn, Ag and $8\text{CaO} \cdot 2\text{SiO}_2 \cdot \text{Al}_2\text{O}_3$ are shown. A. J. PHILLIPS.

Autoclave test. R. J. WIG AND H. A. DAVIS. U. S. Bur. of Standards. *Eng. Record* 71, 655-6(1915); cf. C. A. 7, 1594, 3005, 3006; 8, 2932; 9, 138.—Some neat cements which are sound according to the standard atmospheric steam test but unsound in high pressure steam exhibit signs of unsoundness when stored under normal

conditions in dry air. This may require 9 mos. or more to develop in neat cement specimens, whereas the strengths of mortars and concretes fail to show any difference in the cementing qualities of cements that pass and fail the high pressure steam test. There is also but small difference in linear change between cements passing and failing, whether the specimens are stored in air or H_2O . 70% of a total of 51 brands of cements tested passed the autoclave test, and those originally unsound usually became sound after aging from 2 to 6 mos. Cements normally unsound in the atmospheric or high pressure steam test will generally become sounder if the coarser particles are removed. While fineness is not essential to soundness, the coarse particles usually cause the expansive cracking and disintegrating action of unsound cements in the accelerated soundness tests. The autoclave test should be used on all cements that are to be incorporated in cement mortar or concrete products that are to be cured in steam at pressures above atmospheric. The autoclave test may forecast the behavior of neat cement or rich mortar under normal conditions in dry air but not the behavior of cement in concrete. Cements passing this test are not superior in cementing value (as detd. from compressive strengths of concrete) to cements that fail, nor do they make more permanent or durable concrete. Cements failing the standard atmospheric steam test but meeting the other specifications show in some instances normal strengths in concrete. For practical work the results of the investigation fail to show that the high-pressure steam test is of value as a means of detg. the ultimate soundness of concrete.

A. A. KLEIN.

Electric drive for economical operation and development of cement mills. J. B. PORTER. *Concrete-Cement Age* 6, C. M. S. 35-8(1915).—Curves are given showing power consumed in manuf. of cement.

A. A. KLEIN.

Shrinkage of concrete and conditions of curing. F. R. McMILLAN. Univ. Minn. *Eng. Record* 71, 489-90(1915).—Tests on concrete beams extending 13 mos. show that moisture during the early stages of curing only retards the shrinkage, the final dimensions being practically independent of early curing conditions. The concrete was of 1:2:4 mix. Compressive strength tests on cylinders showed that better curing conditions increased the strength about 50%.

A. A. KLEIN.

Temperature changes in mass concrete. C. M. PAUL AND A. B. MAYHEW. *Proc. Am. Soc. Civil Eng.* 41, 790-810(1915).—Tests ranging from 3 to 19 months on the Arrowrock Dam showed that large bodies of concrete deposited rapidly during summer developed a temp. of 90-95° within 30 days and held it for several months. Concrete 3.5 ft. from an exposed face showed no daily variation in temp. when the daily air variation was about 50°. Also in *Eng. Record*, 71, 710(1915).

A. J. PHILLIPS.

Weathering of concrete prevented by waterproofing. J. L. LYTH., U. S. Reclamation Service. *Eng. Record* 71, 486(1915).—To overcome disintegration of concrete structures due to alternate freezing and thawing of H_2O , vertical surfaces are treated with alum and soap solns. and horizontal surfaces with paraffin. The repaired structures have undergone 2 severe winters without further disintegration. Also in *Eng. Contr.* 43, 346-7(1915).

A. A. KLEIN.

Coal slack for concrete aggregate. R. B. KETCHUM. *Eng. News* 73, 540(1915).—Concrete was 1:5, 1:10 and 1:15 mix and compression tests were made at 30 and 90 days. 1:5 mix is about 50% as strong as gravel concrete at 90 days, while the leaner mixes are about 25% as strong. Coal concrete makes good gains in strength between 28 and 90 days.

A. A. KLEIN.

Use of six-inch and eight-inch aggregate in concrete work. E. O. KRATOR. *Eng. Record* 71, 556-8(1915).—Large aggregate is cheaper than smaller sizes and when machine-mixed produces a stronger concrete.

A. A. KLEIN.

Value of microscopic investigation on blast-furnace slag. H. PASSOW. *Mikroskopos* 1914-15, 243-6.—The value of blast-furnace slag as a raw material for cement manuf. depends upon its physical state. Slow cooling results in the formation of hard crystals which render the slag unfit for admixt. with cement. If the slag is cooled rapidly by means of water, air, or steam, crystn. can be almost completely prevented and the resulting slag has an entirely different chem. compn. and valuable properties from the standpoint of cement manuf. The use of the microscope makes possible the control of the cooling process at all time. Experience gained in repeated microscopical exams. may even permit one to draw fairly reliable conclusions as to the chem. compn. of different furnace slags. Photomicrographs illustrate the various points made and a complete bibliography on this subject is appended. So-called blast-furnace cement is more resistant to the action of sea water and similar salt solns. than other types of cement. C. A. NOWAK.

Domestic flint pebbles to replace foreign supply. ANON. *Concrete-Cement Age* 6, C. M. S. 38-9(1915).—As a substitute for Danish pebbles in grinding, tough flint pebbles from Tex., Miss., Ark. and Mo. are suggested. Rhyolite from the Rocky Mountain and Pacific states, quartzite, diabase from Me. and felsite and trap from the Lake Superior region may be used. Pebbles of rhyolite, basalt and other lava contribute to the cement a puzzolan material that is advantageous. A. A. KLEIN.

General practice in sand testing. E. B. VAN DE GREYN AND C. M. MONTGOMERY. *Eng. Record* 71, 551-2(1915).—Outfit and methods are discussed. A. A. KLEIN.

The economic side of sand testing. CLOYD M. CHAPMAN AND NATHAN C. JOHNSON. *Eng. Rec.* 71, 734-7(1915). F. BACHMANN.

Waterproofing of solid steel floor railroad bridges. Discussion. H. H. QUIDBY, et al. *Proc. Am. Soc. Civil Eng.* 41, 459-79(1915).—Adhesive tests of cotton duck satd. with bitumen on steel and 1:2:4 concrete specimens showed superior adhesion of bitumen to steel. A cut-back treatment with dil. HCl followed by painting with bitumen showed much improvement for concrete bitumen adhesion. Mastic as protection for waterproofing will either be too soft in summer or so hard as to crack in winter. Not less than 5 layers of felt, burlap, cloth or asbestos are used as covering materials. The best material as regards durability is felt of cotton and wool fibers (25-30% of latter). Coal tar is considered equal to, if not superior to, asphalt. A. J. PHILLIPS.

Bituminous materials for road construction. Standards for their test and use. *Surveyor* 47, 348-51, 406-8(1915).—Report of committee of Am. Soc. of Civil Engineers. W. D. C.

The methods for preserving wood. TH. WOLFF. *Kunststoffe* 5, 86-7, 98-100, 111-2(1915).—A review and discussion of the causes of decay, preservative methods, etc. F. W. SMITHER.

Tests of wood preservatives. HOWARD F. WEISS AND C. H. TEESDALE. Forest Service, U. S. Dept. Agr., *Bull.* 145, 20 pp.(1915).—An investigation to secure data on the practical value of a number of compds. and chemicals as wood preservatives. Among the points considered in connection with the materials were (1) chem. and phys. properties, (2) effect of preservative on the strength of the wood treated with it, (3) the ability of the preservative to penetrate and diffuse through the wood, (4) the permanency of the preservative after its injection into wood, (5) the combustibility of wood treated with the preservatives, (6) the toxic efficiency of the preservative in preventing the growth of wood-destroying fungi, (7) the corrosive action of the preservative on steel, (8) the effect of the preservative on paints applied to the wood subsequent to treatment. Air-seasoned hemlock was used in the tests. B. E. BROWN.

Preservative treatment for wooden silos. GRO. M. HUNT. *Wood Preserving* 2, 23(1915).—Pine is the most easily treated; hemlock, tamarack, spruce and Douglas fir are treated with difficulty. The cheapest and simplest treatment is by the brush method. Distillate creosote is heated to 180° and applied by brush or old broom by flooding creosote over surface, 2 coats being applied. For a silo containing 3000 board feet, the cost of creosoting will be about \$12.00.

C. N. WILEY.

The Galesburg tie plant. ANON. *Wood Preserving* 2, 19-20(1915).—Description of a modern railroad timber preserving plant. It has a capacity of 1,500,000 ties.

E. J. C.

KÜHL, H. UND KNOTHE, W.: *Die Chemie der hydraulischen Bindemittel*. Leipzig: S. Hirzel. 349 ss. 14 M.

MAZZOCCHI, L.: *Calci e cementi: norme pratiche ad uso degli ingegneri, architetti, costruttori, capimastri ed assistenti di fabbrica*. 4a ediz. Milano 256 pp. 2.50 L.

U. S., 1,141,591, June 1. I. UJHAZY. Building block of sawdust with a binder formed of lime, borax and casein and fatty constituents of milk.

U. S., 1,141,610, June 1. G. CAPECE. Artificial stone formed of beeswax 1.8, rosin 4.3, varnish 0.3, powdered Pb 3.15, powdered brick 2.9 and portland cement 15.1 parts.

U. S., 1,141,848, June 1. F. R. STEHM. Mixture for waterproofing cement, concrete, etc., formed of kerosene 60 gals., spermaceti 10 lbs., cottonseed oil 2.5 gals., thoroughly mixed at a temp. above 80°. This mixt. is added to about 12 times its wt. of H₂O used in wetting the cement or concrete.

U. S., 1,141,897, June 1. G. LIZIERI. Floor- or wall-covering mixture. See Brit., 9,792, 1913 (C. A. 8, 3507).

U. S., 1,142,610, June 8. W. W. NORMAN. Treating timber (e. g., logs) with preservative liquids. Caps are placed on the ends of the timber to close the heart portion against ingress of liquids. The timber is then treated with air under pressure to remove sap from the outer portion and preservative liquid or coloring is then introduced under low pressure into the outer portion from which the sap has been removed.

U. S., 1,142,611, June 8. W. W. NORMAN. Apparatus for impregnating wood by the method of the preceding patent.

Brit., 1,805, Jan. 23, 1914. E. A. WHITE. A roofing composition is made by mixing 4 parts of calcined SiO₂, while hot, with 1 part of melted natural bitumen. To the hot mixt., 10% by wt. of red lead or litharge and a similar quantity of a mixt. of Na and K silicates are added. This compn. may be spread upon felt or similar roofing material.

Brit., 2,084, Jan. 26, 1914. R. A. MARR. Impregnating wood. See C. A. 9, 364.

Brit., 2,244, Jan. 28, 1914. J. A. CALANTAR. Forming road surfaces (1) by spraying or painting the road with a binding agent such as tar, pitch, asphalt, or bitumen mixed with oil and scattering or sifting over it, while wet, absorbent fibrous material; or (2) by casting upon the road granules or nuts made by dividing while hot, as by rolling and cutting, a known compn. consisting of a binding agent mixed with fibrous material and a portion of oil. Suitable fibrous substances are sawdust, crushed bark, coconut fiber or coir, and as suitable oils there are mentioned creosote and linseed oils.

Brit., 2,661, Feb. 2, 1914. G. M. PARK. In an app. for cooling clinkers in the manufacture of portland cement and for like cooling purposes, the material from a kiln falls into a hopper and passes down a shoot into a rotary chamber containing H_2O or fitted with a H_2O spray. The material is lifted out of the H_2O as the chamber rotates by radial plates and screens, and falls into a 2nd shoot leading to a drum fitted with angle-pieces to cascade the material. After leaving the drum the material traverses in succession a series of concentric open-sided trays provided with suitable peripheral openings, and is finally discharged on to a conveyor. The shoots form a passage for conducting the escaping steam to a stack in which it is condensed by a H_2O spray and led back to the rotary chamber. The trays are supported by radial arms on a projecting shaft driven by gearing, the other end of the cooler being supported by a bearing-ring. The openings between the rotary chamber and the drum facilitate the escape of steam. The free lime in the material is hydrated in the rotary chamber, and the $Ca(OH)_2$ and surplus H_2O pass over a flange into a trough. The rotary chamber with the shoots and stack may be fitted at the front end of an ordinary cooler.

Brit., 3,103, Feb. 6, 1914. T., A., T. and F. COLEMAN. Constructional details of a centrifugal machine for drying and heating sand, stone, etc., for road-making. Cf. C. A. 9, 704.

Brit., 3,467, Feb. 10, 1914. A. FRANCK-PHILIPSON. Bleaching wood and removing the sap by treating it with a soln. of a substance such as H_2O_2 , capable of yielding a bleaching gas, and during the treatment introducing periodically a reagent such as $KMnO_4$, which is capable of decomp. the bleaching soln. and may itself have bleaching properties. The bleaching soln. may be alk., and may contain a viscous substance such as an alk. silicate to retard the liberation of bleaching gas and the penetration of the soln. into the wood.

Ger., 279,940, Dec. 24, 1913. G. B. GIANOTTI. Mfg. multi-colored marble mosaic. Cf. C. A. 9, 1235.

Ger., 280,492, Feb. 9, 1913. F. FLEISHMANN. Mfg. products from artificial stone, a plastic mixt. of fibrous material and hydraulic binder.

Ger., 281,331, Oct. 20, 1912. FARBW. v. M. L. & B. Mfg. non-explosive prepn.s., especially for preserving wood, with the employment of sulfite-cellulose back waters. Cf. Fr., 463,288 (C. A. 8, 2786).

Ger., 281,387, Dec. 14, 1913. CHEM. FABRIKEN DR. KURT ALBERT and DR. L. BEREND. Mfg. compns. for preserving, impregnating, and coating wood. The tar oils used heretofore for these purposes possess very little or no viscosity, and are not suited, therefore, for holding color powder, *i. e.*, to serve as a vehicle. In this process, the color powder and the tar oil are combined with suitable emulsifying agents in such manner that the color powder is distributed, with the oil, in small particles, in the emulsifying agent, with the aid of vigorous stirring. The color powder is thereby so finely divided that upon diln. with H_2O it appears to be completely emulsified, and that it penetrates the wood deeply, with the oils, while the colors obtained by working up the pigments with the ready prepd. emulsion do not possess this property. Preferably, resins are dissolved first in the tar oils, and these resin solns. are employed as emulsifying agents. However, the tar oils can be thickened directly by resinifying with aldehydes the phenols contained in tar oils. In this manner a greater viscosity of the oil is secured, and consequently a greater adhesion on and in the wood, also increased bactericidal power of the tar oil, increased permanency as to atm., chem., and mechanical conditions, and finally a more rapid and complete breaking down of the emulsions. As emulsifying agents are specified casein, albumins, and the like. Mineral or artificial

colors may be employed. Additions may be made to increase the poisonous properties of the product.

21. FUELS, GAS, TAR AND COKE.

J. D. PENNOCK.

J. W. Thomas. JOHN GREENAWAY. *J. Chem. Soc.* 107, 588-9(1915).—An obituary. L. G. C.

The source of energy of machines. M. BODENSTEIN. *Z. angew. Chem.* 28, 1, 209-13(1915).—B. reviews the sources of energy available at the present time. He calls attention to the fact that the heat converted to useful work in the most efficient steam engine or internal-combustion engine is only 16% and 33%, resp., of the heat input, and in order to conserve the present supplies of fuel other methods of conversion of heat to work are necessary. It is proposed to convert heat energy directly to elec. energy or make use of the radiant energy from the sun by means of photochem. reactions for the production of elec. or other form of energy. Both of the proposed methods, although possible on a very small scale in the lab., are not practical from a com. standpoint.

H. R. GUNDLACH.

Preparation of charcoal for small warming stoves. H. FREUND. *Pharm. Zentral-halle* 56, 171-4(1915).—Wood charcoal is powdered, mixed with about 3% KClO_3 or some other suitable oxidizing agent, a binding material such as tragacanth or gelatin is added, and the mixt. is pressed into small perforated cylinders. When ignited these cylinders burn slowly without odor and with a steady glow. The little warming ovens for which they are designed are much used by troops in the field but will be of use for invalids also.

C. O. EWING.

A study of boiler losses. A. P. KRATZ. Univ. Ill. Eng. Expt. Sta., *Bull.* 78 (1915).—A series of 25 tests was made on a 500 h. p. boiler with the heat balance so subdivided as to isolate and det. the amts. of the losses chargeable to boiler, furnace, and setting. A comparison of fresh screenings with coal that had been weathered for 6 years showed that although the latter had deteriorated in heat value, when burned with heavier drafts and in thinner fuel beds, it maintained a boiler capacity and efficiency equal to that obtained with the fresh coal.

H. L. OLIN.

Waste heat from combustion motors; its recovery and use. ERNST GOLZ. *Chem. App.* 2, 92-5, 113-6(1915).—Calcns. of the available heat from Diesel engines with 16 cuts of app. for heating H_2O , buildings, and the Sulzer app. for drying chemicals. Cf. C. A. 9, 1106, 1261.

J. H. MOORE.

Exhaust steam for making water gas. S. A. REINHARD AND G. A. SCHNERR. *J. Gas Lighting* 130, 404-6(1915).—Wet exhaust steam causes no end of trouble from entrained moisture and is hardly more economical than live steam. Marked improvement can be obtained by superheating the exhaust, raising the temp. to about 450°F . by tar burners and maintaining pressure between 2 and 2.5 lbs. by an auxiliary live steam valve. Tests show the steam used per 1000 cu. ft. of gas made can be reduced 25-35%, or approx. the whole of the live steam necessary for gas making is saved. In addition, fewer boilers and less labor are required, and the furnace works much more efficiently with the dry steam.

B. W. GRIMES.

By-products of the gas industry. W. J. A. BUTTERFIELD. *Chem. Trade J.* 56, 395(1915).—The by-products from the coke and gas industry of the United Kingdom are compared with those of Germany.

C. A. COLE.

Gas generators producing fluid slags. K. VOIGT. *Feuerungstechnik* 3, 153-4 (1915); cf. C. A. 9, 165.—The development of this type of generator and the results obtained are reviewed. The advantages of the slagging generator over the non-slagging type are pointed out. The loss of heat through the formation of the slag is not a disadvantage, since in the non-slagging type combustible matter is carried off in the clinker or ashes.

H. R. GUNDLACH.

Centrifugal dehydration of water-gas tar at Amsterdam. ANON. *Am. Gas Light J.* 102, 349(1915).—At ordinary temp. the difference in sp. gr. of water and tar is insufficient to allow their sepn. The higher the temp., however, the wider is the difference between the sp. gr. of the two liquids, and centrifugal sepn. is possible. The centrifugal app. has a drum revolving on a vertical shaft with a flat ring, 4 in. wide at the upper parts of the interior, fitted in such a way that a small space is left between the inner surface of the drum and the outer circumference of the ring. When by the speed of revolution the tar and water are sepd., the tar travels upward along the inner surface of the drum, through the free space of the ring where it makes its exit through the tar offtake. The water forms a layer at the side of the tar and, traveling upwards, its passage is barred by the flat ring where there is an outlet for it. The tar is preheated in a rectangular tank with a cover of sheet iron. The temp. for perfect dehydration of tar lies between 60° and 70°. The heated tar often has a water content of about 60% but one operation in the centrifugal machine delivers tar with less than 1% water. Water-gas tar emulsion containing 30-90% water is treated in the same app. at 90-100°.

P. J. COLE.

Future of the natural gas industry. J. C. McDOWELL. *Gas Age* 35, 537-40 (1915).—The supply and its conservation are treated.

B. W. GRIMES.

Gas incineration an aid to public health. F. L. LISMAN. *Gas Age* 35, 544-9 (1915).

B. W. GRIMES.

Work of the natural gas association. JAMES T. LYNN. *Gas Age* 35, 551-2(1915).

B. W. GRIMES.

Gas compressor and washer combined. ANON. *Gas Age* 35, 562(1915).—The pump consists of a casing and a head, surrounding a wheel with projecting blades, which is rigidly mounted on a shaft supported by bearings. The casing is elliptical in section; the periphery of the rotor is a true circle. Water or other liquid is carried by the revolution through the pump through ports cut above and below the narrow part of the ellipse, drawing gas by its alternate recession and surging, and delivering steadily without pulsation.

B. W. GRIMES.

Formaldehyde process for estimating ammonia. ANON. *Gas World* 62, No. 1606 (Coking and By-product Section), 11(1915).—HCHO combines with NH_4 salts to form hexamethylenetetramine. The acid of the NH_4 salts thus set free is titrated with alkali. The HCHO soln. (20%) must be made neutral to phenolph. with 0.1 N KOH. For *weak liquors* pipet 17 cc. into a beaker, add methyl orange and titrate to neutrality with 0.1 N HCl, boil a few minutes, cool, add 40 cc. water and 10 cc. HCHO soln., titrate with 0.1 N KOH. For *strong liquors* make up 17 cc. to 100 cc. with H_2O , titrate 10 cc. of this soln. with 0.1 N HCl, using methyl orange, boil, cool, add 40 cc. H_2O and 30 cc. HCHO, titrate. For $(\text{NH}_4)_2\text{SO}_4$ dissolve 1.7 g. in 100 cc. H_2O . In a 10 cc. portion, neutralize the free acid with 0.1 N KOH (methyl orange), add 30-40 cc. HCHO and titrate (phenolph.).

M. L. TROWBRIDGE.

Gas economy in iron works. K. RUMMEL. *Z. Ver. deut. Ing.* 58, 1216-21(1915).—A continuation of article by R. (cf. C. A. 9, 142) regarding the economic use of gas in iron works and the comparison of efficiencies with other fuels. The use of gas for regenerative furnaces and furnaces used intermittently is discussed. R. concludes

that for heavy rolling mills the gas is most efficient when burned under boilers for the production of steam power, instead of being used in gas engines for power production.

H. R. GUNDLACH.

Physical constants of gas oils and derived tars. W. F. RITTMAN AND G. EGLOFF. *J. Ind. Eng. Chem.* 7, 481-4(1915).—Results are given on fractional distn., sp. gr., viscosity, surface tension and refractive index of 4 gas oils and derived tars. The differences between the constituents of an aliphatic oil and its derived tar are shown by the differences between volatility-gravity, volatility-refractive index, and volatility-surface tension relations. That aromatic hydrocarbons can be formed from the aliphatic hydrocarbons occurring in petroleum has been verified.

ISADOR MILLER.

Composition of peat tar. E. BORNSTEIN AND F. BORNSTEIN. *J. Gas Lighting* 129, 731(1915).—In the distn. of peat to utilize the heat and to ext. the N there is produced a tar, described as follows: H_2O , 48.5%; distillate 150-70°, 1.8; 170-220°, 4.7; 230-70°, 10.7; 270-330°, 24.7%; residue (coke), 9.4; gas and loss, 0.2%. The combined distillates yielded: Phenols 18, alkaloids 1, oils 34, pitch (paraffin) 47%. It is suggested that the paraffin, vaseline oils and phenols could be profitably extd. from the peat tar.

C. A. COLE.

Coal and gas of Moose Mountain District (CAIRNES) 8. Bolometric method of determining the efficiencies of radiating bodies (BONE) 2.

GASTER, L. AND DOW, J. S.: **Modern Illuminants and Illuminating Engineering.** London: Whittaker & Co. 462 pp. 12s, 6d.

HAASE, F. H.: **Feuerung und Feuerungsanlagen.** Berlin: Geschäftsstelle der Zeits. 225 ss. 4.50 M.

KEPFELER, G.: **Die Aufgaben der technischen Moorerwertung.** Braunschweig: F. Vieweg & Sohn. 102 ss. 8 M.

RECKTENWALD, J.: **Die Vergasung der festen Brennstoffe.** Kattowitz: Gebr. Böhm. 38 ss. 1.80 M.

STRACHE, H.: **Ueber neuere Gasreinigungs-verfahren.** Berlin: Verlag f. Fachliteratur. 70 Pf.

WISLICENUS, H.: **Experimentelle Rauchschäden.** Berlin: P. Parey. 168 ss. 6 M.

U. S., 1,141,829, June 1. T. RIGBY. **Ammonia-recovery gas producers** are fed with a compressed mixt. of air with vapors from the driers used in a plant for briqueting peat or other fuel.

U. S., 1,142,100, June 8. E. A. W. JEFFERIES and G. H. ISLEY. **Gas producer** with a stationary casing and a rotatable ash hopper within the lower part of the casing. The lower edges of the 2 parts are connected by a H_2O seal.

U. S., 1,142,144, June 8. W. B. CHAPMAN. **Gas producer** and app. for supplying fresh fuel to the charge.

U. S., 1,142,275, June 8. E. SCHILL. **Apparatus for compressing natural gas** and sepg. the gasoline from the CH_4 and C_4H_{10} in it.

U. S., 1,142,524, June 8. N. LATTA. **Gas producer.**

U. S., 1,142,525, June 8. G. C. MAAG. **Apparatus for compressing natural gas** and separating gasoline, methane and pentane from it.

U. S., 1,142,633, June 8. P. G. SCHMIDT. **Gas producer.**

Brit., 1,676, Jan. 21, 1914. T. RIGBY and WETCARBONIZING LTD. Peat which has been subjected to heat treatment such as described in 10,834, 1903, 17,610, 1911 (C. A. 7, 411) and 25,146, 1912 (C. A. 8, 1498), to render its H_2O more freely expressible, is further subjected to a distn., the gases resulting from which are treated for the recovery of by-products such as wax, HOAc, MeOH and NH_3 ; the residue, after cooling, if necessary, is gasified, and the resulting producer gases are treated separately from the distn. gases for the recovery of by-products. The distn. is effected in continuous or intermittent retorts, preferably heated internally by steam or H or the hot producer gases obtained by the gasification of the residue. The distn. gases after sepn. of the by-products may be burned alone or mixed with the producer gases; or if the MeOH and similar materials can be neglected, the distn. gases, after sepn. of waxes and HOAc, may be returned to the retorts and continuously circulated with a const. rejection of a certain proportion. Combustion products from furnaces, where such are used for heating the retorts or gases or for raising steam, may be utilized to assist in drying the peat as described in 17,610, 1911, and 24,748, 1911 (C. A. 7, 1601). Part only of the residue from the distn. may be gasified, the remainder being utilized otherwise as fuel. Reference is also made to 17,427, 1912, 9,392, 1913, and 11,133, 1913 (C. A. 8, 416, 3359 and 3499, resp.).

Brit., 2,054, Jan. 26, 1914. BERLIN-ANHALTISCHE MASCHINENBAU AKT.-GES. A combustible gas, consisting mainly of H, is obtained by passing oil vapor through a bed of incandescent fuel.

Brit., 2,069, Jan. 26, 1914. L. L. SUMMERS. Coking. See U. S., 1,114,045 (C. A. 8, 3852).

Brit., 2,609, Jan. 31, 1914. A. HOLLIS. In a scrubber for producer gas, etc., of the kind in which the gas passes downward through woody filtering material, such as wood-wool, sawdust, and chips, carried on perforated shelves, drippings of tarry matter and moisture from the top shelves are prevented from fouling the material on the lower shelves by the provision of 1 or more sheet-Fe trays, having openings covered by hoods for the passage of the gas. The tray is preferably inclined towards a gutter formed on the inside face of 1 of the walls of the filter and leading to a drain pipe.

Brit., 2,649, Feb. 2, 1914. Q. MOORE and DOWSON & MASON GAS PLANT CO. A dry-bottom gas producer of the kind described in 28,054, 1908, with provision for discharge of ashes. Cf. C. A. 9, 1386.

Brit., 2,650, Feb. 2, 1914. Q. MOORE and DOWSON & MASON GAS PLANT CO. Process and app. for the recovery of tar and ammonia liquor from producer or other gas. The gas is led through condensers to a tar extractor placed at such a level that the tar and liquor flow back to the condensers. The gas, after or during the extn. of the NH_3 in an acid bath at this stage, then passes to further condensers the tar and liquor from which pass back to the first mentioned condensers wherein they flow in the reverse direction to the gas. The tar and liquor pass to a separator from which the liquor is led through a cooler and thence to scrubbers through which the gas is passed after it leaves the last of the second pair of condensers. Means are provided for cutting the tar extractor out of the circuit when required. The H_2O used in the cooler and thereby heated may be supplied to the H_2O jacket of a producer.

Brit., 3,363, Feb. 9, 1914. H. W. WOODALL. In heating coke ovens, gas-retorts, etc., the oven or retort gas of high calorific value is dild. with waste products of combustion, in order that it may be used in the producer-gas burners, and also to prevent deposition of C and local overheating.

Fr., 468,320, Feb. 11, 1914. H. W. ROBINSON. Treating tar and pitch. See Brit., 4,159, 1913 (C. A. 8, 2798).

Ger., 277,992, Mar. 19, 1914. J. KELLERMANN. Pyrophoric gas lighter, comprising, near the jet, a catalytic mass which is preheated by the pyrophoric kindling device, and is then rendered incandescent by the action of the combustible material.

22. PETROLEUM, ASPHALT AND WOOD PRODUCTS.

F. M. ROGERS.

Gustav Kraemer. C. GÖPNER. Hamburg. *Chem. Ztg.* 39, 201-2(1915).—An obituary. J. H. MOORE.

The question of the optical activity of petroleum. J. K. v. TRAUBENBERG. *J. Russ. Phys. Chem. Soc.* 46, 1043-8(1914); see C. A. 9, 372. H. M. GORDIN.

Properties of lubricating oils. J. F. WING. *Seifensieder Ztg.* 42, 330-1(1915).—A discussion of the superiority of mineral oils over other oils for lubrication. E. S.

Substitutes for benzene in explosion motors. Velocity of gasifying. II. D. MENEGHINI. Padova. *Ann. chim. applicata* 3, 235-44(1915).—For pure liquids the velocity of evapn. is independent of the pressure, is proportional to the product of the vapor tension of the liquid by the internal friction of the gaseous current, and varies, for a given temp., as the product of the vapor tension by the mol. wt. of the substance evapg. The app. employed for the evapn. tests consisted of a U-tube contg. the liquid, connected on one side with a long CaCl_2 tube for drying the entering air, and on the other side with a capillary that was connected at the same time with a H_2O -manometer and a H_2O -aspirating pump. The aspiration was regulated to 40 mm. of H_2O in the manometer, under which condition 3 l. of gas, during the 5 min. period employed in each test, passed through the app. The U-tube was immersed in a thermostat at 25° (the external temp. varied from 17 to 20°), and for each expt. 10 cc. of the liquid tested were used. The difference in wt. of the U-tube gave the amt. of liquid evapd. Alc. of 99, 95, 90, 80%, resp., gave 1.99, 1.90, 1.85, 1.85% of evapn. CH_3OH gave 3.60%. (This is an exception to the general rule mentioned above and referring to the product of the vapor tension and mol. wt.; it is higher than the figure obtained from calcn.). $\text{C}_6\text{H}_7\text{OH}$ gave 0.85%, benzene 5.10%, toluene 1.73%. Alc.-benzene mixts. contg. by vol. 10, 20, 30, 50, 70, 80, 90%, resp., of benzene gave 3.80, 4.95, 5.90, 6.20, 6.30, 6.25, 6.20%. For alc.-toluene mixts. contg. 10, 25, 50, 60, 75, 90%, resp., of alc., the figures were 2.90, 3.15, 3.10, 2.95, 2.65, 2.25%; benzene-toluene mixts. with 15, 30, 50, 70, 90% benzene 2.50, 3.40, 4.30, 4.80, 5.05%. Addition of toluene to alc.-benzene mixts., amtg. to 10% of the vol. of the benzene, did not appreciably influence the velocity of evapn. Values obtained from com. benzene, toluene, and alc., were practically the same as those given by the pure products. A com. benzine of d. 0.700, as ordinarily used in explosion motors, gave a value of 20.50%. Values for velocity of evapn. at 0° were also detd. for the above-mentioned substances. V at $0^\circ/V$ at 25° varied from 0.221 to 0.308. S. LEVY.

The theory of the perfect sheet asphalt surface. C. RICHARDSON. *J. Ind. Eng. Chem.* 7, 463-5(1915).—Colloid chemistry is of great value in interpreting the behavior of asphalt surfaces and as a guide to their rational construction. The importance of the colloid phase depends on the very great surface it affords, which increases the surface energy and also the extent of the adhering film of bituminous binder.

ISADOR MILLER.

Natural and artificial asphalt. J. MARCUSSEN. *Kunststoffe* 5, 75-8, 90-2, 101-2 (1915); cf. C. A. 9, 146.—A general discussion under captions: properties, uses, coal

tar and coal-tar pitch, oil gas tar and water gas tar, brown coal pitch, petroleum residues, residues from fatty distns. (candle tar, stearin pitch, palm oil pitch, etc., used in the manuf. of roofing papers). Analytical methods and tests in general use are given in some detail. Tables and cuts are given.

F. W. SMITHER.

Viscosimeter for lubricants (VLOTEN) I.

REDWOOD, B. AND EASTLAKE, A.: *Petroleum Technologist's Pocket Book*. London: C. Griffin & Co.

SCHMITZ, P. M. E.: *Eine neue Oelprobermaschine zur Prüfung der Schmieröle bei jeder Temperatur, unter Anwendung verschiedener Metalle als Gleitfläche*. Berlin: Verlag f. Fachliteratur. 1 M.

U. S., 1,141,529, June 1. P. DANCKWARDT. *Producing gasoline from crude oil by introducing a spray of molten Pb, alloy or fused NaNO₂ or NaOH or other liquid insol. in the oil and not distg. at the temp. employed, into the vapor space of the retort used and thence into the liquid in the retort, withdrawing the added liquid from the retort and returning it again after passing it through a heater. Vapor from the retort is continuously drawn off and collected.*

U. S., 1,142,512, June 8. A. H. FRANKE. *Apparatus for purifying lubricating oil by heating, sedimentation and straining.*

U. S., 1,142,759-60-1, June 8. R. E. LAIRD and J. H. RANEY. *Apparatus for breaking up emulsions of petroleum with water, electrolytically*. Cf. C. A. 9, 147.

Brit., 1,878, Jan. 23, 1914. J. J. SHEDLOCK and OPTIME MOTOR SPIRIT SYNDICATE. In the manuf. of motor spirit from hydrocarbon oils, the oils, after purification, are emulsified with H₂O by means of resin soap or other emulsifying agent, and the emulsion is heated in the presence of Fe or steel shavings or Ni or other catalyst. In order to remove S, pitch, etc., the oil is forced, under a pressure of 3-6 atms., over caustic alkali, lime, metal oxides, etc., contained in a vessel which is heated to 300-400° F. The oil then passes through a settling vessel and is delivered partly into a mixing tank, in which the emulsion is formed. The emulsion is mixed with the remainder of the oil in another vessel. The resulting mixt. or emulsion, still under pressure, is sprayed into a cracking chamber, which is heated to 500-900° F. The products from the cracking chamber are delivered through restricted passages into an expansion chamber, in which vaporization occurs, and from which the vapors and gases are led to a scrubber. The motor spirit is then sepd. in a condenser, the remaining gases being delivered by an exhauster to a gas-holder and used as fuel in the burners for heating the heating and cracking chambers. The heavy oils collecting in the expansion chamber and scrubber may be returned for further cracking or may be fractionated. The heating and cracking chambers are provided with internal and external flues. Oil, H₂O, or emulsion may be injected into the cracking chamber through apertures in order to regulate the temp.; H₂O or steam may be admitted to the heating chamber through a pipe.

Brit., 2,142, Jan. 27, 1914. J. B. ERWIN and O. R. ERWIN. *Extinguishing fires in oil tanks*. See U. S., 1,085,875 (C. A. 8, 1202).

Brit., 2,948, Feb. 4, 1914. W. A. HALL. *A motor spirit is obtained by cracking a heavy hydrocarbon oil under such conditions that as much as possible of the gaseous product consists of unsatd. hydrocarbons, mixing alc. vapor with the gases, and condensing under pressure. In an example, gas oil or fuel oil is passed through a coil heated to approx. 600° and at such a rate that only about 25% is converted into gas*

and superheating is avoided; the gas is freed from considerable oil at a temp. above the b. p. of alc. and passed rapidly through alc. The resulting mixt. of gas and vapor is led to the compressor. Alc. may be denatured in this manner. Cf. C. A. 9, 1840.

Brit., 3,210, Feb. 6, 1914. T. DELORT. App. for distilling petroleum, etc., consisting of 2 stills, of which 1 is arranged within the other.

Brit., 3,422, Feb. 10, 1914. G. E. THOMAS and G. L. EVANS. Purifying used lubricant, such as hot-neck grease, by passing it over a magnetic separator.

Ger., 278,956, Sept. 20, 1913. ZELLER & GMELIN. Mfg. a highly viscous lubricating agent, using as initial material the so-called petroleum hard pitch, which is a solid at ordinary temp., brittle, and m. 80-100° according to Krämer-Sarnow. This hard pitch remains, from the distn. of the crude oil to produce lubricating oil, and cylinder oil, as a waste product heretofore useless. This hard pitch is extd. with a volatile solvent such as C_6H_6 , $CHCl_3$, benzine, petroleum, gasoline, or the like, and the extn. is purified with H_2SO_4 and lye, whereupon the solvent is driven out from the ext., washed with H_2O , and recovered. A cylinder oil, liquid at room temp., is obtained; it has a viscosity of about 20° Engler at 100°, and serves, with a flash-point of 310-315°, as a good lubricant for high-pressure steam engines. The residual material from the 1st extn., after fusion, forms a hard pitch, sol. in the known solvents for mineral oil pitch, with lustrous fracture and a m. p. about 50° higher than that of the initial material. It may be employed as an insulating material, as asphalt binder, in roof paper manuf., for street paving, and also in the varnish industry.

24. EXPLOSIVES AND EXPLOSIONS.

C. E. MUNROE.

Explosives. H. LE CHATELIER. *Rev. metal.* 12, 37-79(1915).—A review.

L. T. FAIRHALL.

Picric acid; its manufacture and liability to explode. T. OSBORNE. *Chem. Eng.* 21, 158-9(1915).—Risk when wet is slight. Grinding dry crystals is subject to danger from foreign bodies which strike fire and form "dust" explosions. The max. quantity allowed in one risk is 2000 pounds. Theoretically, picric acid cannot be exploded unconfined but it has apparently done so in certain accidental explosions.

CHARLES E. MUNROE.

KAST, H.: Die Brisanz und Explosionsgeschwindigkeit moderner Sprengmittel. Berlin: Verlag f. Fachliteratur. 13 ss. 1.50 M.

Ger., 279,526, Mar. 30, 1913. DEUTSCHE SPRENGSTOFF-AKT.-GES. Charging shells with fusible explosives by centrifugalization.

Ger., 281,053, Nov. 23, 1913. WESTFÄLISCH-ANHALTISCHE SPRENGSTOFF-ACTIEN-GES. Mfg. 2,4,6,3',4',6'-hexanitrodiphenyl oxide. Such di-, tetra- and penta-nitro-substitution products of diphenyl ether as contain at least 1 NO_2 group in 1 of the 2 benzene nuclei in the *m*-position to the O.at. are treated with hot HNO_3 - H_2SO_4 . The hexanitrodiphenyl oxide is only slightly sensitive to shock, but exceeds picric acid in explosive power.

Ger., 281,436, Jan. 21, 1914. E. KÖHLER. Discharging loaded priming caps from the loading presses.

Ger., 281,497, May 28, 1913. C. CLAESSEN. Mfg. detonators for use in mines and for military purposes. See Fr., 459,979 (C. A. 8, 3238).

25. DYES AND TEXTILE CHEMISTRY.

L. A. OLNEY.

Robert Williamson. ANON. *J. Chem. Soc.* 107, 590-2(1915).—An obituary.

L. G. C.

New dyes and pattern cards. PAUL KRAIS. *Z. angew. Chem.* 28, 245-6(1915); cf. C. A. 9, 246.

E. J. C.

The dyestuffs industry and Austro-German patents. A. DUBOSC. *Mat. grasses* 84, 4301-4(1915).

EDWARD J. KELLEY.

Notes on dye-reactions. GUSTAV ULRICH. *Z. ges. Textil-Ind.* 1914, No. 22; *Chem. Zentr.* 1915, I, 275-6.—The new naphthol A S red dyes may be distinguished from the older β -naphthol reds by their reaction with concd. H_2SO_4 . Cotton dyed with the latter turns blue-violet to blue when treated with the acid, while the soln. becomes fuchsin red. No color changes take place in the case of the newer dyes.

H. L. OLIN.

Turkey red oils. W. FAHRION. *Seifensabr.* 35, 365-7, 391-2, 415-7(1915).—A discussion is given of various contradictions in the literature of this subject, together with some analyses. F. has concluded that the active constituents of turkey-red oil are probably not the sulfonated fatty acids but esters of hydroxy acids, and in the case of red oil derived from castor, the poly ricinic acids. By boiling turkey-red oil $1\frac{1}{2}$ hr. with dil. HCl, all of the organically combined S is split off. By sapon. with alc. KOH only a portion of the organically combined S is removed, the remainder may be taken out by boiling with HCl.

E. SCHERUBEL.

Failures in bleaching. A. KRAMER. *Seifensieder-Ztg.* 42, 308(1915).—Spots which are often found on fibers after bleaching are due to oxycellulose which absorbs bleaching chemicals in different proportions from regular fiber. It may be tested for as follows: Dissolve dry indanthrene yellow in concd. H_2SO_4 , pour into H_2O and neutralize, mix a small amt. of this soln. with 8% NaOH and introduce the fiber. If oxycellulose is present the fibers turn blue after rinsing and drying. Pure cellulose does not show this reaction.

E. SCHERUBEL.

Prevention of decomposition of peroxide bleaching baths. V. WINTSCH. *Rev. mens. blanchissage* 7, 102(1914); *J. Soc. Chem. Ind.* 34, 349.—Alk. solns. of H_2O_2 and other bleaching agents containing active O, are rendered stable by the addition of B compds. and pyrophosphates. A liter of soln. containing 34 g. H_2O_2 , 1.7 g. NaOH, 30 g. $Na_2P_2O_7$, and 5 g. $NaBO_2$, had not diminished in available O content after heating to 60° for 1 hr. After keeping at this temp. 3.5 hrs., a diminution of 84% was noted in the case of a sample which did not contain the metaborate, whereas the sample above mentioned lost only 11.2% of its available O. These additions are also useful for the preservation of neutral or acid bleaching baths.

L. W. RIGGS.

Finishing, ironing, starch and binding preparations for the textile industries. K. MICKSCH. *Kunststoffe* 5, 97-8, 112-3(1915).—A review and discussion.

F. W. SMITHER.

Dyestuffs and Coal-tar Products: Their Chemistry, Manufacture and Application, London; C. Lockwood & Son. 164 pp. 7s, 6d.

U. S., 1,141,148, June 1. A. SCHMIDT and A. STEINDORFF. Making stable concentrated leuco salt mixtures of "hydro-blue" dyes by heating the dye, *e. g.*, hydron blue paste G, with about 30-80% its wt. of glucose and preferably also 20% its wt. of 40° Bé. NaOH and evapg. the mixt. to dryness.

U. S., 1,141,301, June 1. S. BARKER. Apparatus for dyeing yarn.

U. S., 1,141,872, June 1. G. HEBERLEIN. Treating cotton fabric to make it resemble wool. See Ger., 280,134 (C. A. 9, 1396).

U. S., 1,142,476, June 8. T. ALLSOP and W. W. SIBSON. Dyeing apparatus with a perforated rotating drum to hold the material under treatment immersed in a vat through which the dye liquor is circulated. Cf C. A. 8, 1512.

Brit., 2,164, Jan. 27, 1914. H. DUTSCHKE. Imparting a silk-like gloss to cotton and other fabrics containing vegetable fibers, by impregnating the fabrics, after dyeing, with a soln. of a crystallizable salt or organic acid, and then repeatedly passing them through a calender heated to 100-200° or higher, to obtain a uniform deposit of minute and finely distributed crushed crystals upon the fibers of the fabrics. Fluted rollers may be employed to render the appearance of the fabrics more refined. NaCl or NH₄Cl may be the salt employed.

Brit., 2,213, Jan. 27, 1914. E. GRAEGER and A. KEMMLER. In preparing fibers for spinning, raw silk, silk waste, and cocoons are treated in a soln. containing a tryptic ferment, such as pancreatin, or the pancreas gland, or papayotin, with the addition of NH₄ salts, and of a neutral electrolyte, such as NaCl, at about 40°. The material undergoes a preliminary treatment in a hot, weakly alk. soln. of soda or borax.

Brit., 3,114, Feb. 6, 1914. S. S. PARTRIDGE. App. for dyeing yarns or slubbings in hank form comprises a hank-carrying frame which is given vertical reciprocating movements in the vat without rotating, and an agitator for the liquid disposed in a compartment at 1 end of the vat, arranged so that the agitator and frame are sepd. while there is free liquid communication.

Brit., 3,312, Feb. 7, 1914. CHEM. FABRIK-GRIESHEIM-ELEKTRON. Formaldehyde condensation products of 2,3-hydroxynaphthoic acid arylamides are prepd. by treating the arylamides with HCHO in the presence of alkali. Anilides, toluidides, and their Cl and NO₂ substitution derivs., naphthylamides, etc., may be used. Azo dyes are obtained by combining the above described HCHO compds. with diazo compds.

Brit., 3,313, Feb. 7, 1914. CHEM. FABRIK GRIESHEIM-ELEKTRON. Monoazo and disazo dyes are obtained by combining non-sulfonated diazo or tetrazo compds. with the condensation products from HCHO and arylides of 2,3-hydroxynaphthoic acid described in 3,312, 1914 (*supra*). The dyes may be prepd. in substance or on the fiber.

Ger., 278,423, June 24, 1913. BAYER & Co. Mfg. triarylmethane dyes by condensing R₃COH derivs. of aromatic amines with aromatic aldehydes and oxidizing the leuco compds. or sulfonating and oxidizing in any order.

Ger., 278,424, Jan. 7, 1913. Addition to 238,980 (C. A. 6, 1682). BADISCHE. Anthraquinone dyes are obtained by allowing condensation agents having a reducing action to act upon 1,1'-dianthraquinonyl-2,2'-bisarylketones or their derivs. The products correspond to the Ph-Ph'-diaryl derivs. of the dye of the principal patent.

Ger., 278,660, June 29, 1913. Addition to 275,220 (C. A. 8, 3242). M. KARDOS. Mfg. vat dyes by subjecting to alkali fusion, instead of the anthracene-1,9-dicarboxylic acid imides or their halogen substitution products, the N-substituted derivs. of these compds.

Ger., 278,710, Feb. 26, 1913. P. HAHN. Constructional details of a machine for mercerizing yarns. Cf. C. A. 9, 156.

Ger., 279,196, May 9, 1911. Addition to 250,744 (C. A. 7, 266). FARBW. v. M. L. & B. Mfg. condensation products of indigo, its homologs or substitution products, by heating one of the specified initial materials, without the addition of diluents, with BzCl or the chlorides of substituted benzoic acids in the presence of ZnCl₂.

Ger., 279,198, Mar. 19, 1913. FARBW. v. M. L. & B. Mfg. condensation products of the anthraquinone series containing nitrogen by the double decompn. of α -amino derivs. of anthraquinone with aryl- α -haloacetic acid or its esters, and the treatment of the resulting α -anthraquinonyl-C-arylglycines with dehydrating agents, *e. g.*, acetic acid anhydride.

Ger., 279,314, May 18, 1913. CHEM. FABRIK GRIESHEIM-ELEKTRON. Mfg. condensation products from the arylamides of 2,3-hydroxynaphthoic acid by bringing 2,3-hydroxynaphthoic acid arylamides into reaction with HCHO, in the presence of alkalis.

Ger., 279,733, Apr. 29, 1910. Addition to 277,993 (C. A. 9, 967). FARBW. v. M. L. & B. Mfg. after-chromable triphenylmethane dyes by reducing the nitro-leuco compds. from *p*-nitrobenzaldehydes and *o*-hydroxycarboxylic acid with alkali sulfide, with or without the addition of alkali.

Ger., 280,370, Oct. 19, 1911. Addition to 192,872 (cf. 265,833, C. A. 8, 430). FARBW. v. M. L. & B. Stabilizing leuco compounds of indigoid dyes with the aid of hydroxy and dihydroxy acids or their salts and anhydrides which are readily sol. in H₂O, as well as lactic acid and its salts as specified in the principal patent.

Ger., 280,505, Jan. 10, 1912. BADISCHE. Mfg. chromium compounds of the hydroxyanthraquinonesulfonic acids and their derivs. See Brit., 7,892, 1912 (C. A. 7, 2859).

Ger., 280,545, Aug. 24, 1913. F. KRUPP AKT.-GES. GRUSONWERK and J. H. BOEKEN. Process and app. for washing vegetable fibers.

Ger., 280,646, July 15, 1913. AKT.-GES. FÜR ANILIN-FABRIKATION. Mfg. water-soluble greenish blue dyes of the anthraquinone series by heating 1-amino-4-halogenanthraquinone-2-sulfonic acids with aromatic amines, H₂O, and Cu or Cu compds. in the presence or absence of acid-binding agents.

Ger., 280,647, Aug. 29, 1913. Addition to 275,537. BADISCHE. Mfg. vat dyes by treating the nitro- or amino-derivs. of dibenzanthrone or isodibenzanthrone with halogens or substances yielding halogen.

Ger., 280,649, Nov. 22, 1913. GES. FÜR CHEM. IND. IN BASEL. Mfg. new vat dyes by treating indigo or indigoid dyes, in the presence of concd. H₂SO₄, with oxidizing agents.

Ger., 280,711, Sept. 12, 1913. CASSELLA & Co. Mfg. a blue-green vat dye by heating 1-aminoanthraquinone and *o*-chlorobenzaldehyde to a high temp., with the addition of an acid-binding agent and a small amt. of Cu or similar metal salt, with or without a diluent.

Ger., 280,712, July 10, 1913. CASSELLA. Mfg. acridone-like condensation products of the anthraquinone series by condensing β -naphthoquinone-3-carboxylic acid with aminoanthraquinones with free *o*-position with respect to the amino group, and treating the resulting compds. further with dehydrating condensation agents.

Ger., 280,787, Mar. 26, 1913. L. KALB. Mfg. vat dyes by treating 1,1'-dinaphthyl-8,8'- or -2,2'-dicarboxylic acid or their derivs., such as the esters, chlorides,

nitriles, as well as the nucleus substitution products of these compds., with acid condensing agents, such as H_2SO_4 , or AlCl_3 , and the like.

Ger., 280,840, June 25, 1913. Addition to 268,505 (C. A. 8, 2067). **BAYER & Co.** Mfg. vat dyes of the anthracene series by treating the indazoles obtained from *o*-diazomethylantraquinones instead of with halogens or agents yielding halogens, with other condensing agents.

Ger., 280,880, Oct. 21, 1913. **BADISCHE.** Mfg. vat dyes by treating with halogens, or halogenating agents, the dyes obtained according to 276,956 (C. A. 9, 966), addition to 276,357 (C. A. 8, 3243).

Ger., 280,881, Aug. 1, 1913. **BADISCHE.** Mfg. vat dyes of the anthraquinone series by condensing the halogenfluorenonecarboxylic acids with amines of the anthraquinone series.

Ger., 280,882, and addition 280,883 Aug. 12, 1913. **BADISCHE.** Mfg. anthraquinone derivatives. See Brit., 21,027, 1913 (C. A. 8, 3240).

Ger., 280,975, Mar. 14, 1913. **FARBW. v. M. L. & B.** Mfg. ether-like condensation products of the anthraquinone series by condensing alizarin or its substitution products with ethylene halides in the presence of halogen-hydride-binding agents, with or without the addition of catalyzers, such as Cu or its compds.

Ger., 281,046, Oct. 28, 1913. **R. STOLLÉ.** Mfg. *N*-substituted isatins.

Ger., 281,048, June 24, 1913. **BAYER & Co.** Mfg. sulfonic acids of aromatic aminothiazoles by heating dehydrothiotoluidine, its homologs or substitution products or the corresponding primulines, with H_2SO_4 to high temps.

Ger., 281,050, Oct. 14, 1913. Addition to 276,808 (C. A. 9, 966). **FARBW. v. M. L. & B.** Mfg. oxidation products of the indigo series by oxidizing indigo, its homologs or substitution products in neutral aq. suspension, with permanganate solns.

Ger., 281,052, July 19, 1913. **FARBW. v. M. L. & B.** Mfg. isatins by treating with oxidizing agents, in aq. soln., those condensation products of *o*-nitroaldehydes which yield indigo with alkali. Cf. C. A. 9, 966.

Ger., 281,507, June 21, 1913. **L. HERMSDORF and H. TEUFER.** Mfg. silk-like cotton. See Fr., 463,073 (C. A. 8, 3373).

26. PAINTS, VARNISHES AND RESINS.

A. H. SABIN.

Use of lead compounds in paints. **ANON.** *Chem. Trade J.* 56, 437-8(1915).—Abstract of British Departmental report which recommends prohibition of the importation, sale and use of any paint material which contains more than 5% of its dry wt. of sol. Pb. The amt. of sol. Pb is to be detd. by treating the dry matter, free from H_2O , varnish matter, etc., with 1,000 times its wt. of an aq. soln. of HCl containing 0.25% of actual HCl, filtering, pptg. Pb in filtrate with H_2S , and finally detg. Pb as PbSO_4 . Arguments by E. M. Johnson of the United Kingdom White Lead Corroders in protest against the above report, which, according to J., means the extinction of the British white lead industry, are appended.

E. W. BOUGHTON.

Recent advances in our knowledge of ultramarine. **L. BOCK.** *Z. angew. Chem.* 28, I, 147-52(1915).—An extensive discussion of the reactions that occur during the manuf. of ultramarine, the nature of the products, etc., with review of the literature and account of exptl. work. Many reactions and formulas are given. B. states that

the nature of the combination between the Al_2O_3 and the SiO_2 in ultramarine is clear, but that the manner in which the S is combined is still uncertain. In blue ultramarines which are rich in SiO_2 and S, the latter is partly attached to the alkali in the mol. and is partly in a state of low oxidation. In green ultramarine the S is combined as sulfide and disulfide.

E. W. BOUGHTON.

Paint vehicles as protective agents against corrosion. M. TOCH. *J. Ind. Eng. Chem.* 7, 510-4(1915); *J. Soc. Chem. Ind.* 34, 592-5(1915).—Results of coating steel with 52 different vehicles.

ISADOR MILLER.

Linoxyn. F. FRITZ AND CLARA ZYMANDL. Triest. *Chem. Rev. Fett-Harz-Ind.* 22, 27(1915); cf. *C. A.* 6, 305; 7, 1816; 8, 2495.—The following additional analytical table on linoxyn products is given without comments by the authors:

Product.		Sp. Gr. at ° C. (H ₂ O 4°).	I No.	% ash.	% non-oxid. acids.	% oxidized acids.	% H ₂ O-sol. acids.	
Walton oil	Hard	1.0680	20.0	64.8	1.39	26.3	52.1	4.3
"	"	1.0693	20.0	67.7	1.44	26.4	47.4	5.9
"	"	1.0611	21.0	68.4	1.19	26.1	46.7	4.9
"	"	1.0726	18.0	78.9	1.27	26.7	47.4	5.9
"	"	1.0728	14.5	58.7	1.31	24.2	50.1	6.5
"	"	1.0730	17.0	61.5	1.35	23.8	50.0	4.5
"	"	1.0704	18.0	55.8	1.30	26.1	47.6	9.0
"	"	1.0668	18.0	66.1	1.07	29.7	44.2	7.9
"	"	1.0765	17.0	68.1	1.27	28.8	47.3	6.8
"	"	1.0817	21.5	52.8	1.42	30.8	45.1	13.2
"	"	1.0711	22.5	70.8	....	34.3	43.8	12.0
"	"	1.0724	23.5	66.8	....	32.2	42.9	12.6
Rapidly oxidized linseed oil, soft		.....	82.8	0.21	42.0	42.5	3.4	
"	"	"	97.9	0.19	42.6	42.3	3.4	
"	"	"	94.2	0.23	42.5	41.7	4.1	
"	"	"	90.4	0.25	44.2	42.4	4.9	
"	"	"	90.4	0.20	45.3	41.7	10.6	

P. ESCHER.

Behavior of alcoholic rosin solutions alone and while drying. O. PRAGER. *Seifensieder-Ztg.* 42, 218-9(1915).—The solubility, viscosity, clearness, color and time of drying, of 9 kinds of rosin are tabulated, also the behavior during and after drying on glass, tin, hard wood, paper, leather, split leather and stained wood. E. SCHERUBEL.

Detection of phenol-formaldehyde condensation products (STEINITZER) 7. Products resembling linoxyn (SCHARFER) 27. Linoleum substitutes (CHARDET) 30.

ANDES UND ERWIN: Lack und Firnis-Fabrik. Die Fabrikation der Lacke, Firnisse, Buchdrucker-Firnisse und des Siegellackes. 6 Aufl. Wien: A. Hartleben. 270 ss. 3.80 M.

U. S., 1,141,177, June 1. C. ELLIS. Making white lead. Molten Pb is divided into small streams which are forced together to form a spray of the molten metal and the latter is exploded by a jet of steam. The product is then treated with air, H_2O and CO_2 , with or without HOAc.

U. S., 1,142,365, June 8. G. E. POSSA. Printing ink for intaglio or photogravure processes on cylinder or rotary presses; formed of casein or albumin 1.4, borax 0.18,

sulfonated castor oil 2.8, a lake color 5.4, turpentine 3.5, carbon black 2.2 and H_2O 14 parts.

Brit., 2,318, Jan. 28, 1914. J. FRACHEBOURG. Production of colored illustrations or transparencies by superimposing by transfer monochrome prints. The monochrome prints are made in greasy inks on gelatin, collodion, celluloid or other films supported on temporary paper backings, the gelatin, etc., films being finally transferred and superimposed on a final backing. The temporary paper backings are coated with albumin, casein, dextrin, arrowroot, cellulose, gum, glue, varnish or, preferably, gelatin to close the pores and cover the fluff, and then with wax, paraffin, or stearin before being coated with the films which receive the monochrome prints. The films are transferred to their final backing in a soln. of gelatin and sugar in H_2O to which $HOAc$ may be added, the sepm. taking place between the wax and the film.

Fr., 467,464, Jan. 19, 1914. INTERNATIONAL COLOR & CHEMICAL CO., INC. In the manuf. of paints and enamel, the pigment (chrome yellow) is combined, in the presence of an excess of a pptnt. ($Pb(OAc)_2$) with soap soln (below 5% of the wt. of the pigment), and kneaded up with heating (60°), below the m. p. of the metal soap (Pb stearate), with a vehicle (linseed oil), whereby the H_2O is sepd. out. The complete dehydration follows by heating to 100° .

Ger., 281,432, Nov. 8, 1913. Addition to 270,993 (C. A. 8, 2248). M. WEN-DRINGER. Mfg. a high grade, pure and clear coumarone resin from heavy benzenes b. $160-80^\circ$, also a clear and light-fast solvent naphtha, having an agreeable odor with prevention of emulsions and sepn. of acid resins. Application of the principal patent has demonstrated that the use of H_2SO_4 of 60° Bé. can be avoided, and that a still brighter and high melting coumarone resin is obtained—and indeed without the formation of acid resins and sulfonation—if, in adding the small amts. of concd. H_2SO_4 (0.25–0.40 vol. %), care be taken that the temp. of the contents of the washer is not raised above $40-50^\circ$. If the temp. of the washer reaches $100-120^\circ$, secondary reactions, especially the formation of naphtha-insol. acid resins, are unavoidable, if the inflowing H_2SO_4 be not immediately dild. At a lower temp., however, the action of the concd. H_2SO_4 in the formation of the naphtha-sol. coumarone resin is not changed. This depression of the temp. can be effected by the insertion of cooling worms into the washer, by the passage of air, by slow feeding of acid, or otherwise. The color of the coumarone and indene resin is perfectly clear, citron- to amber-yellow, and these resins melt at a higher temp. according as less H_2SO_4 and a lower temp. are employed in the polymerization. Also, in the distn. of the polymerized naphtha, over-heating must be avoided, and therefore direct firing is not used.

27. FATS, FATTY OILS AND SOAPS.

E. SCHERUBEL.

Catalytic hydrogenation of fatty acids in the laboratory. H. DUBOVITZ. *Seifen-sieder-Ztg.* 42, 304–6(1915).—The app. described consists of a round-bottom flask connected with a tube containing the catalyzer deposited on pumice. The tube is connected to a receiver which in turn connects with a suction line. The fatty acids to be hardened are distd. by means of heat supplied by a Bunsen burner and pass through the catalyzer tube which is also heated. Gas is generated in a Kipp app. and is properly purified before coming into contact with the catalyzer and fatty acid vapors. E. S.

The cleavage of fats by high pressure steam. J. MARCUSSEN. *Mitt. kgl. Material-prüfungsamt* 32, 502–6(1914); through *Chem. Zentr.* 1915, I, 812.—M. reports results obtained on repeating tests perviously reported (C. A. 2, 3413; 3, 255). Tribenzoin

tripalmitin, and tristearin were used separately in one test and palm kernel fat in another. It is concluded that the hydrolysis of the fats on heating with H_2O under pressure is bimolecular with intermediary formation of mono- and di-glycerides. The same conclusion holds for the hydrolysis of fats by acids and enzymes. Cf. C. A. 1, 360, 2556.

F. W. SMITHER.

The detection of rape oil. HANS KREIS AND EMIL ROTH. Basel. *Mitt. Lebensm. Hyg.* 6, 38-40(1915).—The authors have modified their earlier method (cf. C. A. 7, 3802). Saponify 10 g. of oil by heating on the bath with 50 cc. 95% alc. and 5 cc. 40% NaOH. After driving off alc., take up the soap with H_2O , add an excess of HCl and boil gently. Wash the fatty acids 3 times with hot H_2O in a separatory funnel, wash them into a 150 cc. Erlenmeyer with 50 cc. 95% alc. and heat to boiling. Add 0.75 g. Pb acetate dissolved in 25 cc. of hot alc. and let stand 12 hrs. at a temp. above 15° . Filter the ppt., wash it 3 times with alc., return it to the flask and boil with 100 cc. 1% HCl. Cool, wash the flask contents into a separatory funnel, and shake with ether. Wash 3 times with H_2O and distil from a tared flask. A rape oil residue should weigh 1.3 g. Fractionate a second time and det. m. p. of acid. Values below 50° indicate the presence of rape oil.

H. L. OLIN.

Products resembling linoxyn obtained when steam-distilling vegetable oils. W. SCHAEFFER. Triest. *Chem. Rev. Fett-Hars-Ind.* 22, 37-8(1915).—An analysis is given of a dark colored sticky oil which had accumulated in the oil separator of a superheated steam deodorizer for vegetable oils: oxidized fatty acids 44.56, non-oxidized fatty acids 29.49, H_2O -sol. non-volatile acids 6.12, insol. residue 0.43, ash (much Fe) 5.25%.

P. ESCHER.

American neutral oil soap. E. SCHUCK. *Seifensieder-Ztg.* 42, 323-4(1915).—Description of the crutcher in which this kind of soap (for textile purposes) is made. The fat basis is generally corn, cottonseed or linseed oil, but 20 to 25% of rosin may be added. S. gives the following formula: corn oil 550 lbs., 24.5° Bé. KOH 594 lbs., M rosin 110 lbs., H_2O 800 lbs. Fatty acids may be used in place of the oil, but the KOH must be increased to 653 lbs. per batch.

E. SCHERUBEL.

Purification of low grade fats. P. T. *Seifensieder-Ztg.* 42, 371-2(1915).—A discussion of old and well known methods.

E. SCHERUBEL.

Talc and its use in soap and cosmetics during war time. F. *Seifensieder-Ztg.* 42, 324-5, 346-7(1915).

E. SCHERUBEL.

Reducing action of soaps. W. SCHRAUTH. *Seifensieder-Ztg.* 42, 369-71(1915).—In medicated soaps, especially those containing Hg, the soap base frequently has a reducing action. Soaps made from the satd. fatty acids do not possess a reducing action while those made from the unsatd. do. S. made some expts. with organic compds. of Hg in both Na and K soaps of satd. and unsatd. fatty acids, and the practical conclusions derived are that tallow, coconut and palm kernel oil may be used as a satisfactory soap base, but that bone greases and lard are unsuitable, also most vegetable oils.

E. SCHERUBEL.

The composition of foreign soaps. K. BRAUN. *Seifensieder-Ztg.* 42, 326-7(1915).—Analyses are given of Sunlight and Pear's soap, Roger & Gallet toilet soap, Thompson's soap powder and Minlo's washing powder.

E. SCHERUBEL.

Household soaps. ERNE. *Seifensieder-Ztg.* 42, 26-7(1915).—Discussion of substitutes for previous raw materials.

E. SCHERUBEL.

Foreign bath soaps. K. BRAUN. *Seifenfabr.* 35, 389-91(1915).—Analysis of English, French and Italian soaps.

E. SCHERUBEL.

Digitonin method for sterols in strophanthus oil (MATTHES) 17. Alcoholic rosin solutions (PRAGER) 26. Analysis of fatty substances 12. Rubber substitutes from oxidized oils (CHARDET) 30.

GANSWINDT, A.: *Moderne Seifenfabrikation*. Leipzig: B. F. Voigt. 228 ss. 7.50 M.

U. S., 1,141,104, June 1. A. B. CARR. Preparing cottonseed for storage in bulk by heating to 130–80° (F.?) partially to cook or coagulate the albuminous constituents without destroying their germinating quality, while protected from the air, and then cooling to 32–80° (F.?) to prevent continuation of the cooking when stored in bulk.

U. S., 1,142,668, June 8. G. CALVERT. Hydrogenating oils. A mixt. of the oil, *e. g.*, cottonseed or whale oil, with H and a catalyst, is heated under a pressure of above 250 lbs. per sq. in. in a closed vessel fitted with a beater which is so operated as to give a series of rapid impacts on the mixt. Cf. *C. A.* 9, 531.

Brit., 3,344, Feb. 9, 1914. O. C. HAGEMANN and C. BASKERVILLE. Carrying out catalytic reactions in liquids, particularly the hydrogenation of oils, fats, and fatty acids. See U. S., 1,083,930 (*C. A.* 8, 1025).

Ger., 281,146, July 7, 1912. B. BENEDEX. Mfg. fatty, soap-like products from hydrocarbons, for laundry and like purposes.

Ger., 281,329, Dec. 3, 1913. Addition to 259,360 (*C. A.* 7, 3000). H. OCKELMANN and O. OCKELMANN. Mfg. a stain-removing preparation by adding to the alk. soap obtained according to 280,688 (*C. A.* 9, 1553) a substance which permits the admixt. of sugar and thereby the taking up of a considerable amt. of KOH. Alc. is specified as such a substance. The various alcs., also oxidation products of alc., such as aldehyde and ketone, can be employed, especially the derivs. of alc. The higher the alc. content, within certain limits, the larger the amts. of sugar which can be incorporated. *E. g.*, for a soft soap, use sugar 2000 g., soap 2000 g., KOH 80 g., alc. 120 g., and for a hard soap, use soap 1500 g., sugar 500 g., KOH 19 g., and alc. 30 g. The alc. offsets the undesirable thickening effect of the sugar in the soln.

30. RUBBER AND ALLIED SUBSTANCES.

R. T. STOKES.

The proteins in rubber and in latex. F. FRANK. *The Rubber Industry* 1914, 144–8.—The proteins were obtained free from the rubber by boiling 1 to 2 g. of the rubber in cymene, limonene or dipentene until a uniformly thin soln. resulted, and then centrifuging. They were washed with xylene, benzene and ether. This method can be used for the quant. detn. of N with good comparative results. The products obtained by this method gave the biuret reaction, the xanthoproteic reaction and PbS reaction for proteins. Millon's reagent gave marked reactions for the presence of tyrosine groups. Liebermann's reaction proved unreliable but all pptn. reactions characteristic of the known albumins were observed with certainty. The proteins were hydrolyzed with H₂SO₄ and the products of hydrolysis detd. The following groups were identified: monoaminocarboxylic acids, amino acids of the aromatic series (phenylalanine, and tyrosine), amino acids of the heterocyclic groups (tryptophan certainly), diaminomono-carboxylic acids and also with fair certainty monoaminodicarboxylic acids and cystine. In rubbers which externally show slight signs of disintegration the presence of amino acids can always be proven. In the discussion which followed the

paper it was pointed out that in the detn. as carried out, some of the amino acids would be sol. in the solvents used and thus be lost for the detn. W. F. ZIMMERLI.

The effect of acids and alkalis on rubber, more especially in relation to reclaimed rubber. W. G. MARTIN. *The Rubber Industry* 1914, 205-11.—A standard compd., fine Para 38.25%, ZnO 60% and S 1.75% was mixed with different amts. of powdered NaOH (0.25, 0.5, 0.75, 1, 3 and 5%) and vulcanized. Using NaOH up to 0.5% the vulcanization was accelerated; above that amt. it was retarded. The influence of acid was detd. by using the standard compd., fine Para 38.25%, BaSO₄ 60% and S 1.75%, and adding different amts. of H₂SO₄. It was found that even as small an amt. of acid as 1/8% retarded the vulcanization so that the product obtained was poor. 1-3% acid produced a porous vulcanized product. W. F. ZIMMERLI.

Recent advances in the analysis and evaluation of rubber and rubber goods. PHILIP SCHIDROWITZ. *Analyst* 40, 223-33(1915).—A review. P. B. DUNBAR.

Experiments on the determination of mineral matter in rubber mixings. B. D. PORRITT AND R. WHEATLEY. *The Rubber Industry* 1914, 193-9.—An attempt was made to break down the rubber by treatment with O₂, but good results were not obtained because some of the rubber remained unattacked. This may be due to the combined S forming a product which is unaffected by O₂. W. F. ZIMMERLI.

A simple method for the estimation of mineral matters in vulcanized rubbers. H. W. JONES. *The Rubber Industry* 1914, 199-201.—Two g. rubber are dissolved by heating with 40-50 cc. of PhNO₃ in a 200-300 cc. flask. After cooling, the flask is filled with acetone and the contents mixed. The mineral matter deposits quickly and is washed with acetone by decantation and weighed. W. F. ZIMMERLI.

The estimation of bitumens in rubber mixings. B. D. PORRITT AND E. ANDERSON. *The Rubber Industry* 1914, 181-9.—The results obtained with old methods for detg. bitumens in vulcanized rubber by extg. with different solvents were unreliable. It was hoped to devise a reliable method using the property of the insolubility of bitumens in HNO₃ (sp. gr. 1.355). The rubber to be analyzed is dissolved in HNO₃ and the bitumens filtered through a Gooch. The residue was then extd. with CS₂ and the ext. weighed. The method did not prove satisfactory. W. F. ZIMMERLI.

Use of nitric acid as a solvent for compounded and vulcanized rubbers. H. W. JONES. *The Rubber Industry* 1914, 189-90.—Carbonaceous constituents (lamp-black and hydrocarbons) may be detd. with fair results by dissolving 1-2 g. of the rubber in 40 cc. HNO₃ (sp. gr. 1.42) on the steam bath. The mixt. is filtered on asbestos after cooling and washed with cold HNO₃ and finally with H₂O. The residue can be weighed directly, or ignited and weighed to get % carbonaceous matter. W. F. ZIMMERLI.

Variability (of plantation rubber). P. SCHIDROWITZ. *The Rubber Industry* 1914, 212-29.—A brief general account of the principles underlying the methods of evaluation by vulcanization tests approved by the committee on standardization appointed by the Rubber Growers' Assoc. Details are to be published in sep. papers. The rubber is evaluated by giving marks for: (1) tensile work done on taking test piece to the break, (2) type (general mechanical properties, such as capacity for work, elasticity, recovery, rate of increase of resistance to stretch), (3) curing capacity, physical conditions and stability. The marks given by the above tests are added and compared to a standard which is 1000 marks. The results of applying the method to 67 rubbers are given in tables to show the variability of rubbers. W. F. ZIMMERLI.

Some American methods of testing mechanical rubber goods. D. E. DOURY. *The Rubber Industry* 1914, 230-45.—Outline of the methods of physical tests described in the U. S. Bur. of Standards, *Circ.* No. 38. W. F. Z.

The influence of temperature on the tensile properties of rubber compounds. P. L. WORMELEY. *The Rubber Industry* 1914, 246-58.—W. studied the influence of change of temp. on elasticity, tensile strength and ultimate elongation. He found that in measuring the thickness of the test pieces with a spring micrometer, the effect of expansion due to a rise in temp. is balanced to such an extent by the softening of the rubber that the variation in measured thickness rarely exceeds 1%. Although no fixed relation could be found, it was shown that temp. changes such as usually occur in a testing lab. greatly affect the physical properties of rubber. Elasticity increases, the tensile strength decreases, and the elongation increases with rise of temp. The tensile strength is affected to a less extent in high than in low grade rubbers. W. F. Z.

The depolymerization of raw rubber. A. VAN ROSSEM. *The Rubber Industry* 1914, 149-55.—1% solns. of plantation crepe in xylene were heated to 130° in an app. in which the soln. could be exposed to a gas, and the gas absorbed detd. The rubber soln. was exposed to O, H, N, and CO₂ and the change in viscosity of the soln. as well as the amt. of the gas absorbed detd. at different time intervals. It was found that the O was not absorbed until a definite limit of relative viscosity was obtained (after 8 to 10 hrs.). H, N and CO₂ were not absorbed, and the reduction of the viscosity of the soln. when exposed to these gases was not nearly as rapid as in the case where O was used. From this the conclusion is drawn that O has a catalytic action on the acceleration of the depolymerization of rubber, and that oxidation takes place after depolymerization. Oxidation is, therefore, only a secondary process in the phenomenon of the tackiness of rubber. W. F. ZIMMERLI.

The rubber solutions vulcanized by ultraviolet rays. A. HELBRONNER AND G. BERNSTEIN. *The Rubber Industry* 1914, 156-63; cf. C. A. 8, 2815.—The viscosity of rubber solns. is reduced with increasing amts. of S added. Rubber solns. containing different amts. of S were exposed to ultraviolet rays for different time intervals and the degree of vulcanization (or increase in viscosity) was detd. by cementing 2 pieces of fabric together by means of the soln. and detg. the degree of resistance to sepn. of the 2 plies. The degree of vulcanization (increase in combined S) depends on the concn. of S in the rubber and on the thickness of the film exposed to the light. Solns. of rubber vulcanized with ultraviolet rays are permanent, and if the operation is carried out in the proper manner, will remain const. for a long time. Besides rubberizing cloth the solns. can be used for very important cements (joining and rubberizing leather, and repairs of rubber goods). In using these solns. for joining 2 pieces of rubber a positive absorption of the soln. is obtained, and the 2 pieces of rubber are not sepd. by a layer of rubber (as is the case where ordinary cements are used). W. F. ZIMMERLI.

Vulcanization. G. BERNSTEIN. *The Rubber Industry* 1914, 164-71; see Helbrunner and B., C. A. 8, 2815. W. F. ZIMMERLI.

The mass action of sulfur in vulcanization. H. SKELLON. *The Rubber Industry* 1914, 172-80; cf. C. A. 7, 3670; 8, 262, 1678.—S. vulcanized very thin sheets of rubber mixings containing different amts. of S for different time intervals at 140° and detd. the combined S. The sheets were 0.020 in. thick with a variation of not more than 0.0015 in. They were vulcanized on an iron tube, covered with tin foil and wet cloth. Curves were drawn to represent the results. A max. point for combined S was noted in mixings containing 3, 5, 10, 20, 30, 40 and 50% S, vulcanized for 0.5, 1, 1.5, 3, 6 and 9 hrs. In the graphs representing the above as coeffs. of vulcanization, the max. of combined S is emphasized by the appearance of a flat portion on the curve. The incline on this flat portion of the curve increases with increasing time, and is probably due to the influence of the mol. effect of the S not dissolved in the rubber on the rubber-S phase; or to the greater excess of undissolved S causing the rubber-S phase to keep more

const., and also to the easier formation of polyprrene polysulfides which would increase the velocity of the reaction. In the case of the long cure on the rubber containing 50% S, the coeff. of vulcanization reached above 50% as against the theoretical 47%. This rubber was found to contain a new kind of "free S" which could be extd. with acetone only under pressure. W. F. ZIMMERLI.

The coagulation of the latex of *Hevea brasiliensis* and its bearing on the strength of the rubber. N. W. BARRITT. *The Rubber Industry* 1914, 130-6; cf. *C. A.* 8, 2266.—Fresh latex and aq. solns. of Na_2SO_4 and AcOH were used in the expts. Increasing the amt. of salt soln. without changing the acid strength resulted in a stronger vulcanized product, while increasing the acid decreased the strength. Dilg. the latex caused a poorer coagulation and a rubber of poorer strength. W. F. ZIMMERLI.

The chemical coagulation of rubber latex. F. KAYE. *The Rubber Industry* 1914, 137-43.—The latex, after coagulation with acid, showed more acid than was introduced for coagulation. This is probably due to H_3PO_4 formed by the hydrolysis of proteins. A standardization of coagulation is difficult when acid is used because of the variability of the action of enzymes on the proteins when the period lapsing before coagulation varies; and also to the different states of diln. and temp. which influence the hydrolysis. W. F. ZIMMERLI.

Synoptical tables of the different varieties of commercial raw rubber. D. SPENCE. *The Rubber Industry* 1914, 23-32.—Tables of the different varieties of rubber, giving the trade name, geographic origin, chief export center, botanical origin, loss on washing, and the resin content. W. F. ZIMMERLI.

The systematic study of rubber production. R. N. LYNE. *The Rubber Industry* 1914, 35-44.—The work being done in research on rubber is described and a plea is made for more extensive investigation. W. F. Z.

A comparison between wild and plantation-grown rubber. A. IRVING. *The Rubber Industry* 1914, 45-57. W. F. Z.

The rubber plantations of Angola. C. DE M. GERALDES. *The Rubber Industry* 1914, 71-4.—Instead of allowing the latex to coagulate on the tree as is usually done with *Manihot*, it is successfully collected and coagulated in bulk. Good yields of rubber are obtained. W. F. Z.

Rubber cultivation in Cochin China. A. CREMAZY. *The Rubber Industry* 1914, 75-83.—The Brazilian method of coagulating with smoke is used successfully. W. F. Z.

Kelantan as a rubber producer. T. C. HUTCHINGS. *The Rubber Industry* 1914, 84-6.—Growth of rubber trees is favorable but labor is high. W. F. ZIMMERLI.

Cultivation of rubber-growing vines in Central Africa. E. DE WILDMAN. *The Rubber Industry* 1914, 87-95. W. F. Z.

Notes on the Philippine rubber question. O. W. BARRETT. *The Rubber Industry* 1914, 96-100. W. F. Z.

The best and most economical methods of tapping. W. F. DEB. MACLAREN. *The Rubber Industry* 1914, 101-13. W. F. Z.

Notes on the physiology of the latex production in *Hevea*. R. H. LOCK. *The Rubber Industry* 1914, 114-23. W. F. Z.

Observations and comparative tests of latex of wild and plantation *Hevea*. F. RIPAUV. *The Rubber Industry* 1914, 124-9.—R. found that, on coagulating *Hevea* latex by means of CO_2 , a product was obtained equal to plantation smoked sheets. Good results were obtained by adding a dil. soln. of creosote to the latex. Coagulation

should not be hastened by heating or by the addition of acids. The coagulum should not be subjected to any mechanical working. H. B. SLUSSER.

Rubberized balloon fabrics. G. BARR. *The Rubber Industry* 1914, 259-75.—Properties and testing of rubber balloon fabrics. W. F. Z.

Synthetic rubber. Researches on the commercial preparation of isoprene. G. CHARDET. *The Rubber Industry* 1914, 276-9.—A mixt. of resin oil vapor and H was passed over metallic cloth (Fe) heated to dull redness. The condensed product was treated with CaCl_2 to dehydrate it, and then rectified. An av. of 8-12% isoprene was obtained. As by-products dipentene (b. p. 170°), some cymene, and some phenanthrene were obtained. Similar results can be obtained starting with naphtha oils.

W. F. ZIMMERLI.

Substitutes derived from oxidized oils. G. CHARDET. *The Rubber Industry* 1914, 280-3.—C. finds that oils are "hardened" more quickly by passing ozone into the heated oil containing 1% Mn resinate and suggests this method for making linoleum and rubber substitutes.

W. F. ZIMMERLI.

The advantages and defects of plantation rubber. W. A. WILLIAMS. *The Rubber Industry* 1914, 284-97.

W. F. Z.

Balata in rubber compounds. *Holland Ryksvoorlichtingsdienst*; through *Gummi-Ztg.* 29, 610-1 (1915); cf. *Ind. Rub. World* Nov., 1910, 49; *Gummi-Ztg.* 25, 460 and 569.—As a result of a few expts. for which the above gives the results of mechanical tests, it is concluded that, provided the price is not too high, balata may be substituted for the usual fillers to give strength and toughness. In small amts. it may be quite generally used with profit.

E. L. DAVIES.

The manufacture of balata. M. W. TER LAAG. *Caoutchouc et gutta-percha* 134, 8619-20 (1915).—A criticism of the process.

EDWARD J. KELLEY.

The impregnation of cables. ANON. *Caoutchouc et gutta-percha* 134, 8621-2 (1915).

EDWARD J. KELLEY.

Substitutes for hard rubber. *India Rubber World* 52, 483-5 (1915).—A general discussion of such products as casein plastics, celluloid, phenol-formaldehyde condensation products and vulcanized fiber.

R. T. S.

Detection of phenol-formaldehyde condensation products (STEINITZER) 7. Estimating carbon dioxide in presence of sulfides (JONES) 7.

U. S., 1,42,526, June 8. C. E. MILLER. **Apparatus for vulcanizing rubber pneumatic tires.**

Brit., 2,070, Jan. 26, 1914. F. E. MATTHEWS and E. H. STRANGE. Natural or synthetic caoutchouc and caoutchouc-like substances are treated with liquid SO_2 to produce compds. of caoutchouc, etc., which resemble caoutchouc. In an example, synthetic rubber produced by the action of Na on butadiene is dissolved in benzene, and the cooled soln. is sealed up with liquid SO_2 . After heating at 40° for some time, the vessel is opened and, on evapn. to dryness, an elastic product results which may be mixed with fillers, untreated rubber, S, or other vulcanization agent and vulcanized according to the amt. of "vulcanization" which has already been effected by the SO_2 .

Brit., 2,281, Jan. 28, 1914. F. RIPRAU. **Coagulating latex** by means of smoke in shallow pans, supported on frames. The rubber is removed as sheets from the pans, and may be gently pressed. If desired, after the rubber is coagulated, the sheet may be turned over and again treated with smoke, or further layers may be superposed upon the original layer.

Brit., 2,336, Jan. 29, 1914. A. JOHNSTON and NORTH BRITISH RUBBER CO. Rubber floorings, pavings, and like coverings are formed by vulcanizing directly on the floor or road a layer of unvulcanized rubber by means of steam plates, hot plates, or other device, or by chem. vulcanizing agents such as S_2Cl_2 , etc. The surface to be covered may be metal, concrete, or other material; the finished rubber surface is without joints. The rubber may be in the form of finely-divided particles of vulcanized or unvulcanized rubber mixed with vulcanizing ingredients, and be then reformed under pressure and heat. A non-slip pattern may be molded on top.

Brit., 2,627, Jan. 31, 1914. H. A. WICKHAM. In latex-coagulating apparatus of the rotary type, such as is described in 7,371, 1907, in which a film of latex is treated with smoke and other agents, a fixed housing completely or partly enclosing the rotating member is divided by a partition, and the latex-delivery conduit is traversed so as to distribute the latex over the moving surface. Cf. C. A. 9, 732.

Brit., 3,158, Feb. 6, 1914. W. E. MUNTZ. Rubber goods employing a foundation fabric are impregnated with gases or vapors for which SO_2 and H_2SO_4 have a stronger affinity than they have for the foundation fabric. Examples of the substances that may be used are NH_3 and substances of an alk. nature, such as the higher alkylamines, that are capable of being vaporized by heat or by reagents which do not injure the goods. The vapors, etc., may be generated independently or from substances in the goods. The goods may be impregnated by 1st subjecting them to vacuum and then applying the gas, etc., under pressure.

Ger., 281,262, Dec. 23, 1910. Addition to 277,653 (C. A. 9, 1136). J. STOCKHAUSEN. Process of mfg. plastic or elastic masses. Cf. Brit., 23,630, 1911 (C. A. 7, 1299).

CHEMICAL ABSTRACTS

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No. 15.

I. APPARATUS.

L. C. JONES.

A simple apparatus for purification of viscous substances. F. F. BLICKE. Charlottenburg. *Chem. Ztg.* 39, 424(1915).—A glass crucible is suspended in a wide-mouth flask by means of a wire passing up through the return cooler. The substance in the crucible is covered with a fine wire gauze to prevent floating out, and a small funnel supported by the wire drops the condensed solvent on the center of the gauze.

J. H. MOORE.

Synthermal regulator, a device for automatically maintaining an adiabatic condition in calorimetry. T. W. RICHARDS AND G. D. OSGOOD. *J. Am. Chem. Soc.* 37, 1718-20(1915).—A delicate differential H thermometer was devised which, in connection with a relay, operates a heating or cooling mechanism for causing one bath to follow the temp. of another within 0.03°.

E. B. MILLARD.

Improved quartz mercury vapor lamp for biological and photochemical investigations. W. T. BOVIE. *J. Am. Chem. Soc.* 37, 1721-6(1915); cf. *C. A.* 9, 1340.—The lamp consists of a quartz tube 70 cm. long, closed at one end by an invar stopper and inverted in a cistern of Hg. The principles of the Hg air pump have been incorporated into the design so that no pump is required to exhaust the lamp. It can be reëxhausted in a minute without disturbing the substance under investigation and without interrupting the exposure for more than a fraction of a minute.

E. B. MILLARD.

Apparatus for determining the melting point of paraffin waxes. F. H. SMALL. *J. Am. Leather Chem. Assoc.* 10, 144-6(1915).—A glass tube, the graduated lower part of which is the smaller, is closed at the bottom, receives the wax in the larger upper part and is nearly immersed in a vessel of water whose temp. is gradually raised. The amts. of liquid collecting in the graduated portion at successive temps. are observed, thus giving an approx. estimate of the % melting at each temp.

L. B.

A modification of the Bellani porous plate atmometer. B. E. LIVINGSTON. *Science* 41, 872-4(1915).—A discussion of various forms of atmometers with a detailed description of a modified form of the Bellani app.

F. W. SMITHER.

Approved safety lamps. *Colliery Guardian* 109, 910-2(1915).—The safety lamps order of March 16, 1915, issued by the Home Secretary.

H. L. OLIN.

Some fireproof specialties for chemical and metallurgical purposes. K. ENDELL. Charlottenburg. *Chem. Ztg.* 39, 421-2(1915).—General remarks on app. the principle constituent of which is either clays, pure oxides, or carbides.

J. H. MOORE.

A new blast-compressor. ANON. *Chem. Ztg.* 39, 400(1915).—A small motor blast driven from the lighting circuit.

J. H. MOORE.

Sprays for cooling water. ANON. *Met. Chem. Eng.* 13, 401(1915).—A brief discussion of the use of sprays for cooling water and for washing and cooling air. A new nozzle, manufd. by the Spray Eng. Co., Boston, is illustrated. The advantage claimed over the well-known types is a central jet so placed as to give a solid cone of spray instead of a hollow cone.

W. L. BADGER.

Ice calorimeter (GRIFFITHS) 2.

Brit., 4,482, Feb. 20, 1914. A. FERRARIS. Pumps for corrosive liquids of the type wherein a body of inert liquid, such as oil, is interposed between the piston and the corrosive liquid.

Brit., 4,657, Feb. 23, 1914. SILKEBORG MASKINFABRIK ZEUTHEN & LARSEN. A machine for making emulsions, as in the manuf. of margarine, consists of a vessel through which the material flows continually and which contains stirrers alternating with perforated partitions. The stirrers consist of disks attached to a horizontal shaft and formed with slots, the edges of which are turned up so as to produce a propeller. One set of partitions is perforated with small holes, and the other set is wheel-shaped. The size of the perforations diminishes from the inlet end of the machine to the outlet end.

Brit., 4,828, Feb. 24, 1914. E. OLIVIER-ALPHAND. Filters comprizing sleeves of filter cloth doubled over cylindrical metal cages so as to form annular chambers.

Ger., 279,360, Mar. 12, 1914. AKT.-GES. DER MASCHINENFABRIKEN ESCHER WYSS & CIE. Automatic return of a liquid lubricant from the vaporizer in the exhaustion chamber of a refrigerating machine.

Ger., 279,465, Apr. 15, 1913. L. A. RIEDINGER. MASCHINEN- UND BRONZEWAREN-FABRIK A.-G. Safety device for the pressure system of refrigerating machines.

Ger., 280,696, Apr. 5, 1911. E. ALTENKIRCH and G. GEHLHOFF. Thermoelectric cooling and heating body, comprizing a series of thermopiles connected in parallel with a source of current, contacting with each other at the points of welding, and being arranged mutually so that the warm junction, say of an inner element, is next to an outer element.

Ger., 280,977, May 7, 1913. CARL ZÜBLIN. App. for evaporating liquids or drying and superheating vapors or gases by direct contact of the substances with the heating flame, on the surface-combustion principle.

Ger., 281,127, Oct. 22, 1912. KÖNIG FRIEDRICH AUGUST-HÜTTE. A trough drying apparatus with an endless screw designed to comminute the material during its passage through the trough.

Ger., 281,128, Sept. 17, 1913. K. ROSS. App. for saturating liquids with gas, especially for satg. H_2O with CO_2 .

Ger., 281,156, Nov. 6, 1913. P. P. STEIN. Device for permitting reading of a thermometer in the dark, comprizing a float carrying radioactive material.

Ger., 281,263, June 12, 1914. G. VOGEL. Welding burner.

Ger., 281,284, Apr. 13, 1911. W. GENSECKE. App. for heating the condensate for the purpose of recovering the waste heat in condensers provided with several steam jets for removing the air and non-condensable gases.

Ger., 281,492, Nov. 28, 1913. G. W. BARTH. A sampler for use with roasting drums and the like.

Ger., 281,526, Nov. 15, 1913. C. A. HARTUNG. Automatic device for mixing gases, vapors, or liquids in definite proportions, with another gas, vapor, or liquid, flowing in closed tubes.

Ger., 281,527, Dec. 14, 1913. C. H. MATTERN. Electric device for determining vapor density.

Ger., 281,552, Nov. 13, 1913. ALLGEMEINE ELEKTRIZITÄTSGES. Constructional details of rotary compressors, whereby a smooth flow of the medium is insured.

Ger., 281,670, Dec. 23, 1913. W. BUSS. A stopcock for liquids or gases provided with a removable sieve mounted in the plug. This sieve is designed to incline downwardly, during the passage of the liquid or gas, in the direction of flow. A small chamber is provided under the sieve to receive solid matter removed from the current thereby.

Ger., 281,693, May 26, 1912. W. GENSECKE. App. for removing the air and the uncondensable vapors from condensers.

Ger., 281,727, Feb. 7, 1914. AKT.-GES. BROWN, BOVERI & CIE. Hg app. for producing a vacuum or condensing gases or vapors, wherein the Hg (or other elec. conducting liquid) is kept in circulation in a closed chamber by means of a current induced by a magnetic field, and effects the exhaustion or condensation of the gas or vapor.

Ger., 281,765, Oct. 14, 1913. Addition to 233,516 (C. A. 6, 1695). W. A. RUCKER. Modification in the construction of the device specified in the principal patent for regulating the temperature in chemical digestion flasks, and the like.

Ger., 281,889, June 12, 1913. P. HEINRICH. Construction of a color atomizer (air brush).

Ger., 281,918, Dec. 9, 1913. J. FRISCH & Co. Glass vessel for observing colors of liquids or solns., especially in titrations, is provided with an enamel interior or exterior coating, extending over the bottom and up the sides to any desired height, and in a color suited to the purpose for which it is to be used. This enamel provides a constant and permanent background or base. A vessel with enamel extending up the sides to some height permits observation of the color of the liquid contents only by reflected light by looking down into the liquid diagonally. If, however, the enamelling does not extend so high, say a few mm. only, the vessel serves also for the observation of color by transmitted light. The vessel may be placed on any surface without influencing the appearance of the liquid contents.

Ger., 282,128, July 12, 1913. H. TRAUN & SONS, v. HARBURGER GUMMIKAMM Co. A container for hydrofluoric acid consists of a vulcanizable mixt. of rubber and an impermeable substance, such as paraffin, which is not attacked by HF. The paraffin or gutta-percha, or a mixt. of these, is added to the vulcanizable mixt., and the resulting mass is vulcanized. The resulting containers combine high mechanical strength with chem. inactivity, and prevent diffusion. According to the concn. of the HF, up to 15% paraffin, calculated to the amt. of the pure hard rubber, is used. The temp. of vulcanization may be 145-150°.

Ger., 282,172, Feb. 19, 1914. J. ACKER, E. SCHMITZ, L. GOURWITSCH. App. for taking average samples, as of naphtha and the like, from liquid containers, consisting of a hollow cylinder which is lowered and raised by means of a suitable mechanism.

Ital., 129,756, 397-76, Feb. 27, 1913. P. RIBONI and A. BIBOLINI. App. for separating the constituents of a mineral or other mixture, dependent upon the difference in the dielec. constants of the constituents. The initial material is subjected to the influence of a suitable electrostatic field.

2. GENERAL AND PHYSICAL CHEMISTRY.

WILLIAM D. HARKINS.

Assistants: A. B. CARTER and E. B. MILLARD.

Compressibilities of the elements and their relations to other properties. T. W. RICHARDS. *J. Am. Chem. Soc.* 37, 1643-56(1915); cf. *C. A.* 8, 1896, 3523; 9, 399.—

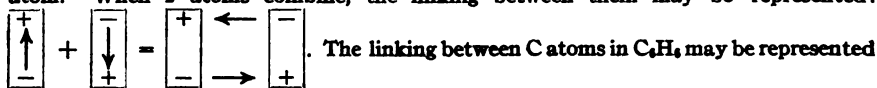
The data on this subject in *Publication Carnegie Inst.* 76(1907), which were referred to a questionable value for the compressibility of Hg, are now corrected by use of the new absolute value 0.00000395 (cf. *C. A.* 9, 983) at 20°, in place of the value 0.00000379 previously used. The compressibility of ice is less than that of H₂O in spite of the greater vol. of the former. Similarly, solid *o*-cresol and *p*-cresol in the solid state have the values 23.8×10^{-6} and 21.8×10^{-6} , resp., between 300 and 500 megabars, while the corresponding quantities for the liquid are 42.1×10^{-6} and 41.8×10^{-6} . A diagram is given for 35 solid elements in which the reciprocal of the abs. m. p., the coeff. of expansion, at. vol., and compressibility are shown to vary periodically when at. wts. are plotted against the other quantities mentioned. Density is not adequately represented by at. vol., since Au and Ag have nearly equal at. vols. and m. ps., yet quite different compressibilities. As usual, the more dense is the less compressible. The following (empirical) equation roughly represents the compressibility (β) as a function of the density (D), the abs. m. p. (T_m) and the at. wt. (A): $\beta = 0.00021A / D^{1.28}(T_m - 50^\circ)$.
E. B. MILLARD.

The dawn of modern chemistry. JOHN M. STILLMAN. *Pop. Sci. Monthly* 87, 5-21(1915).—This historical paper deals with the period beginning with the early 16th century and extending well toward the latter part of the 18th century.

E. J. C.

The method of "small vibrations" in atom-dynamics. R. SEELIGER. Charlottenburg. *Verh. deut. physik. Ges.* 16, 1042-50(1914).—Mathematical. C. D. W.

Applications of Thomson's theory of atoms and molecules to structural chemistry. B. SZYSZKOWSKI. *Svensk. Kem. Tidskrift* 27, 71-5(1915).—Each valence electron is connected to the atom by a tube of force which is anchored in the interior of the atom. When 2 atoms combine, the linking between them may be represented:



as $C \rightleftharpoons C$, or, more briefly, $C \equiv C$. Employing the briefer notation, the tautomer-

ism of acetoacetic ester was $CH_3 \cdot C(=O) = CH \cdot CO_2H$, $CH_3 \cdot C \equiv CH \cdot CO_2H$, $CH_3 \cdot C \equiv CH \cdot CO_2H$
(ketoform) (tautomer) (enol form)

where the 4-bonded C atoms should read $\rightleftharpoons$. The weakly aromatic character of naphthalene as compared with naphthoquinone was a direct consequence of its structure, for in the former there is no true aromatic ring with 6 C atoms linked $\rightleftharpoons$ while in naphtho-

quinone the left ring was a true aromatic ring, thus: and

Substitution could be shown by the arrangement $R \cdot C = H$
 $Cl = Cl \rightarrow$

$R \cdot C - H$
 $Cl - Cl \rightarrow$ Other cases more complicated were also taken up, from which

it was concluded that the theory made all reactions and properties of organic and inorganic compds. clear and easily represented, that the theory gave a true model of

the mol. and not merely a conventional representation of properties and reactions, and furnished a clear conception of valence. These claims were not wholly clear to the abstractor.

E. B. MILLARD.

Determination of a system of chemical equivalents by means of normal solutions. L. KLEIN. Heilbronn. *Z. physik. chem. Unterr.* 28, 90-4(1915).—The system outlined is for elementary work and is based on the neutralization of solns. of bases with acids, evapg. and weighing the resulting salts.

J. H. MOORE.

Extension of the dilution law to concentrated solutions. JAMES KENDALL. *J. Am. Chem. Soc.* 36, 1069-88(1914); cf. *C. A.* 6, 3043; 8, 1044.—The modified law developed was $\Delta^2/\Delta_0(\Delta_0 - \Delta)v' = K$, where v' was the number of unit weights of solvent employed to dissolve one equiv. wt. of total salt, and the other terms have their usual meaning. This equation and $n_u(n_u + n_i)v'/n_i^2 = \text{const.}$ are valid for all concns. of electrolyte, when n_u , n_i and n_s are the numbers of mol. wts. of unionized mols., ions and solvent, resp. The theoretical basis underlying this modification of the dilution law was that the dissociation of a binary electrolyte into its ions did not take place spontaneously, but by impact with the mols. of the solvent. The dissociating power of a solvent was ascribed to its unsatd. character, i. e., to free valences.

E. B. MILLARD.

Ammonia. I. General considerations. F. HABER. *Z. Elektrochem.* 20, 597-604 (1914); cf. *C. A.* 9, 515, 1423.—Summary and theoretical introduction referring to earlier and future papers (cf. following abstr.). The following substances served as catalysts for the combination of N with H: Os, U carbide, Mo, and W. When U carbide was used, the expression for the equil. for the formation of NH_3 for temps. up to 1100° and below 600° was the same as that when Os was the catalyzer between 560 and 974° , namely $\log K_p = (9591/4.571 T) - (4.98/1.985 \log T) - (0.00046/4.571 T) + (0.85 \times 10^{-8}/4.571 T^2) + 2.10$. The sp. heat of NH_3 gas may be represented by the equation $C_p = 8.62 + 0.0035t + 0.000005t^2$, and the heat of formation of NH_3 from N_2 and H_2 by $Q = 10950 + 4.85t - 0.00093t^2 - 0.0000017t^3$ cal. E. B. M.

Ammonia. VII. Ammonia equilibrium at ordinary pressures. III. F. HABER. Berlin-Dahlem. *Z. Elektrochem.* 21, 128-30(1915); cf. *C. A.* 8, 3101; 9, 515, 1423.—Approximate expts. with $1/4$ N and $3/4$ H at const. (atm.) pressure and 600 to 1100° , were made with Fe-asbestos or U carbides as catalyzer. The U carbide first changes to a nitride, which is an active catalyzer. The values of $K = p_{\text{NH}_3}/p_{\text{N}_2}^{1/2} p_{\text{H}_2}^{3/2}$ were detd. at each temp., as follows: at 1100° 0.92×10^{-4} , 1000° 1.38×10^{-4} , 850° 2.71×10^{-4} , 700° 6.57×10^{-4} , 600° 13.8×10^{-4} . At the higher temps. the agreement between these values and the calc. const. was complete, but at 600° and 700° the calc. values were somewhat higher than the observed. E. B. M.

Ammonium solutions. R. E. SLADE. *J. Chem. Soc.* 105, 1351-3(1914).—Corrections to the e. m. f. detns. of *J. Chem. Soc.* 99, 1974(1912) (*C. A.* 6, 564). The value $\epsilon_0 = -0.486$ should be decreased 0.170 in the equation for ϵ . Using Auerbach's value for the H electrode (*C. A.* 6, 1565), the value of ϵ at 25° should be $\epsilon = -0.654 - 0.059 \log [p_{\text{NH}_3} p_{\text{H}_2}^{1/2}/(\text{NH}_4^+)] = -0.551$ for $p_{\text{H}_2} = 1$ and $(\text{NH}_4^+) = 1$.

E. B. MILLARD.

Extension of Trouton's rule. S. ARRHENIUS. *Medd. K. Vetenskapsakad. Nobelinstit.* 3, No. 6, 9 pp.(1915).—For a large number of reactions the quotient Q/T was a "const." between 28 and 56, when the variations in Q and T were quite large. For the decompn. of HCl or HBr by heat the "consts." were 0.88 and 0.24, resp., but the temps. of decompn. were 50,000 and 100,000°, resp. The quotient Q/T had about double the value when the number of mols. increased 2 on decompn. that it had when the increase was 1 mol. (55.4 and 36.4, resp.). Deviations from a const. quo-

tient were much larger than could be accounted for by exptl. errors, even for reactions of the same type. The calcns. were preceded by some interesting speculations on the temp. of processes in the sun, where temps. of 3 or 4 million degrees are reached. Chem. reactions could not be the source of the heat from the sun, since if the sun were pure C its combustion would supply the radiated energy for only 4000 years at most.

E. B. MILLARD.

Dissociation of electrolytes as a function of the neutral molecule. B. DE SZYSZKOWSKI. *Medd. K. Vetenskapsakad. Nobelinst.* 3, No. 2, 1-49 (1915); cf. *C. A.* 8, 1364.—Using the data of Kohlrausch, K. and Maltby, and Kendall (*C. A.* 8, 1044), S. has discussed the general dissociation functions of electrolytes of all types up to 0.5 *N*, and has given $D = K + k(C_0^{1/2})^m$ as the equation best representing the data. $D = \alpha^2 C / (1 - \alpha)$, where α is the degree of dissociation, *C* is conc., *K* is the proper dissoc. const., *k* is another dissoc. const., *m* is a const. between 1.0 and 1.35, and *C*₀ is the conc. of unionized mols. The Δ° values given in the original data have not been tampered with in any case. Tables are given for the cond. of 34 electrolytes of such various types as KCl, KCNS, CHCl₃COOH, C₆H₅(NO₂)₂COOH, H₂PO₄ and β -resorcylic acid in H₂O, together with calcd. values of the activity coeffs. of the neutral mols., *k*, *K* and *m*. All of the values of *m* are between 1.00 and 1.35, and most of them are below 1.2. Evidence has been given in support of the theory of Walker (*Rep. British Assn.* 1911, p. 349; *C. A.* 5, 3645) and of Lewis (*Z. physik. Chem.* 70, 218 (1909); *C. A.* 3, 2399) that the deviations of strong electrolytes are due to the neutral mols., and not to the ions, since organic acids obey the mass law at ion concns. 1000 times as great as those at which salts begin to show considerable deviations. The power of the neutral mol. to increase the dissociation has been expressed for all of the electrolytes investigated by means of the "activity coeff." *a*, which varied between 6.0 and almost zero, the smallest value detd. being 0.00025. The existence of a proper dissoc. const. *K* for strong electrolytes as first suggested by Arrhenius has been definitely proved, its order of magnitude for salts being 0.01.

E. B. MILLARD.

Distribution of dinitrobenzoic acid between benzene and water. BOHDAN DE SZYSZKOWSKI. *Medd. K. Vetenskapsakad. Nobelinst.* 3, No. 3, 7 pp. (1915); cf. *C. A.* 8, 1365.—The distribution expts. have been carried out by the method previously used, for 1,3,5-dinitrobenzoic acid between C₆H₆ and H₂O. [The temp. of these expts. was not given, but seems to be 25° from the other papers.—ABSTR.] As the mol. concn. of the H₂O layer decreased from 0.0063 to 0.0010, the ratio of the concn. of unionized mols. in this layer to the concn. of the C₆H₆ layer decreased steadily from 0.437 to 0.277. This shows that the C₆H₅(NO₂)₂COOH is more associated in H₂O than in C₆H₆, which is in direct contradiction to the Nernst-Thompson rule relating association to dielectric const. Calcns. are given to show that the coeff. of distribution between the phases was 0.625 for the simple mols. and 0.875 for the double mols. when the liquids were CHCl₃ and H₂O, and the distribution coeff. of the double mols. between C₆H₆ and H₂O was calc. as 1.77. The order of the consts. $w^2/(c_0 - w) = W$ and $m^2/(c_B - m) = B$, where *c*₀ was the total conc. of undissociated mols. in H₂O, *w* the concn. of simple mols. in H₂O (therefore (*c*₀ - *w*) was the concn. of double mols. in H₂O), *m* the concn. of simple mols. in the C₆H₆ phase and *c*_B the total concn. in this phase, was shown to be independent of the nature of the solvent in the non-aq. phase, by expts. with CHCl₃ in place of C₆H₆. *W* was 0.0016 and *B* was 0.0036 in CHCl₃, and the corresponding values in C₆H₆ were 0.00158 and 0.048. This was claimed to be the first case of association of an organic acid in H₂O. Cf. following abst. E. B. MILLARD.

Hydrates and complex molecules in non-associated solvents. BOHDAN DE SZYSZKOWSKI. *Medd. K. Vetenskapsakad. Nobelinst.* 3, No. 4, 26 pp. (1915); cf. *C. A.* 8,

1364-5 and preceding abstr.—From the equations above and those of Hendrixson (*Z. anorg. Chem.*, 13, 73 (1897)), de S. has calcd. that the degree of hydration is independent of the concn. of the acid, from which it follows that the amount of H_2O in an organic solvent used in distribution expts. must be const. as well. A "real" dissociation const. has been used; allowance has been made for the hydrated mols., and it has been shown that a const. relation exists between the "real" distribution const. and that obtained by expt., when the degree of hydration is given. This degree of hydration may be detd. simply from the solubilities of the acid in dry C_6H_6 and in the same solvent satd. with H_2O when the latter detn. is made in the presence of an excess of both acid and H_2O , since the increased solubility in the presence of H_2O can only be due to the solution of hydrated mols. in the C_6H_6 . The "dry" C_6H_6 was a good commercial product used without further drying. From detns. in both dry and moist $CHCl_3$ and C_6H_6 , the hydration const. H has been detd. from benzoic, salicylic, *o*-nitrobenzoic and 1,3,5- $C_6H_3(NO_2)_3COOH$; $H = n.s/h$, where n was the concn. of non-hydrated simple mols., s the solubility of H_2O in the organic phase, and h the hydrated mols., and the value of H for the acids in the order named above was 0.0982, 0.133,, and 0.130. Further detns. of the solubility of 2 organic acids present in C_6H_6 simultaneously showed that each increased the solubility of the other by forming "complexes" contg. 2 mol. species. Calcns. are given for the dissociation const. of these complexes into the simple mols., and for simultaneous hydration and complex formation.

E. B. MILLARD.

Hydrated and complex molecules in non-associated solvents. BOHDAN DE SZYSZKOWSKI. *Medd. K. Vetenskapsakad. Nobelinst.* 3, No. 9, 20 pp. (1915); cf. preceding absts.—Further consideration of the data on solubility and distribution. Systems of 3 and 4 acids have been considered. The affinity between 2 acids was very great in 2-component systems, especially between *m*- and *o*- $C_6H_4NO_2COOH$. Since each of these forms complexes with itself, the complexes here formed are probably between complexes of each as well as between simple mols. of each. From other considerations it was calcd. that 96% of the acid present was in the form of hydrated and solvated mols., and about 1% as associated mols. in a system in which all of the acids but one and H_2O were together considered the "solvent" for the other acid. The increase in the dissociation const. of an organic acid from concns. of 0.1 *N* to higher concns. cannot be due to viscosity changes alone, but may be explained by complex formation.

E. B. MILLARD.

Influence of temperature on the hydration and association of acids in benzene. BOHDAN DE SZYSZKOWSKI. *Medd. K. Vetenskapsakad.* 3, No. 10, 11 pp. (1915); cf. preceding absts.—The hydration increased with the temp. for the acids considered (salicylic, and *o*- and *m*-nitrobenzoic), at least over the temp. range 25 to 40°, since the solubility of H_2O in C_6H_6 increases with the temp. The hydrated mols. were also more dissociated at the higher temps., and this, together with the increased degree of dissociation of H_2O with increasing temp., explained why the increase of the real hydration const. was greater than that of the apparent const. These considerations are applicable only to cases of distribution between H_2O and a non-associated solvent.

E. B. MILLARD.

Solubility of electrolytes in salt solutions. BOHDAN DE SZYSZKOWSKI. *Medd. K. Vetenskapsakad. Nobelinst.* 3, No. 5, 26 pp. (1915).—Expts. have been made on the solubility of 1,3,5- $C_6H_3(NO_2)_3COOH$ in H_2O and in solns. of KCl , $NaCl$, KNO_3 and $NaNO_3$ of various concns., and of *m*-aminobenzoic acid in the same solvents. These data and others of de S. have been used to prove theoretically and experimentally that the increased solvent effect produced by neutral salts upon the solubility of sparingly sol. electrolytes (which lead generally to maxima of solubility at a given salt concn.) was

a natural consequence of double decompn. and of the increase of affinity constant caused by the presence of the salt. The abnormal increase of solubility of salicylic acid, and especially of $1,3,5\text{-C}_6\text{H}_3(\text{NO}_2)_3\text{COOH}$, in nitrate solns. was ascribed in part to an individual solvent action exerted by the salt itself, since the increase was too great to be due to metathesis or increase of affinity const. alone. E. B. MILLARD.

Radiometric measurements of the ionization constants of indicators. II. M. G. PAULUS, J. F. HUTCHINSON AND H. C. JONES. *J. Am. Chem. Soc.* 37, 1694-704 (1915).—An intensification of the red color of rosolic acid solns. completely transformed by the addition of alkali was found to take place when such solns. were allowed to stand, the time reaction being in all probability due to a slow union of the metallic phenolate with the quinoid complex. In rosolic acid solns. contg. a large excess of alkali a perceptible bleaching of the red color was also indicated. The ratio (C/C_0) of the red to the yellow component has been detd. for indicator solns. of various H ion concn., using the radiometric method developed in the previous article (cf. *C. A.* 9, 1265). From this ratio the values calcd. for the ionization const. of rosolic acid, assuming the indicator to be monobasic, decreased with decreasing alkalinity. When the H ion concn. was increased from 2.533×10^{-8} to 19.52×10^{-8} , the total salt concn. being 0.0259 *N*, the value of the ionization const. K_i was found to decrease from 5.65×10^{-8} to 2.89×10^{-8} . This variation of the consts. could be explained by regarding the indicator as a dibasic acid, and it was shown that the intensely colored form of the indicator was formed when the first H of the indicator was replaced by the base. E. B. M.

The apparent slowness of hydrolysis of ferric salts. A. QUARTAROLI. Univ. Pisa. *Gazz. chim. ital.* 45, I, 139-52 (1915).—Certain reactions in aq. solns. are not fast enough to be considered instantaneous. The hydrolysis of salts requires relatively considerable time. The soln. obtained on dilg. such salts only comes to equil. after weeks or months. Thus the HCl increases, the color changes and the Tyndall effect becomes gradually more marked with time when a conc. FeCl_3 soln. is dild. Goodwin (*Z. physik. Chem.* 21, 1 (1896)) studied the case of FeCl_3 and concluded: (1) that the mol. cond. of the solns. increases with time and the velocity of increase increases rapidly with the dilm., (2) that the increase in cond. is not immediate but begins after a period that increases with the conc., and (3) that the period necessary to reach equil. increases enormously with the conc. G.'s explanation may be expressed thus: $\text{Fe}^{++} + \text{H}_2\text{O} \longrightarrow \text{FeOH}^+ + \text{H}^+$ and $x(\text{FeOH}) + 2x(\text{OH}) \longrightarrow (\text{Fe}(\text{OH})_3)_x$, in which the formation of the colloidal $\text{Fe}(\text{OH})_3$ seems to accelerate the whole process. Wagner (*C. A.* 8, 2644) suggested that colloidal $\text{Fe}(\text{OH})_3$ is formed at once, but that the course of the re-action is modified by a diminution in the degree of its dispersion. Neither G.'s nor W.'s interpretation permit of a direct demonstration. Q. proposes to study these questions by utilizing the magnetic properties as described recently. The Fe must be in the form of ions. Fe^{++} compds. in nondissociating solvents or in the colloidal form fail to show magnetic properties in soln. By the use of Quincke's method and the author's own modification previously described, comparable results were obtained. The intensity of the electromagnetic field was detd. by means of the variations of the resistance in a Bi spiral measured with a Wheatstone bridge or galvanometer. The field intensity was detd. with various current intensities and a curve was constructed so that with a known current a known field would be produced. The field used varied from 10000 to 25000 gauss. The methods of exposing the solns. and of comparing results were the same as those used previously. The magnetic susceptibility of the solns. of FeCl_3 of various concns. was detd. immediately after prepn. and at certain intervals until the values became constant, indicating that hydrolytic equil. had been reached. The elec. cond. for similar solns. at the same intervals was detd. The magnetic susceptibility detd. was corrected against that of H_2O . The H-ion conc. in the soln. when

equil. had been reached was detd. by the ethyl diazoacetate method. The expts. were all done at 25°. A conc. soln. of pure FeCl_3 was prepared. The Fe and Cl were detd. and enough HCl added to make the ratio 1:3. This soln. contained 110.36 g. FeCl_3 (0.6802 mol.) per l. and was used in all expts. Five cc. were used in each case and dild. to the degree required. Solns. of 0.06802 (5.8% hydrolyzed at equil.), 0.03401 (24.2% hydrolyzed), 0.01360 (45.6%), 0.00680 (60%), 0.00340 (78%), 0.001360 (91%), 0.000545 (94.8%), 0.000109 (94.8–100%) and 0.000054 mol. conc. were studied. The period at the end of which the final observation was made for the first 7 was 3 mos., 1 mo., 20 days, 7 days, 5 days, 2 days and 6 hrs., which indicates something of the relative rates of hydrolysis. At a dild. of 0.000054, at which other authors have pronounced the hydrolysis complete, Q. found that the magnetic susceptibility was still faintly positive, from which he concludes that not all of the Fe is in the colloidal state. Another series of expts. was carried out in which the effect of the addition of 10 cc. conc. HCl to 5 cc. FeCl_3 soln. before the above dilds. were prepared was studied. With the more dil. solns. the HCl did not produce any appreciable difference in the hydrolysis. A 3rd series of expts. was treated with K_2SO_4 to coagulate the colloidal $\text{Fe}(\text{OH})_3$. In these cases the hydrolysis was more rapid but the negative susceptibility at equil. was the same as when K_2SO_4 was absent. The results are discussed and are found to be contrary to Goodwin's results and in general support those of Wagner. The latter's explanation is modified somewhat by stating that the Fe is not all present in the colloidal form but is partly present as basic FeOHCl_2 and $\text{Fe}(\text{OH})_2\text{Cl}$, which cannot be much dissociated electrolytically. The general interpretation of the noninstantaneous hydrolysis of FeCl_3 is as follows: Immediately after the dild. the hydrolyzed portion of the salt is composed partly of FeOH^+ ions (and possibly $\text{Fe}(\text{OH})_2^+$) and partly of amicroscopic, colloidal granules of $(\text{Fe}(\text{OH})_3)_x$ or highly basic chlorides, the latter having a high degree of dispersion. These with their enormous surface adsorb a large amt. of HCl. Contrary to Goodwin's hypothesis the amt. of colloidal $\text{Fe}(\text{OH})_3$ remains unaltered from the beginning to the end of the reaction, but the degree of dispersion and thus the surface is diminished and part of the HCl is liberated. As the dild. increases the fraction of the hydrolyzed part consisting of ordinary ionized mols., FeOH^+ , $\text{Fe}(\text{OH})_2^+$, etc., increases in comparison with that existing in the colloidal state. Various authors have stated that in a soln. of 0.000054 mol. conc. FeCl_3 is completely hydrolyzed and exists wholly in the colloidal state, but by means of Q.'s sensitive method for detg. the magnetic susceptibility it is shown that this statement is incorrect. The failure of the $\text{K}_4\text{Fe}(\text{CN})_6$ reaction at this dild. and its appearance when HCl is added are not decisive observations, since even these authors do not believe that the reactions of Fe^{++} are the same as those of the ions FeOH^+ or $\text{Fe}(\text{OH})_2^+$.

E. J. WITZEMANN.

The significance of the dependence between magnetic susceptibility and dissociation. Association between ions and solvent. A. QUARTAROLI. Univ. Pisa. *Gazz. chim. ital.* 45, I, 153–60(1915); cf. preceding abstr.—It has been found that magnetic substances in dissociating solvents give solns. which are paramagnetic or less diamagnetic than the solvent. Magnetic substances in EtOH or Et_4O do not show any magnetic action. Thus the solvent and the dissociated part of the compd. seem to control the magnetic properties. The magnetic susceptibility should therefore increase with dild.; this has been verified variously. A similar increase was noticed (*l. c.*) in soln. to which HCl had been added in order to prevent hydrolysis. These statements may possibly only be true for dil. solns. since the presence of complex compds. and ions may complicate the explanation in these cases. The union of CN or O with the magnetic ion diminishes or destroys the strong atomic susceptibility. The results of this earlier work indicate a well defined relation between magnetic susceptibility and

electrolytic dissociation. The action of a magnetic field on a magnetic disperse system is discussed for the cases in which the disperse phase consists of (1) macroscopic granules, (2) micro- and ultramicroscopic granules, (3) amicrons and nondissociated mols., and (4) ions. When the suspension in case (1) is placed between the poles of a powerful electromagnet, the granules will be attracted and will move through the liquid toward the poles. Thus if to a dil. soln. of FeCl_3 a little K_2SO_4 is added the granules of $\text{Fe}(\text{OH})_3$ formed will not be attracted at first but when they have increased sufficiently in size a slight attraction occurs. In discussing case 2 it is imagined that the granules are spheres 1 mm. in radius. If these are reduced to 1μ in radius the surface is increased 1000 times and the movement of these particles will be much less in the same field. The relation of Stokes' law to this case is discussed; it is found to apply, from which it is found that the velocity of the 1 mm. particles is 1,000,000 times that of the 1μ particles. For particles with a radius of 10μ the velocity would be 10^{10} less than that of the 1 mm. particles. The same reasoning applies even more strongly to case 3 and a variation in the conc. when in the field is even less possible. In case 4 no variation in the conc. takes place under the influence of the field. The whole liquid undergoes either attraction to the poles or with the dil. soln. less than is exerted on the solvent alone. Thus the ions behave as though rigidly connected with the solvent. Disregarding the mols. of H_2O of hydration the ions are surrounded by an extensive layer of H_2O mols. which are turned with the oppositely charged face toward the ion and are held by electrostatic force. It is for this reason that a magnetic force acting on the individual Fe ions acts on the whole FeCl_3 soln. and placed in a magnetic field acts paramagnetically, but when filled with a nondissociated soln. of colloidal $\text{Fe}(\text{OH})_3$ the effect is absent.

E. J. WITZEMANN.

Catalysis. XIX. Reactions of both the ions and the molecules of acids, bases, and salts. Conductivity and ionization of sodium ethylate, potassium ethylate, lithium ethylate, sodium phenolate, potassium phenolate, sodium phenylthiouazole, sodium iodide, sodium bromide and mixtures of these electrolytes in absolute ethyl alcohol at 0, 25 and 35°. H. C. ROBERTSON, JR. AND S. F. ACREE. *J. Phys. Chem.* 19, 381-432 (1915); cf. *C. A.* 7, 3125.—Cells of dumb-bell shaped cross section, and other forms were used, the object of the constriction being to give the cell a greater resistance. In some of the cells the constricted portion was smaller than the electrodes. For cells of very small resistance, Pt cylinders of different sizes arranged on concentric axes were used. Solns. were prepared by vol. at 25° and corrected for vol. changes at 0 and 35°. Good commercial chemicals were used without purification for the expts., with the exception of EtOH and PhOH, which were distd. and dried. Temp. coeffs. of cond. were practically the same for all salts, 2.65% per degree from 0 to 25°, and 2.8% per degree from 0 to 35°. Duplicates generally agreed within 0.5%. Electrolytes in alc. cause a much larger increase in viscosity than the same salts in H_2O . The viscosities are additive for mixed electrolytes when the total conc. is not more than 0.5 *N*; at higher concs. the viscosities and conds. are smaller than the values calc. from the mixt. law. The cond. ratio without a viscosity correction gives a better value for the degree of dissociation than the ratio corrected for viscosity according to Noyes, Washburn, and others, though neither ratio gives a good value over 1.0 *N* concn.

E. B. MILLARD.

Relation between affinity constant and catalytic activity of an acid. H. S. TAYLOR. *Medd. K. Vetenskapsakad. Nobelinst.* 3, No. 1, 9 pp.; cf. *C. A.* 8, 2096.—No formulation of the exact mechanism of catalytic hydrolysis can be given on account of the uncertainty as to the degree of dissociation of the catalyte. This is due to lack of knowledge as to corrections for viscosity and similar properties. A plot of $\log K_m : \log K_H$ against log affinity const. was drawn through the origin and was best shown by a straight line

most nearly dividing the points into 2 groups, rather than by a line convex toward the affinity const. axis and more or less asymptotic to it. The slope of this line was 0.5, or, $2 \log K_m : \log K_H = \log A.K.$ Then if c' is the conc. of the H ion and c is that of the undissociated mols., $K_m^2/K_H^2 = c'^2/c^2$. The results of Dawson and Powis (*C. A. 8*, 1373, 2293) in general confirm this conclusion though the relation $K_m : K_H = 0.1$ was not very close. D. and P.'s data show 0.5 for this relation. The strength of the acid is probably the detg. factor in this catalytic ratio, and deviations from the equations above are to be sought for in the variations of the nature of the reaction studied. As before, it was stated that the catalytic ratio varied somewhat with the reaction which was being catalyzed.

E. B. MILLARD.

Activity of the undissociated molecule in ester catalysis. EVA RAMSTEDT. *Medd. K. Vetenskapsakad. Nobelinst.* 3, No. 7, 33 pp. (1915).—Detns. have been made of the degree of dissociation at different concns. of β -naphthalenesulfonic, trichlorobutyric, and cyanoacetic acids and H_3PO_4 and of their Na salts, by the conductivity method. The rate of hydrolysis of EtOAc by each of the acids at various concns., with and without the presence of the corresponding Na salt, has also been detd. The hydrolytic activity could be represented by the equation of Sneath and Taylor: $R = n_H K_H + n_m K_m$, where R was the reaction const., n_H and n_m were the concns. of the ion and the undissociated mol., and K_H and K_m their respective catalytic activities. By comparing the exptl. data for different concns. of acid, with and without salt, fairly concordant values of K_m and K_H were found for each acid, K_H being nearly equal for all acids and K_m always depending on the nature of the undissociated mol. The ratio $K_m : K_H$ was 0.98 for β -naphthalenesulfonic acid, 0.055 for trichlorobutyric, 0.003 for cyanoacetic and 0.01 for H_3PO_4 . Assuming (with Szyszkowski) that the increase of dissociation const. with concn. was due to the effect of the undissociated mol., it was shown that the effect was greater for larger values of the ratio above. This was considered important for the strong acids for which the simple rule that $K_m : K_H$ grows with the dissociation const. cannot be applied.

E. B. MILLARD.

The allotropy of cadmium. V. The heat of transformation: $Cd_\alpha \rightleftharpoons Cd_\gamma$. ERNST COHEN AND W. D. HELDERMAN. *Utrecht. Verslag Akad. Wetenschappen* 23, 1015-19 (1914).—It has already been pointed out in connection with the thermodynamics of normal Cd cells that this metal may exist in various allotropic modifications (cf. *C. A. 9*, 1267). In order to measure the heat of transformation of Cd_α to Cd_γ , cells containing each variety of Cd were made up according to the following plan: $Cd | CdSO_4 \text{ soln.} | Cd \text{ amalgam}$. Measurements of the e. m. f. (E) and the temp. coeff. of E for each cell were sufficient for the calcn. of the heat of transformation by means of the well-known Gibbs-von Helmholtz equation. It was thus found that 1 g. atom of Cd_α goes over at 18° into Cd_γ with an absorption of 739 g. cal. By extrapolation of the results the metastable inversion $Cd_\alpha \rightleftharpoons Cd_\gamma$ would appear to take place at 95° .

L. H. ADAMS.

Solubility curves of salt hydrates: calcium nitrate. H. S. TAYLOR AND W. N. HENDERSON. *J. Am. Chem. Soc.* 37, 1688-94 (1915); cf. Basset and Taylor, *C. A. 6*, 2044, and D'Ans and Siegler, *C. A. 7*, 2002.—The satd. solns. analyzed were prepared from supersatd. solns. by inoculation with a small crystal of $Ca(NO_3)_2 \cdot 4H_2O$ and then allowing the solns. to stand until equil. was attained at the desired temp. It was possible to obtain solid unstable $Ca(NO_3)_2 \cdot 4H_2O$ in equil. with the soln., and to show that the solid phase was the unstable hydrate by inoculation of the system with a small crystal of the stable hydrate, when more solid sepd. from the liquid phase. The results have been plotted with those of Basset and Taylor into the usual form of phase diagram. The solubility of the anhydrous salt at 25° agreed with that of B. and T. (l. c.) but not with that of D'Ans.

E. B. MILLARD.

Influence of temperature on the velocity of solution of magnesium in hydrochloric acid. W. BONDORFF. *Medd. K. Vetenskapsakad. Nobelinst.* 3, No. 8, 34 pp.(1915).—The velocity of the reaction was very small up to temps. of -20° ; it increased somewhat more rapidly then up to 20° , and from there up was nearly proportional to the temp. A sharp break in the velocity curve in the neighborhood of the f. p. of H_2O was not observed. The velocity of the reaction was also influenced by the concn. of the acid, this curve rising somewhat more rapidly than the concn. E. B. M.

Diffusion of gases through mercury vapor at low pressures, and the diffusion air pump. W. GADE. *Ann. Physik* 46, 357-92(1915).—For simultaneous diffusion of Hg and other gases from a flask (during exhaustion) the Stephan diffusion equation was confirmed. A pressure much lower than the pressure in the pump can be obtained in a flask by use of the pump if the tube between the vessel and the pump be cooled. When air-free H_2O vapor was maintained outside of a clay cylinder connected inside to a vessel, the pressure within the vessel dropped from 750 to 15 mm. when the H_2O was condensed at room temp. By combining this principle with a water pump, a Röntgen tube was exhausted until Röntgen rays were produced. E. B. MILLARD.

The diffusion coefficient of gases and the viscosity coefficient of gas mixtures. J. P. KUENEN. *Leiden. Verslag. K. Akad. Wetenschappen* 23, 1049-54(1915).—In this communication K. gives a further discussion of diffusion coeff. and viscosity coeff. of gases and mixts. (cf. C. A. 8, 1038, 2836). A slight mistake in K.'s former calcs. is pointed out and formulas are modified accordingly. L. H. A.

The influence of hydration and of the deviations from the ideal gas laws in aqueous solutions of salts on the freezing points and the boiling points. C. H. SLUTTER. *Verslag. Akad. Wetenschappen* 23, 920-30(1914); *Chem. Weekblad* 12, 178-208(1915).—The ionization coeff., i , of KCl, NaCl, $CaCl_2$, and $MgCl_2$, in aq. soln. was detd. at 0° and at 100° from cond. measurements at concns. varying from 0.0005 to 1.0 formula-wt. per 1000 g. H_2O . The values of i so obtained were compared with those derived from measurements of the f. p. lowering and b. p. increase, resp., for the same salts, at concs. from 0.01 to 1.0 formula-wt. per 1000 g. H_2O . The cond. detns. were carried out in the usual way, using a slide wire bridge, induction coil and telephone. The sp. cond. of the water used was 0.6×10^{-4} . The f. p. measurements were detd. by the method of Robertson and Walker, in which corrections for the influence of radiation and for other temp. effects are done away with. Temps. were measured with a Beckmann thermometer (nominal accuracy 0.001 $^{\circ}$). The b. p. detns. were obtained with an app. consisting of twin copper cylinders, one containing pure H_2O and the other the soln. under investigation. Simultaneous readings of the temps. in each were made by means of 2 Beckmann thermometers. The various results are compared with those of previous investigators and fair agreement found. The difference between the values of i obtained from cond. measurements on the one hand and from f. p. and b. p. detns. on the other hand are explained by S. by assuming (1) an increasing hydration of the salts in the following order: KCl, NaCl, $CaCl_2$, $MgCl_2$; (2) a decrease in hydration with rising temp.; (3) a deviation from the ideal-gas law for the osmotic pressure and therefore a deviation from Raoult's law for f. p. and b. p. changes. This is ascribed to the influence of the factors a and b in van der Waals' equation of state.

L. H. ADAMS.

Theoretical determination of the entropy-constant of gases and liquids. H. TETRODE. *Verslag. Akad. Wetenschappen* 23, 1110-27(1915).—From purely theoretical considerations T. develops a formula for detg. the entropy const. by calcn. of vapor pressure according to the methods of statistical mechanics. The next step is the application of these formulas to the calcn. of gas equilibria. T. concludes with a gen-

eral discussion of the significance of Boltzmann's conception of entropy in relation to various states of matter.

L. H. A.

Determinations of the ratio of specific heats of gases from the velocity of sound.

A. LÉVUC. *Compt. rend.* 160, 601-3(1915); cf. C. A. 9, 1870; *Ann. chim. phys.* [7] 17, 499.—Attention has been directed to 10 detns. of the ratio, in which gross errors have been made. By reversing the calcn., and computing the velocity of sound in these gases, values were obtained from 1250 m. per sec. for H to 481 m. per sec. for satd. H₂O vapor at 100° and 190 m. per sec. for satd. ether vapor at 22 cm. of Hg.

E. B. MILLARD.

The sol and gel state of gelatin solutions. I. Gelatinizing. II. Swelling. I. ARSZ. Koll. Beihefte 7, 1-90(1915).—A study was made of the viscosity of gelatin solns. at different temps. The gelatin used was purified by dialyzing in running H₂O for several days and then drying over H₂SO₄. It was dissolved at 50-60° in glycerol containing 32% H₂O. The viscosities were detd. with Ostwald viscosimeters. A battery of 7 viscosimeters were used so that the time could always be regulated to more than 2 min. The detns. were carried out in thermostats. It was found that a 10% soln. of gelatin maintained at 95° quickly decreased in viscosity. At 85° and 75° the viscosity decreased more slowly, while at 65° no change in viscosity could be noted after 24 hrs. From this it is seen that in gelatin solns. a chem. change takes place at high temps. which does not occur below 65°. This change is irreversible. Below 65° it was found that a gelatin soln. reaches an equil. which differs according to the temp. The equil. for a given temp. can be found by detg. the change in viscosity of 2 gelatin solns., one being cooled from a higher temp. and the other being warmed from a lower temp. The curves for the changes of viscosity will approach a point characteristic for that temp. and can be calcd. The changes in viscosity below 65° are reversible and are due to differences in inner compn., depending on whether or not the soln. has been agitated. At higher temps. the equil. is reached more quickly than at low temps. The relation between the Tyndall phenomenon and temp. was also studied (cf. C. A. 8, 1039). For the method reference must be made to the original. To compare the results with the above viscosity expts. solns. of gelatin in glycerol and H₂O were used. It was found that in a soln. which is cooled from 70° to room temp. the intensity of the dispersed light gradually increases. The gelatinizing of the soln. has no effect on the results. The intensity of the Tyndall phenomenon is dependent on the temp. at which the detn. is made and the thermal history of the soln. At higher temps. the results are high, while at lower temps. they are low. At const. temps. the intensity of the dispersed light increases or decreases according to the previous treatment of the soln. An equil. could be obtained only at higher temps. The results are explained as being due to the different sizes of the particles at different temps. The swelling of gelatin in H₂O was detd. by immersing sheets in H₂O kept at the required temp. in thermostats and detg. the increase in wt. from time to time. The rate of swelling of dry gelatin in H₂O is very rapid at high temps. so that the gelatin goes into soln. in a very short time. Below 30° the swelling is slower. The curves of swelling at 2° and 12° show that most of the swelling takes place during the first hour and that after that the increase in wt. is very slow; no equil. was reached even after 3 weeks. The rate of swelling depends on the thickness of the gelatin and also on its water content. In the case of gelatin containing water it was also found that the age of the gel has a great influence on the swelling. A freshly gelatinized 20% gel, at 20°, increased very much more quickly than the same gel which had been kept out of water for 3 days at 20° and then immersed in water at 20°. The same results were obtained at 10°. If a gel which is at equil. at 20° is cooled to 10° it takes up water faster than before. In the swelling of gelatin the water changes the size of the gelatin particles and probably decreases the attraction of the particles for each other.

W. F. ZIMMERLI
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Relation between "limiting value" and concentration of arsenic trisulfide sols. H. R. KRUYT AND J. VAN DER SPEK. *Verslag Akad. Wetenschappen* 23, 1104-9(1915).—Previous communications by K. and others (cf. *C. A.* 8, 543) have dealt with the limiting value of the amt. of various electrolytes which may be added to certain sols without causing flocculation. The present communication is an account of expts. on the flocculation of As_2S_3 sols of varying concn. by means of KCl, BaCl₂ and $KAl(SO_4)_2$. The As_2S_3 sols were prepd. by the method of Schulze, and varied in concn. between 5 and 75 g. per 1000 g. H_2O . It was found that the "limiting value" of K concn. was practically independent of the concn. of As_2S_3 , while those for Ba and Al were nearly proportional to As_2S_3 concns.; this value was much less for Al than for Ba and less for Ba than for K. L. H. ADAMS.

Mercuri-organic colloidal compounds. III. M. RAFFO AND G. ROSSI. Univ. Bologna. *Gazz. chim. ital.* 45, I, 132-9(1915).—In a preceding paper (*C. A.* 7, 1259, 1724) colloidal pentamercuriacetanilide was described. Colloidal tetramercuriacetanilide has also been obtained (cf. *C. A.* 8, 2775). Both of these compds. are formed in solns. contg. AcOH and the presence of AcOH is necessary for their colloidal stability. Expts. showed that there exists between the colloids tetra- and pentamercuriacetanilide and AcOH, which is formed with them, a peculiar elec. equil. completely analogous to that existing in solns. of colloidal S, between the colloid and the crystalloids H_2SO_4 and Na_2SO_4 ; it manifests itself by a diminution of the elec. cond. of the crystalloids of formation. Addition of a crystalloid capable of coagulating the colloid is accompanied by a decrease of the cond. due to the transference of elec. charges from the coagulating crystalloid and from the crystalloids of formation to the colloidal particles. E. J. WITZEMANN.

Some further experiments with liquid drops and globules. C. R. DARLING. *Proc. Phys. Soc. London* 26, 118-9(1914).—Several descriptive expts. P. D. F.

Transition from ordered to turbulent flow in capillary tubes. II and III. WALTHER SORKAU. Buenos Aires. *Physik. Z.* 16, 97-101, 101-2(1915); cf. *C. A.* 7, 435, 2001, 3559, 3695; 8, 2832; 9, 17.—Data for H_2O , benzyl alc., Me_2CO , $EtOAc$, and CCl_4 at several temps., and by using the app. previously described, have been taken. The results are shown in numerous diagrams. There is usually a sharp break from Hagen turbulence to the second type of turbulent flow. The critical velocity is detd. only by the diam. of the capillary tube. E. B. MILLARD.

Boundary film between a liquid and its saturated vapor. C. A. MEBIUS. *Physik. Z.* 16, 121-7(1915).—Theoretical. E. B. MILLARD.

Influence of time on the solidity of colophonium and colophonium-wax mixtures. F. HAUSER. *Verh. deut. physik. Ges.* 17, 95-103(1915).—During 70 days the pure substance and the wax mixt. remained unchanged, within the limits of the expts. The brittleness of pure colophonium decreases on standing, but that of the wax mixt. increases on account of the crystn. of the wax. Both materials exhibit a peculiar behavior on standing for a long time in H_2O , but no explanation was offered for it. E. B. M.

Organic liquids and alkaline solutions. T. J. TWOMEY. *J. Phys. Chem.* 19, 360-2(1915).—Drops of $CHCl_3$ or CCl_4 when allowed to fall into H_2O or H_2SO_4 were spherical and coalesced easily. If added to NaOH or if the H_2SO_4 was made alk., the drops flattened and did not coalesce easily. Air bubbles formed on the drops, apparently because air was drawn from the soln. by the organic liquid. No explanation of the effect is offered. E. B. MILLARD.

Velocity of crystallization from aqueous solutions. N. P. CAMPBELL. Kandy, Ceylon. *J. Chem. Soc.* 107, 475-80(1915).—The method employed was to hang in a slightly supersatd. soln. of K alum 2 weighed crystals of alum as nearly perfect as possi-

ble. The soln. was stirred while the temp. fell slowly, and the crystals grew regularly and rapidly. No attempt was made to regulate the temp. other than to take advantage of the difference between day and night temps. to produce supersatn. The crystals did not grow according to the law $m = kt$ (m = mass of crystal and t = time), as found by Richards and Archibald for small crystals growing in highly supersatd. solns. (*Am. Chem. J.* 26, 61(1901)), but according to the results of these expts, $m^{1/3} = kt$. Addition of portland cement to the alum soln. caused complete suppression of the octahedral faces, and the appearance of cubic crystals which grew as rapidly as the octahedral crystals. When these cubes were recrystd. from H_2O they assumed again the octahedral form. In a soln. supersatd. with both alum and $K_2Cr_2O_7$, an alum crystal and one of $K_2Cr_2O_7$ grew side by side with perfect faces. E. B. MILLARD.

Anomaly of the viscosity coefficients of anisotropic liquids. R. SCHACHENMEIER.
Ann. Physik 46, 569-76(1915).—Mathematical. E. B. MILLARD.

Molecular resistance encountered by a plate moving in gas. MARTIN KNUTSEN.
Översigt K. Vidensk. Selsk. Forh. 1914, 311-27; *Ann. Physik* 46, 641-56(1915).—After a theoretical calcn., expts. were performed upon two moving plates, one moving at right angles to the plane of rotation, the other moving parallel to the plane. By first measuring the angle of rotation in a vacuum and then in various gases, it was found that the exptl. numbers corresponded closely with the theoretical. P. M. GLASOR.

Measurement of very low temperatures. XXIII. The vapor pressure of hydrogen from the boiling point down to near the triple point. H. KAMMERLINGH ONNES and W. H. KERSOM. *Proc. Akad. Wetenschappen Amsterdam* 16, 440-5.—Discrepancy between the heat of vaporization of H at the b. p. found by expt. and by calcn. from the Clapeyron-Clausius equation led to a repetition of the exptl. work on the part of the authors. Temps. were measured by a Pt resistance thermometer recently compared with a H thermometer. Observations covered the range -252.63° to -258.31° and extrapolation over 0.80° on the calibration of the Pt resistance thermometer gave -259.14° as the triple p. with a pressure of 5.07 cm. Observations with much and little liquid corresponded to a temp. interval of 0.003° , well within the limits of exptl. error. The triple p. was read from the temp. of the bath when the first crystals became visible in it. The curve which represents $\log p$ as a function of $1/T$ is slightly concave upwards, thus differing from that of Travers and Jaquerod (*Trans. Roy. Soc. London (A)* 200, 155(1902)), which is slightly convex upwards. The b. p. was found to be -252.76° . This agrees with that found by Travers and Jaquerod (*loc. cit.*). The heat of vaporization of H at a pressure of 75.15 cm. from the Clapeyron-Clausius equation gives 105.5 cal. while that found by the direct measurement above at the smallest velocity of vaporization gave 110.2 cal. This high result may be due to the condensation of vaporized H within the calorimeter. It agrees essentially with Onnes' previous result. J. W. SHIPLEY.

The ice calorimeter. With remarks on the constancy of the density of ice. EZER GRIFFITHS. Univ. Wales. *Proc. Phys. Soc. London* 26, 1-14(1913). Discussion. *Ibid* 14-5.—The mean value of the Bunsen calorimeter const. was found to be 15.486 mg. Hg per mean cal., i. e., mass of Hg drawn into the instrument by addition of 1 mean cal. Errors due to progressive freezing or thawing of the ice mantle were greatly diminished by suspending the calorimeter within a transparent vacuum vessel of cylindrical form, the stem and capillary of the calorimeter projecting through a rubber stopper, and the vacuum vessel being completely embedded in powdered ice. Various observers have found that the density of ice at 0° is not const. A consideration of their work leads to the conclusion that the small variations observed may be due to occluded water or an amorphous modification cementing the ice crystals together. The value

of the latent heat fusion (80.30) calc. from the calorimeter const. supports this view, as it is higher by about 0.7% than the value obtained by direct detns. with ice in bulk.

PAUL D. FOOTE.

The thermal expansion of mercury and fused silica. F. J. HARLOW. *Cass Tech. Inst. Proc. Phys. Soc. London* 26, 85-94(1914). Discussion. *Ibid* 94-6.—Fused silica bulbs containing Hg were heated in an oil bath and the overflow of Hg weighed. The following values were obtained for the differential expansion coeff. ($\times 10^6$) of Hg in silica: From 0° to 30, 50, 75, 100, 140, 184, 200, 250, 300°: 18060, 18068, 18081, 18102, 18150, 18220, 18248, 18356, 18489, resp. The linear coeffs. ($\times 10^6$) of expansion of silica detd. by Callendar for above temp. ranges are as follows: 35.8, 39.6, 43.4, 46.6, 50.5, 53.9, 54.9, 57.6, 59.8. Expt. shows that silica is isotropic; hence cubical expansion is 3 times linear expansion. Using Callendar's values, the abs. coeffs. ($\times 10^6$) of expansion of Hg for the above temp. ranges are: 18168, 18188, 18213, 18244, 18305, 18387, 18419, 18537, 18678, resp. These results differ from detns. by the abs. method by other observers. Sears, in discussion, gives a recomputed table of Harlow's values for Hg based on expansion of silica detd. by other investigators.

PAUL D. FOOTE.

Relation between temperature coefficient of expansion of solid substances and the temperature. S. VALENTINER AND J. WALLOT. *Ann. Physik* 46, 837-67(1915); cf. *C. A.* 9, 12.—Detns. have been made over the temp. range from 0° to liquid air or liquid H temps. on the coeff. of temp. expansion of quartz glass, invar, Pt, Ir, Rh, CaF₂, and pyrite, and the results have been discussed in the light of the Nernst-Lindemann formula for sp. heats of solid substances. The temp. coeffs. of the substances bear a relation to temp. similar to the N.-L. formula for sp. heat, and the former may be calcd. from the latter with an error of $\pm 1\%$. The relation could also be expressed as $\log \alpha_{T_1} - \log \alpha_{T_2} = \log \varphi(\beta v/T_1) - \log \varphi(\beta v/T_2)$.

E. B. MILLARD.

Relation between the physical quantities c , β , δ , and E for solid elements. J. KLEBER. *Ann. Physik* 46, 1054-6(1915).—The relation was obtained by eliminating v from the equations $v = 57.698 (c/\beta)^{1/2} - 637$ and $v = 99.04 (E/\delta)^{1/2}$. E was the modulus of elasticity of the element, δ its density, c its sp. heat, β the linear coeff. of expansion and v the velocity of sound in the substance.

E. B. MILLARD.

Investigations on the temperature-coefficients of the free surface-energy of liquids between -80° and 1650°. VII. The specific surface-energy of the molten halides of the alkali metals. F. M. JAEGER. *Groningen. Verslag Akad. Wetenschappen* 23, 611-27(1914).—The surface tension of a number of molten salts of the alkali metals was detd. with the same app. which has been previously used for other liquids (cf. *C. A.* 9, 738). The necessary measurements of the d. of the various salts as a function of temp. required for the calcn. of the molar surface-energy have not yet been completed and will be published later. The variation with temp. of the specific surface-energy in ergs/cm². (χ_t) of all the salts may be represented by the expression $\chi_t = a - b(t - t_s) + c(t - t_s)^2$ in which t_s is the m. p. and a , b and c are constants. The values of t_s , a , b and c , resp., of the various salts are as follows: LiF, 840, 255.2, 0.126, 0; LiCl, 608, 140.2, 0.076, 0; NaF, 990, 201.6, 0.106, 0; NaCl, 801, 114.1, 0.071, 0; NaBr, 768, 106.5, 0.069, 0; NaI, 660, 88.2, 0.053, 0; KF, 858, 143.2, 0.087, 0; KCl, 780, 97.4, 0.072, 0; KBr, 734, 88.8, 0.070, 0; KI, 681, 78.3, 0.064, 0; RbF, 765, 132.0, 0.131, 0.00012; RbCl, 720, 98.3, 0.086, 0; RbBr, 685, 90.7, 0.069, 0; RbI, 642, 80.3, 0.065, 0; CsF, 692, 107.1, 0.088, 0.0004; CsCl, 646, 91.3, 0.077, 0; CsBr, 631, 83.6, 0.063, 0; CsI, 620, 91.6, 0.056, 0. From these results it is apparent that χ_t as a function of t is very nearly a straight line in all cases. This result may be contrasted with the previous measurements in organic liquids for which the curvature of the χ graph is usually quite marked. The following conclusions are drawn from the observations:

(1) in the case of the four halides of the same alkali metal the temp. coeff. b of χ decreases continually with increasing at. wt. of the halogen atom; (2) at the same temp. the value of χ for the same halide of all the alkali metals decreases gradually with increasing at. wt. of the alkali metal; at the same temp. χ for the four halides of the same alkali metal gradually decreases with increasing at. wt. of the halogen atom. The relations, however, do not possess a simple additive character. Finally, reasons are given for believing that the liquid Li salts possess a higher degree of molar complexity than the salts of the other alkali metals. VIII. The specific surface energy of various salts of the alkali metals. *Ibid* 627-40.—The results for these salts expressed as above in terms of t_s , a , b and c , resp., are as follows: Li_2SO_4 , 852, 224.4, 0.067, 0; Na_2SO_4 , 884, 196.3, 0.140, 0.00042; K_2SO_4 , 1074, 144.5, 0.066, 0; Rb_2SO_4 , 1055, 135.0, 0.087, 0.00007; Cs_2SO_4 , 1015, 113.1, 0.087, 0.00006; LiNO_3 , 254, 118.4, 0.063, 0; NaNO_3 , 312, 120.7, 0.063, 0; KNO_3 , 339, 112.9, 0.075, 0; RbNO_3 , 304, 109.4, 0.075, 0; CsNO_3 , 414, 92.0, 0.084, 0; LiBO_2 , 845, 264.8, 0.082, 0; NaBO_2 , 965, 201.6, 0.159, 0; KBO_2 , 964, 136.6, 0.310, 0.00053; Na_2MoO_4 , 687, 215.1, 0.121, 0.00009; K_2MoO_4 , 919, 152.5, 0.066, 0; Na_2WO_4 , 694, 204.4, 0.068, 0; K_2WO_4 , 921, 158.2, 0.083, 0; NaPO_3 , 620, 2095, 0.059, 0; KPO_3 , 820, 161.2, 0.069, 0 (up to 1275°). In all cases except the last the max. temp. reached was 1500-1600°. Inspection of these results shows that in most cases χ decreases with increasing at. wt. of the metal. L. H. ADAMS.

Surface tensions of water, methyl, ethyl and isobutyl alcohols, ethyl butyrate, benzene and toluene. T. W. RICHARDS AND L. B. COOMBS. *J. Am. Chem. Soc.* 37, 1656-76(1915).—The capillary tubes were carefully tested for uniformity of bore by measuring a Hg thread in different portions; only tubes in which the length of the thread varied less than 1 part in 2000 were used. Height of meniscus was read by means of a black shield held tangent to the meniscus. It was shown that when a fine glass rod was immersed in H_2O in the middle of a tube 20 mm. in diam., there was a "capillary" rise of 0.31 mm.; this was offered as the explanation of the wide differences between the detns. of surface tension by various workers with this method. In the app. here used the capillary did not dip into the liquid in the middle of another tube, but formed one arm of a U-tube, the other arm of which was a tube 38 mm. in diam. It is shown that at least this diam. is required if a flat surface is obtained in the middle of the tube. The limbs of this tube were fused to a stopcock which served to close both of them. The position of each meniscus was read with the app. in 4 different positions to eliminate errors from prismatic irregularities in the glass walls of the tubes. The surface tensions found were H_2O 72.62 dynes per cm. at 20°, C_6H_6 28.91, toluene 28.58, MeOH 22.61, EtOH 22.27, iso-BuOH 22.85, and Et butyrate 24.54. This preliminary work is to be followed by further data. E. B. MILLARD.

An experiment with the ion theory. F. SCRIBA. Darmstadt. *Z. physik. chem. Unterr.* 28, 94-5(1915).—A glass test tube about 1 in. diam. and 8 in. long has 2 electrodes fused in near the bottom, is half filled with pure H_2O and held in a clamp. A smaller tube with a small hole in the lower end passes through a cork and dips in the H_2O . The electrodes and a block of pure, dry rock salt held between 2 springs are connected in parallel with a d. c. of 110 v., an incandescent lamp being inserted beyond the connection. The lamp does not glow until a bit of the salt is dropped into the inner tube and begins to dissolve. J. H. MOORE.

Experiments with very strong thermoelectric currents. W. VOLKMANN. *Verh. deut. physik. Ges.* 17, 72(1915).—The heat from a Bunsen burner was sufficient to give rise to a current which operated an electromagnet of 10 kg. pulling force. By using a blast lamp, a current of 150 amp. could be generated. Details were not given. E. B. MILLARD.

Potential of silver against silver ion in concentrated solutions of potassium and of sodium chloride, and its relation to the activities of such solutions. G. S. FORBES AND F. O. ANDEREGG. *J. Am. Chem. Soc.* 37, 1676-85(1915).—Potentials have been measured at 25° for cells of the type Ag | dil. AgNO₃ | KNO₃ | AgCl in conc. MCl | Ag, where MCl was either NaCl or KCl at concns. between 0.38 and 3.9 N. Diffusion potentials were eliminated by the use of conc. KNO₃ in agar-agar. From the data, values of the activity of chloride ion have been calcd. The activity of chloride ion in relation to concn. decreases as concn. increases from small values up to 1.7 N, and the minima attained (0.385 and 0.394) are almost identical for both chlorides. These minima are not due to a decrease in the solubility product of AgCl but to a change of the Ag complex from M₂AgCl₂ to M₃AgCl₄. The solubility product of AgCl was assumed const., and evidence offered to show that its variation does not greatly affect the conclusions. The activities obtained by this method are always smaller than those from conds. except in the more conc. solns. of NaCl. The dissociation calcd. from them reaches a minimum at 1.7 N.

E. B. MILLARD.

The influence of organic bases on the potential of the hydrogen electrode. ARRIGO MAZZUCHELLI. *Univ. Rome. Atti accad. Lincei* 24, I, 139-43(1915).—The bases used were quinine, cinchonine, brucine, veratrine, coniine, hydrastinine, quinoline, lutidine, dimethylaniline, and phenylhydrazine as the sulfates. As was observed in the case of Zn, the addition of these bases make the potential of the H more nearly that of the noble metals. Quinoline and dimethylaniline have an especially strong effect as in the case of Zn. PhNHNH₂ probably acts as a depolarizer. Gelatin, saponin and starch have no effect.

E. J. WITZEMANN.

The electrical conductivity and fluidity of strong solutions. W. S. TUCKER. *Proc. Phys. Soc. London* 25, 111-24(1913).—Cond. and viscosity of CaCl₂ solns. were measured isothermally and at varying concns. for several different temps. Expressing concn. as the ratio of masses instead of by vol. (mols. solute per 100 mols. solvent) the relation between conc. and ratio of cond. to fluidity is linear except at low concn. The rate of decrease of cond. with decreasing temp. decreases.

PAUL D. FOOTE.

Influence of pressure on the electrical conductivity of pure metals according to a theory of E. Grüneisen. BENGT BECKMANN. *Physik. Z.* 16, 59-62(1915).—Grüneisen's equation for the elec. cond. of a metal as a function of its compressibility gives the correct order of magnitude for the pressure function, with the exception of Hg and Bi. It holds rigorously for Au, Ag, Cu and Al, and is to be considered as an approximation for all other metals.

E. B. MILLARD.

Influence of temperature and pressure on the electrical conductivity of palladium during occlusion of hydrogen. B. BECKMANN. *Ann. Physik* 46, 481-502(1915).—The first 30 vols. of H per vol. of Pd increase the resistance very greatly; from this to 925 vols. the ratio of resistance to initial resistance was $W'/W = a + bv$, where $a = 1.0292$ and $b = 0.000668$. Above 925 vols. of H the resistance increases more slowly and supersatn. has no effect. The cond. at 18° was almost a linear function of the at. % H; the pressure coeff. of resistance was also a linear function of the atomic % H.

E. B. MILLARD.

Influence of pressure on the electrical conductivity of tellurium. BENGT BECKMANN. *Ann. Physik* 46, 931-40(1915).—Te was melted into a capillary and there cooled. Pt wires fused into the ends of these Te wires served as electrodes. The expts. have been made on the resistance at 0° for pressures from 250 to 1500 atm. on several specimens. A plot between pressure coeff. and resistance at 0° was nearly a straight line. The resistance could be expressed as an exponential of the pressure.

Considerable variation between the various specimens was found; this complicated general treatment.

E. B. MILLARD.

Nature of electrical conduction as required to explain the recovery of resistance of metallic selenium following illumination. F. C. BROWN. *Phys. Rev.* [2] 5, 395-403(1915); cf. *C. A.* 9, 1424, 1427-8.—Assuming that the specific cond. varies as the number of electrons taking part in the conduction at that instant, that the electrons do not exist free in the sense of the kinetic theory of gases, but that under illumination they are rendered free (or unstable), and that the recombination of the freed electrons will take place according to the law governing the recombination of ions in gases, the rate of recombination may be expressed as $dN/dt = -aN^2$, where N is the av. number of electrons in the free state at any instant and a is the coeff. of recombination. Then if $i = kN$, $di/dt = -a'i^2$. The approx. form of the equation, $\Delta i/\Delta t = -a'i^2$ was verified, not the integrated form, since in the latter case when a large % of the electrons have combined, a non-uniform distribution of them causes a decrease in the coeff. of recombination. The value of a' was approx. const. for 0.05 sec. period of recovery. The coeff. of combination under different pressures varies inversely as the cond. ensuing from the pressure, and the evidence points to the view that the rate of production of electrons by light falling on Se varies directly as the same cond. resulting from the pressure effect. The coeff. of recombination varies with the potentials applied in such a way as to explain the deviations from Ohm's law. The voltage effect is thus identical with the pressure effect.

E. B. MILLARD.

Ionization. J. J. THOMSON. *Proc. Phys. Soc. London* 27, 94-117(1914).—Ionization is the process by which ions (particles charged with electricity) are produced in a solid, liquid, or gas. This paper considers ions in gases in regard to (1) the nature of the ions, (2) the process by which they are produced. The evidence as to the nature of ions is derived from expts. on their mobility which have shown: (a) The mobility of a positive ion depends only on the gas through which the ions are moving and not on the nature of the gas out of which the ions are formed. (b) The mobility of the ions in a gas at const. d. is independent of the temp. (c) There is a considerable number of gases in which the mobility is very approx. inversely proportional to the sq. root of the d. of the gas. (d) In the case of negative ions there is an abnormal increase of mobility when the pressure is reduced below a certain value, and there is some evidence that this is also the case for + ions at very low pressures. Two theories of the mobilities of ions are considered, one founded on the view that the action between ions and mols. is analogous to impacts between hard elastic spheres, the other on Maxwell's theory of forces between ions and mols. varying inversely as the 5th power of the distance between them. (a) follows from the 2nd theory provided the ion is a cluster whose mass is considerably greater than that of a mol. of the gas through which it is moving. It follows also from the 1st theory if all ions in a given gas are the same size. (b) follows at once from the 2nd theory; to explain it on the 1st theory requires that the size of the ion vary with the temp. in a definite manner. The necessary relation can be deduced from thermodynamical reasoning under certain assumptions. (c) requires on the 1st theory that the ions in these gases be the same size, on the 2nd theory that the gas mols. exert the same force on a charged point at a given distance. (d) follows on either theory if the ion dissociates at low pressures so that free corpuscles are present in the gas. The 1st stage of the process of ionization in the vast majority of cases consists in the detachment of an electron or corpuscle. Evidence as to the method by which this takes place is afforded by detns. of the velocity with which the electrons are ejected from the body. In the case of ionization by light or Röntgen rays this velocity depends primarily on the wave length of the radiation, not upon its intensity, nor on the nature of the mol. from which the corpuscle is ejected. This

velocity is far greater even when every allowance is made for resonance than can be accounted for if it is supposed that the energy of the light is uniformly distributed, and that the corpuscle acquires its velocity by the action on it of the elec. force in the wave. Another explanation not open to these objections is advanced. When ionization is due to the action of moving electrified particles, whether + or —, the results are quite different. The velocity of the ejected particles (δ rays) does not seem to vary much with the velocity of the particles which eject them, and is of the same order whether these particles are positive rays or the much swifter cathode rays. The method of ejection by the impact is considered, and suggestions given as to a possible theory and its consequences.—[AUTHOR'S ABST.]

PAUL D. FOOTE.

A lecture experiment to illustrate ionization by collision and to show thermoluminescence. F. J. HARLOW. *Cass Tech. Inst. Proc. Phys. Soc. London* 26, 55-9 (1913).—(1) A method is described for demonstrating to an audience ionization by collision and the reduction of the sparking potential by the presence of initial ionization. (2) CaO and AlPO_4 upon Pt, subjected while cold to an intense spark discharge, exhibit thermoluminescence, the CaO on being warmed giving out a golden yellow glow and AlPO_4 a blue glow. CaO on Ni or Al shows thermoluminescence but no effect was found for CaO on Cu. It seems probable that this phenomenon is connected with the elec. activity of salts and oxides upon metals.

PAUL D. FOOTE.

Force acting on the cathode during glow discharge. FRANK TUCZEK. *Physik. Z.* 16, 102-4 (1915).—The force exerted on the cathode during a glow discharge and its relation to the gas pressure over a range from 0.02 to several mm. of Hg has been measured with a rotating radiometer wheel and a torsion balance. The greater part of the force is due to thermoradiometric action which in turn is due wholly or partly to an electrostatic attraction. Its variations follow essentially those of the electrode potential. The relation of the force to current strength is complicated by a decided hysteresis; the curve shows breaks that are caused by forcing the negative glow through the wire net anode.

E. B. MILLARD.

Electron emission of a calcium oxide electrode in vacuum. WERNER GERMERSHAUSEN. *Leipsig. Physik. Z.* 16, 104-8 (1915).—In contradiction to the theory that a Wehnelt electrode could be active only by giving up gases and gradually exhausting the oxide film (on account of chem. reactions taking place in it), it was shown that the decrease of activity of a CaO electrode was caused by the residual gases just as with a W electrode. If a CaO electrode can act only by giving up gases, it should show (if the current has not risen to the impact-ionization value) a specifically smaller effect than a metal in a vacuum free from residual gases. By eliminating the residual gases from a CaO electrode, the const. b of the Richardson equation was considerably lowered, i. e., the electron emission was increased, and an effect obtained which was independent of the duration of the bombardment.

E. B. MILLARD.

Effects of different gases on the electron emission from glowing solids. FRANK HORTON. *Proc. Roy. Soc. London (A)* 91, 322-37 (1915); cf. *C. A.* 8, 3392.—The emission of electrons from lime or from a glowing Nernst filament is independent of the nature of the gas in the discharge tube, at least for air, O, N, and H. At low pressures the thermionic current from a given cathode under definite conditions was practically identical in all 4 gases. At higher pressures the thermionic currents vary, but an increased thermionic current does not necessarily mean an increased electron emission from the cathode; the large currents which are obtained at certain gas pressures, particularly with H, are the result of ionization of the gas mols. by collisions. O and H differ widely in their affinity for the material of an oxide cathode, so that the equality of the electron emission in these gases is evidence that the electrons are not produced by chem. action between the cathode and the surrounding gas. A Pt cathode produces

a genuine increase in the emission which appears to be brought about by the absorption of H by Pt. The exact manner in which the H acts is at present unknown, but Wilson (1908) has shown that the expts. can be explained on the supposition that the H atoms in the surface layer of the Pt are positively charged, and have the effect of lessening the work which an electron must do in order to escape from the metal. With an electrode like lime, or a Nernst filament, by which the H is not absorbed, the electron emission is unaltered by the presence of this gas. E. B. MILLARD.

Changes of mass of small mercury drops held in suspension in a gas. A. SCHIDLOF AND A. KARPOWICZ. *Physik. Z.* 16, 42-5(1915); cf. *C. A.* 8, 3141.—Droplets held between the plates of a condenser and made to move up and down were observed to have a gradually increasing time of rise and fall for a given distance. It was shown that the droplets were pure Hg, and that no other explanation could be found than a decrease in mass of the drops. E. B. MILLARD.

Derivation of the Planck-Einstein energy formula without the use of the quantum hypothesis. S. RATNOWSKY. Zürich. *Verh. deut. physik. Ges.* 17, 64-8(1915). E. B. MILLARD.

Light intensities of spectrographs and monochromatics. W. VOLEMANN. *Verh. deut. physik. Ges.* 17, 69-72(1915). E. B. MILLARD.

The principle of Hamilton in Einstein's theory of gravity. H. A. LORENTZ. *Verslag K. Akad. Wetenschappen* 23, 1073-89(1915).—Wholly mathematical. L. H. ADAMS.

The continuous spectra of gases. E. P. LEWIS. Univ. California. *Nature* 95, 394-5(1915); *Science* 41, 947-8(1915).—In photographs of the H spectrum obtained with a large two-prism spectrograph the continuous spectrum was frequently observed, extending in the ultraviolet to wave length of about 2100. The spectrum appeared to be uniformly continuous, and it is considered that its gradual fading out in approaching the wave length 2100 is due rather to the absorption of the thick quartz system than to the lack of these wave lengths in the emitted light. If the assumption is correct that the continuous spectrum is due to mol. collisions, then the number of collisions would depend mostly on the mean velocity of the mols. so that the number of collisions would rapidly diminish as the mol. wt. increases. This was found to hold true for H, He and Ne. With a 2 min. exposure the continuous spectrum of H was very intense, that of He about $\frac{1}{2}$ as strong, and that of Ne about $\frac{1}{3}$ as strong. N, Kr and Xe did not show any continuous spectra. It is pointed out that H tubes used in the way described may render excellent service as sources for the study of absorption spectra in the ultraviolet. W. H. ROSS.

The arc spectrum of gold referred to the international normals. MARIE QUINCKE. Bonn. *Z. wiss. Phot.* 14, 249-62(1915).—Using a concave grating, 6.5 m. radius, 20,000 lines per inch, dispersion in 2nd order 1 Å. per mm., C arc with Au in crater, 120 v., 5-6 amp., arc gap 6 mm., the arc spectra of Au and principle impurities were photographed and measured in the region $\lambda = 6700$ to 2300. Tables of intensity and comparison with data from other sources are given. PAUL D. FOOTE.

Measurements on the arc spectrum of manganese referred to the international normals. HANS FUCHS. Bonn. *Z. wiss. Phot.* 14, 239-48, 263-80(1915).—Using a Rowland concave grating, 6.34 m. radius, 20,000 lines per in., C arc with the + electrode bored out and filled with metallic Mn, 220 v., 6-10 amp., the arc spectrum of Mn was measured from 7070 to 2290. About 1200 lines are tabulated with intensities and detns. by other investigators. PAUL D. FOOTE.

Wave-number system of ruthenium. EMIL PAULSON. *Physik. Z.* 16, 81-4

(1915); cf. *C. A.* 9, 1426.—A table of 548 lines of Ru is shown. The lines consist of 65 groups of 18 lines each following each other at intervals. E. B. MILLARD.

Theory of the glow discharge. III, IV and V. RAGNAR HOLM. *Physik. Z.* 15, 782-3(1914); 16, 20-30, 70-81(1915); cf. *C. A.* 8, 1696. E. B. MILLARD.

Spectrum of gadolinium. E. PAULSON. Lund. *Physik. Z.* 16, 7-8(1915); cf. *C. A.* 9, 1426.—From Kayser's data, some regularities are found, a group of lines being repeated at intervals. E. B. MILLARD.

Criticism of the conception of an elementary quantum of electricity. (Analogous behavior of oil and metal particles in relation to electric charges and Brownian movement.) FRITZ ZERNER. Vienna. *Physik. Z.* 16, 10-3(1915).—A critical review. E. B. MILLARD.

Regularities in the platinum spectrum. EMIL PAULSON. *Ann. Physik* 46, 698-704(1915); cf. Kayser, *Abhandl. Berl. Akad.* 1897; *C. A.* 9, 1426.—Wave lengths are given for 175 lines, which belong to a group of 10 lines repeated 34 times. The strong line $\lambda = 3638.956$ must be double, for it comes in the 6th place in group 6 and the 3rd place in group 11. It fits equally well in both places. E. B. MILLARD.

Determinations of the active wave lengths of color filters. M. PIRANI AND W. W. LOEBE. *Verh. deut. physik. Ges.* 17, 47-62(1915); cf. *C. A.* 8, 3.—Expts. were made with a König spectrophotometer. Filters were "monochromatic" when, on moving 50μ from the max. permeability, the intensity of the transmitted light was 1% of that at the max. The calcd. max. agreed with the observed within 0.5%, except when the filter was near the limits of the visible spectrum. The best results were obtained in yellow-green light, which was accordingly stated to be the best for photopyrometric work. When a filter had several sharply defined maxima and minima, the max. permeability could be detd. only when the intensity at the highest max. was 10 times as great as at the nearest inferior max. When 2 maxima of about equal height are sepd. by a deep minimum, no effective max. can be detd. E. B. MILLARD.

Emission conditions for some band spectra of nitrogen and carbon. R. SEELIGER. *Physik. Z.* 16, 55-9(1915); cf. *C. A.* 8, 862. E. B. MILLARD.

Absorption spectra of various halogen derivatives of benzene and toluene as vapors and in solution. J. E. PURVIS. *J. Chem. Soc.* 107, 496-509(1915); *C. A.* 7, 564, 2215, 2348, 3444.—The considerable number of bands of *p*-C₆H₄Cl₂, *p*-C₆H₄Br₂, and of *o*-, *m*- and *p*-C₆H₄ClBr disappear in soln. and are replaced by a few moderately wide diffuse bands. There are differences between *o*- and *m*-comps. as compared with *p*-comps. which are more marked in the vapors than in soln. The marked absence of narrow vapor bands in phenylacetonitrile, BzCl and BzOH, the complete elimination of both vapor and soln. bands in *cyclo*-C₆H₄Cl₂, C₆Cl₆ and C₆Me₆, and the similarity of the vapor bands and soln. bands at higher temps. and pressures of comps. which exhibit a series of finer vapor bands at lower temps. and pressures are the remarkable features of the present expts. In soln. the solvent modifies the oscillations within the mol. so that on account of its external influence the number of individual bands is greatly decreased. A group of vapor bands seems to close up under the influence of the solvent to form a diffuse wide band, whereas in other instances the vapor bands are so weak that they practically disappear when the substance is in soln.

E. B. M.

Some temperature coefficients of refraction of optical glasses. J. W. GIFFORD. *Proc. Roy. Soc. London (A)* 91, 319-21(1915).—Data has been taken for 34 kinds of glass. E. B. MILLARD.

Part played by gases in the photoelectric behavior of zinc. HANS KÜSTNER. *Ann. Physik* 46, 893-930(1915).—Pure Zn, in the absence of active gases, gave no measurable photoelectric effect (see *C. A.* 8, 1382). A strong photoelec. effect was observable in presence of an active gas when the pressure was as great as 5×10^{-7} mm. of Hg, but no effect was produced by several thousand times this pressure of an inert gas. This behavior is in contradiction to the dielectric const. theory, according to which the effect should be zero only in an absolute vacuum. Also in contradiction to this theory was the fact that the photoelec. effect on a freshly cleaned surface did not appear until the pressure of H was raised to 16 times its previous value. Fatigue and recovery were both independent of the illumination over a wide range of currents.

E. B. MILLARD.

Photometry of vari-colored light sources. M. v. PIRANI. *Z. Beleuchtungsw.* 21, 41(1915).—An improved method is described.

C. G. F.

Diffusion and absorption of hydrogen in quartz glass. HERMANN WÜSTNER. *Ann. Physik* 46, 1095-1127(1915).—At 1000° and 3 atm., 0.06 cc. of H were taken up by the quartz surface, at 100° and 3 atm. only 0.0178 cc., and at 1100° 0.0342 cc., in 5 hrs. The absorption of H in quartz at 700 to 1000° was of the same order as the absorption of H_2O at room temp. At 1000° and 900 atm. the amt. of N taken up by quartz was only 0.003 cc. The expts. with O were abandoned because the hot O reacted with the Hg seals. It was not shown that the small amt. of N was not really a trace of O in the N being absorbed by the Hg. At the end of the O expt. nearly all of the O had combined with the Hg.

E. B. MILLARD.

Dispersion of electric double refraction. NIKOLAUS LYON. *Ann. Physik* 46, 753-84(1915).—The Kerr const. for CS_2 at 20° has been measured for 10 wave lengths distributed rather evenly between 460 and 670μ , with the mean value 1.13×10^{-11} and a probable error of about 4%. The dispersion of electrical double refraction was measured for several organic liquids by comparison with the CS_2 values. Values calcd. from the Havelock formula agreed with the exptl. values for substances with a large optical dispersion, but for Et_2O with its small elec. double refraction and weak optical dispersion the agreement was very rough.

E. B. MILLARD.

Theory of radiation. W. WIEN. *Ann. Physik* 46, 749-52(1915).—Theoretical.

E. B. MILLARD.

Result of plotting the separation of homologous pairs (of spectrum lines) against atomic numbers instead of atomic weights. H. E. IVES AND OTTO STUELMANN, JR. *Phys. Rev.* [2] 5, 368-72(1915).—The discrepancies between the linear relation of log. at. wt. to log. of the distance between the lines of a spectroscopic pair as found by Runge and Precht (*Phil. Mag.* 5, 476(1903)) form the basis of the discussion. If atomic numbers are plotted instead of at. wts. the source of the "unknown disturbing cause" of R. and P. is found to be the use of (non-significant) at. wts. of B and K in place of at. numbers. K and B fall on the straight line of the plot then, in place of being "exceptions." The discrepancy between the chem. at. wt. of Ra and that found by the calcns. of R. and P. was 13%. In the present method this discrepancy was reduced to 8%, i. e., the calc. at. number was 96, and the true number is 88; but Mg has been the cause of a fresh deviation. At any rate the relation between at. number and line sepn. is satisfactory enough to suggest a review of the exptl. work on the Mg-Ra group. The work is considered as further evidence in support of the theory of a nucleus atom.

E. B. MILLARD.

Infra-red transmission and reflection of a number of the aniline dyes. J. B. JOHNSON AND B. J. SPENCE. *Phys. Rev.* [2] 5, 349-58(1915); cf. *C. A.* 8, 3393.—Expts. have been carried out on the absorption and reflection of 25 dyes in the infra-red up

to 12μ , by making use of a special spectrometer (*Astrophys. J.* 39, 243(1914)) and the light from a Nernst glower. There is a similarity in the transmission curves for related compds., but the theory that certain groups in a chem. mol. give rise to definite absorption does not hold for these complex substances with any degree of consistency. The bands of max. reflection in general correspond with periods of weak transmission, though the evidence furnished does not seem to be conclusive in detg. whether or not these are bands of metallic reflection. In all probability they are not. E. B. M.

Distillation of liquid air in a magnetic field. R. S. McBRIDE. *J. Am. Chem. Soc.* 37, 1715-8(1915).—Samples of the gas coming off from a Dewar tube placed in a field of 10,000 lines of force per sq. cm. were compared with the gas from a similar tube contg. some of the same specimen of liquid air evapg. in the absence of a field. Less O came off during the early part of the distn. from the flask in the magnetic field, showing a tendency toward better sepn. in the field. Adding Fe filings to concentrate the field had no appreciable effect on the sepn. which was at best but little better than without the field. E. B. MILLARD.

3. RADIOACTIVITY.

WILLIAM H. ROSS.

Advances in the study of radioactive bodies. FREDERICK SODDY. *Pharm. J.* 94, 696-7(1915).—Report on 2 lectures. S. WALDBOTT.

Character and degree of the radioactivity of the "Kuvak" springs in Penza. P. P. VON VEIMARN. *J. Russ. Phys. Chem. Soc.* 46, 742-5(1914).—An exam. of the H_2O of the "Kuvak" springs gave the following results: The lower the situation of the springs on the slope of the hill, the greater is the radioactivity of the H_2O . The radioactivity is very feeble, and being due not to radioactive solids in soln., but to dissolved emanation, is dissipated slowly even in stoppered vessels, and very quickly if the container is frequently opened. An exam. was also made of commercial samples of H_2O of these springs sold under the name of "detonating ore." They were found to be entirely devoid of radioactivity, and are therefore medicinally worthless. H. M. G.

Radioactivity of the deposits from the Borzhom springs. E. BURKSER. *J. Russ. Phys. Chem. Soc.* 47, 21-5(1914).—Radioactive detns. showed that the deposits of the 2 springs examd. contain 10.08 and 17.89×10^{-13} g. of Ra, and 26.2 and 3.26×10^{-8} g. of Th per g. of deposit, resp. The waters of the springs contain 0.02 and 0.07×10^{-9} g. of Ra per l., while the Th content of the 2 waters is almost identical and amounts to 7.02×10^{-4} g. per l. H. M. G.

The spectrum of Röntgen radiation. A. SOMMERFELD. *Ann. Physik* 46, 721-48 (1915).—A mathematical paper showing that Röntgen radiation produced under a discharge of const. potential will be most intense in the longest wave lengths, while these wave lengths are absent if the potential is alternated. For the former case the max. lies in the infra-red; for the latter in the ultra-violet. But long wave-length radiation is readily absorbed by the radiator, especially in the presence of free electrons, so that the ordinary spectrum seems to be of the alternating potential type. G. L. WENDT.

Dispersion of Röntgen rays. P. DEBYE. Göttingen. *Ann. Physik* 46, 809-23 (1915).—An attempt to explain mathematically Friedrich's interference photographs on the basis of electron rings within the atom. With long waves the diffuse radiation is found to be proportional to the square of the number of electrons in the rings, but with shorter waves the value tends toward the first power. The space distribution demands a dipole in both cases. In the direction of the primary beam the radiation

remains proportional to the square of the number of electrons and shows interferences which are evident as rings in the Friedrich photographs. G. L. WENDT.

Radiations produced by Röntgen rays. J. LAUB. Buenos Aires. *Ann. Physik* 46, 785-808(1915).—The intensity of secondary rays is dependent on the angle of incidence of the primary X-rays on the radiator. With very fine leaves of Al or paper an angle of near 90° is necessary to produce any radiation. L. therefore supposes that the intensity of secondary radiation depends on the number of atoms traversed, the effect being one of bending or refraction. No connection was found between the variation of the intensity of the secondary rays with the angle of incidence and the polarization of the primary rays. New characteristic secondary rays from various elements were measured, the values for the absorption coeffs., $(\lambda/t)_{Al}$ being as follows: Zn, 18.5 and 5.6; Cu, 23.8; Pb, 16.2; Fe, 43.8; Pt, 21.5 and 7.2; C, 0.37; S, 0.21. These secondary rays from C and S are the most penetrating yet known. Their use instead of γ -rays in medicine is suggested. G. L. WENDT.

An emission law for homogeneous Röntgen rays. J. LAUB. Buenos Aires. *Verh. deut. physik. Ges.* 17, 104-8(1915).—An approximate law for the sp. absorption coeffs. of the elements for K-radiation is $(\lambda/t)_{Al} = 1663.5 \times 10^8/N^3$, where N is the atomic number. A more exact value for the elements Fe to Se is $(\lambda/t)_{Al} = 2836.8 \times 10^7/N^3$; for Br to Sn, $1768 \times 10^8/N^3$; and for Sb to Ce, $1164.7 \times 10^9/N^7$. For the L-radiation the value is nL/N^7 , where $L = 3606.8 \times 10^{11}$. For the newly measured rays from Cu, Zn, Pt, etc. (cf. preceding abstr.) the coeff. is nK/N^8 , where n is an integer between 1 and 7, and $K = 1138$. The new rays from C and S probably belong to a class of rays still harder than that of the K- or the L-series.

G. L. WENDT.

A metallic safety Röntgen tube. L. ZEHNDER. *Ann. Physik* 46, 824-36(1915); cf. C. A. 9, 1005.—This tube is unbreakable, allows no leak and gives a radiation 20 times as intense as that of the Gundelach tube. L. claims it can be made 1000 times as intense. An ordinary Gundelach cathode is set into the mouth of a heavy porcelain high voltage insulation tube, the heavy Cu lead wire passing through the tube, at whose other end is an iron valve for sealing after evacuation. A brass cylinder is set into the mouth of the porcelain tube, thus insulated from the cathode. Into the other end of the brass tube is fitted a screw system carrying the adjustable anticathode, a W block set into a massive Cu carrier. Opposite this is a small window in the brass tube covered by a hemisphere of thin glass. The brass case is also provided with a side tube containing charcoal which can be electrically warmed to give the exact regulation of the vacuum. The efficiency of the tube is due to the speed with which heat is carried away, all parts being massive. The electrodes may be water-cooled. The beam is sharply defined by the window. The intense radiation permits very brief exposures and gives very delicate contrasts such as the design on a coin. If the brass case is electrically earthed the tube may be handled while in use and brought close to the patient.

G. L. WENDT.

Spectrum investigations with Röntgen rays. I. ERNST WAGNER. Univ. München. *Ann. Physik* 46, 868-92(1915).—The sep. absorption of sections of the spectrum by Ag and Br renders a photographic measurement of the relative intensities of spectral regions precarious. The wave lengths at which absorption by various metals begins are sharply defined. Stokes' law, that the wave length of the primary exciting ray (λ_A) is shorter than that of the excited characteristic secondary ray (λ_a), is shown to hold for the α , β , and, in the case of Pd, for the γ lines, i. e., for the whole K-series. The "Stokes interval," λ_a/λ_A , is essentially const. for 8 elements. Similar expts. on Au and Pt with the L-series point to a similar relation there and to the universality of this fluorescence mechanism. W.'s measurements agree with Kossel's

(C. A. 9, 1715), development of Bohr's atom, viz., that the frequency of the K-line and that of the L-line added give the frequency of the absorbed primary radiation. More exactly, $\nu_{KA} = \nu_{K\alpha} + \nu_{L\alpha} + \nu_{M\alpha} + \nu_{N\alpha} + \dots$. Calcn. gives the frequencies for the various series as: K, 1.7×10^8 ; L, 0.22×10^8 ; M, 0.03×10^8 ; N, 0.007×10^8 ; O, probably, in the Schumann region. This is a geometric series with a factor of $1/8$ or $1/7$.
G. L. WENDT.

The influence of Röntgen rays on the condensation of water vapor. FRANZ STRIEDER. Univ. Marburg. *Ann. Physik* 46, 987-1008(1915).—In air or O the expansion ratio of 1.25, required by C. T. R. Wilson (*Trans. Roy. Soc. London* 189, 265(1897)) for the condensation of water vapor by gaseous ions, is necessary only if the condensation of droplets is to be produced, immediately upon exposure to the ionizing rays. Exposure for 1 min. to X-rays, from a tube operating at 12 amps., gives condensation at a very small expansion, while an illumination of 8 min. produces spontaneous condensation without pressure change. With 13 amps. only 3.5 min. are necessary. In oxygen-free N and H no condensation takes place below Wilson's expansion limit of 1.25. Following Bieber (*Ann. Physik* 26, 727 (1908)), S. attributes the effect to persistent hygroscopic nuclei of H_2O_2 formed after the production of at. O by the X-rays.
G. L. WENDT.

The distribution of electrons in atoms. ARTHUR H. COMPTON. Princeton Univ. *Nature* 95, 343-4(1915).—It has been shown by Bragg (C. A. 8, 2308) that in the spectra obtained when X-rays are reflected from rock-salt, the intensities of the higher orders rapidly diminish. From a study of the data thus established, C. concludes that the intensities of the different orders cannot be accounted for by assuming that the atoms in the salt crystal are made up of single rings of electrons, or by assuming a uniform vol. distribution of the electrons in spheres. A distribution which fits Bragg's data acceptably is an arrangement of the electrons in equally spaced concentric rings, each ring having the same number of electrons and the diam. of the outer ring being about 0.7 of the distance between the successive planes of atoms. It is pointed out further that if the trains of waves of the primary beam of X-rays are short compared with the distance which the rays penetrate the crystal, certain corrections have to be applied to the exptl. data, and on this assumption it can be shown that the av. distance of the electrons from the center of the atom is small compared with the distance between the atoms.
W. H. ROSS.

The distribution of the electrons in atoms. W. H. BRAGG. Univ. Leeds. *Nature* 95, 344(1915).—B. agrees with Compton (preceding abstr.) in ascribing the rapid decline in the intensities of the higher orders of the X-ray spectra to the fact that the atom should not be treated as a point, but as a distribution of electrons in space.
W. H. ROSS.

Pitchblende of Cornwall, Eng. (PENROSE) 8. Radioactivity and the earth's thermal history (HOLMES) 8.

4. ELECTROCHEMISTRY.

COLIN G. FINK.

Reclaiming nickel anodes. ANON. *Met. Chem. Eng.* 13, 453-4(1915); *Iron Age* 95, 1392(1915).—Scrap Ni anodes are reclaimed and made fit for further service by welding (autogenous) together a number of such anodes into one. The saving is about 18 cents a lb. when compared with the cost of new anodes.
C. G. F.

The Ilmenite arc. I. LADOFF. *Elec. Rev. West. Elec.* 66, 691-5(1915).—A short review of the various kinds of additions to arc lamp electrodes is first given. About

40 electrodes of various contents of TiO_2 , Cr_2O_3 , and other materials were prepared and tested. It was found that the 30% TiO_2 ilmenite electrode, although it did not give the highest efficiency, was practically free from slagging and non-starting troubles, and had a reasonably long life. Efficiency tests of ferro-ilmenite and magnetite cathodes established the general superiority of the ilmenite over the magnetite cathode under identical conditions. It was also found that there is a definite interdependence between the amperage (temp.) of the arc and its most efficient length (voltage), shorter arcs being more economical at low amperages and *vice versa*. Cr compds. were ascertained to have a cooling effect. Ferro-ilmenite cathodes containing various amts. of Na, U, V and Ca salts were compared. Those containing U proved most efficient and steady. An increased efficiency of 133 to 195.3% was obtained by using an anode of ferro-ilmenite instead of massive Cu. Cold-rolled steel, V steel and graphite anodes were also tried with an increased efficiency of 212% in the case of V steel and 165% in the case of cold-rolled steel. An arc between ferro-ilmenite (30%) and cold-rolled steel with protected tip gave an increased efficiency over the magnetite arc of 151% at 4 amps. Of this 104% was due to the anode alone. The efficiency attained by the "ilmenite (30%) to cold-rolled steel" arc at 4 amps. is equal to the best quartz tube Hg arc. At 6.6 amps. it reaches the best values of a 500 watt yellow flame arc. The ilmenite electrode efficiency increases more rapidly than any other commercial illuminant with increase in wattage. A description of methods and app. is given.

W. E. RUDER.

The electric strength of air. VI. J. B. WHITEHEAD. *Proc. Am. Inst. Elec. Eng.* 34, 843-65 (1915); cf. C. A. 6, 2361; 7, 2514.—This paper deals particularly with the theories of gaseous conduction and corona formation. Some of the simpler fundamental expts. on the elec. cond. of air are described.

W. E. RUDER.

Electrical porcelain. E. E. F. CREIGHTON. *Proc. Am. Inst. Elec. Eng.* 34, 753-842 (1915).—The author first deals with the testing of porcelain by means of a high-frequency oscillator. This is a combination of a 60-cycle transformer, a condenser, spark-gap, and an oscillation or coreless transformer. The 60-cycle potential charges the condenser, and this in turn discharges through the gap and the coreless transformer. High frequency wave trains are consequently set up and these are of the same nature as those set up in transmission lines. This is the only kind of strain that injures the insulators and consequently elec. porcelain should be tested under these conditions. It is shown that good porcelain insulators of proper design will stand high frequency discharge tests for many hrs., so that even though the test is a severe one it makes it certain that porcelain that will stand up under it is entirely trustworthy. A detailed description of the app. and tests is given. The essential points in the factory process of mixing, firing and glazing porcelain are given. Uniform mixt., uniform plasticity, and uniform shrinkage in drying and firing are very essential. Defective insulators are in general due to accidents of mfg., because the dielectric strength of all porcelains are passably good except for flaws. Details of tests on various types of insulators are given.

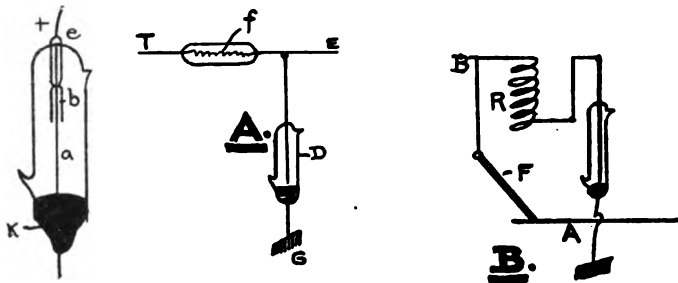
W. E. RUDER.

Carrying capacities of rubber insulated wires and cables. ANON. *Elec. Power and Gas* 34, 272-3 (1915).—A table, based upon the National Elec. Code, is given by use of which practical men may read directly the values for various circuits.

W. E. RUDER.

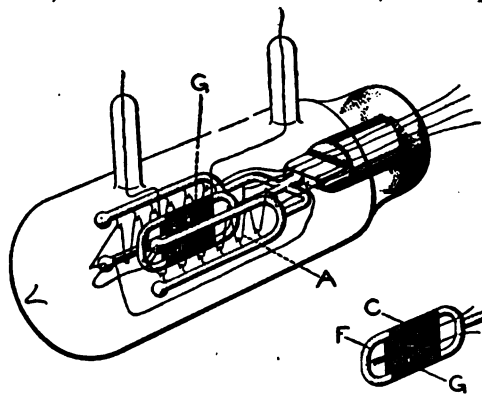
Vacuum tubes for telephone-line protection. F. SCHROETTER. *Elektrotechn. Z.* 136, 77-78 (1915).—A new form of vacuum tube, effective to as low as 130 v., is described as illustrated in cut. An Al anode pin *a* is protected by the tube *b* and placed a few mm. from the fused K-Na alloy cathode *k*. The tube is filled with He, Ne, Ar or a mixt. of these at 1-3 mm. pressure. Such a tube will stand thousands of breakdowns

without change of its critical voltage. Two kinds of connections, as illustrated, may be made. By special methods, voltages as low as 104 may be made to operate these tubes. If *a*, covered with a layer of K, is used as cathode, and a distance of 5 mm. is set between *a* and *k* with an atm. of $\frac{1}{2}$ Ne and $\frac{1}{2}$ He at 2 mm. pressure, a breakdown of 104 v. is obtained. In the scheme of connections A, the fuse *f* (0.5 amp.) is inserted between the telephone transmission line *T* and the exchange line *E*. In the



second case *B* the sepn. is made by a relay consisting of a high resistance *R* (8000–15000 ohms) coil and armature *F*. A brush discharge takes place in the vacuum tube in case of a dangerously high voltage on the line because the high elec. resistance of *R* prevents the current from reaching an intensity sufficient to vaporize the cathode *k* and produce an arc. The relay is excited by current passing through *R* and breaks contact between *A* and *B*. W. E. RUDER.

Pure electron discharge for wireless telegraphy and telephony. I. LANGMUIR. *Gen. Elec. Rev.* 18, 327–40(1915); *Electrician* 75, 240(1915).—An historical review is given of the work leading up to the establishment of the existence of pure electro-emission from hot bodies in the highest vacua. The fundamental principles of this phenomenon are outlined and their practical expression in the kenotron (cf. *C. A.* 9, 1008) a hot filament vacuum rectifier, and the pliotron, a new type of amplifier, is described.



In the pliotron a third electrode, in the form of a grid of very fine wire (0.01 mm.) is added between hot cathode and anode for the purpose of controlling the current flowing between them. The device is similar in construction to the DeForest audion but the operation is in many ways very different. The fig. shows the construction of a small pliotron as used for amplifying radio signals. There have been constructed larger types capable of controlling as much as 1 kw. each so that a large number of these

operated in parallel may be used to control very large amts. of power. The characteristics of this device depend upon the length of hot filament used, the spacing and size of wires on the grid, the size and shape of the anode and the distance between grid and anode. By using a fine grid the current to the anode can be stopped entirely by a very slight neg. potential on the grid, while on the other hand a low + potential will be sufficient to draw a large current to the anode. The use of this device as detector, amplifier, and oscillator in the receiving station and its application to wireless telephony are discussed. W. E. RUDER.

Electrolytic iron. T. D. YENSEN. *Electrician* 75, 119(1915); see C. A. 9, 906, 1892. C. G. F.

Electrolytic iron: Its manufacture, properties and uses. L. GUILLET. *Rev. metal.* 12, 81-94(1915); see C. A. 9, 23, 756. E. J. C.

Platinum plating. G. NIKOLAUS. *Elektrochem. Z.* 21, 193-5(1914).—By using a bath of 4 g. H_2PtCl_6 , 20 g. $(\text{NH}_4)_2\text{PO}_4$, 90 g. Na_3PO_4 and 5 g. of NaCl in 1 l. of H_2O , a pure white deposit of Pt may be obtained. The bath should be boiling while in use; the articles to be plated should be kept in const. motion and a voltage of 6-8 maintained. W. E. RUDER.

Photometry of vari-colored light sources (PIRANI) 2.

Brit., 3,545, Feb. 11, 1914. DETTIFOSS POWER Co. and J. H. LIDHOLM. In the manuf. of calcium cyanamide, the N is supplied under pressure to accelerate the reaction, and the CaC_2 is dild. with inactive substances such as sand, or a carbide of low % is used, to prevent the temp. from rising to the sintering point of the cyanamide, the % of inactive matter corresponding to the pressure used.

Brit., 3,546, Feb. 11, 1914. DETTIFOSS POWER Co. and J. H. LIDHOLM. In the manuf. of calcium cyanamide from CaC_2 and N in a rotary tube furnace, the N, supplied under pressure, is used as a driving-agent for circulating the gas in the furnace.

Brit., 3,547, Feb. 11, 1914. DETTIFOSS POWER Co. and J. H. LIDHOLM. Calcium cyanamide is obtained by heating CaC_2 and N separately or simultaneously to a temp. much above the reaction temp. so that the reaction takes place instantaneously. The finely powdered carbide is sifted through a sieve into N in a tube which is highly heated by elec. current through ring contacts. The N is supplied by a pipe and passes through charcoal between an outer shell and the central tube, and thence through a channel into the central tube. The lower part of the furnace is water-cooled and is discharged as a powder by a screw. The furnace may be heated by arcs, which may be spread into disks. Cf. C. A. 9, 1434.

Brit., 3,654, Feb. 12, 1914. I. H. LEVIN. In app. for making gases such as oxygen and hydrogen electrolytically, anode and cathode compartments are connected by independent off-take conduits with corresponding compartments of a tank, the lower part of which may be contracted. A partition between the latter compartments reaches nearly to the bottom of the tank, where it enters a small trough so as to prevent transference of bubbles while allowing equalization of pressure in the cell compartments. The electrolyte and gas enter the compartments through nozzles projecting the liquid on to a surface, which may be made with baffles to facilitate disengagement of gas. The gases collect in chambers above the tank, provided with level gages. An overhead reservoir for electrolyte communicates by a pipe with the bottom of 1 of the tank compartments. Passages return the electrolyte to the cells.

Brit., 3,835, Feb. 13, 1914. SOC. ELECTRO-METALLURGIQUE DE ST. BÉRON. Constructional details of an electric furnace for melting alloys such as ferro-manganese, ferro-chromium, and ferro-silicon for steel manuf.

Can., 161,067, Mar. 2, 1915. N. V. HYBINETTE. Electrolytically extracting copper from material containing copper partly as oxide and partly as sulfide, by leaching said material with an acid sulfate soln. containing a large quantity of Fe, of which only a small quantity is oxidized to the ferric state, electrolyzing the resulting soln. while maintaining unrestricted diffusion between anolyte and catholyte and interrupting the said electrolysis before sufficient Fe has been oxidized to $\text{Fe}_2(\text{SO}_4)_3$ to retard the decompn. of Cu, leaching fresh quantities of the ore with the resulting electrolyte to reduce the ferric salts and repeating such leaching and electrolysis until

substantially all the Cu easily sol. in a weak soln. of $\text{Fe}_2(\text{SO}_4)_3$ is removed and removing the remaining CuS by leaching with a stronger $\text{Fe}_2(\text{SO}_4)_3$ soln. and electrolyzing the resulting soln. while maintaining a restricted diffusion between anolyte and catholyte.

Can., 161,113, Mar. 9, 1915. W. S. LANDIS. **Forming nitrogen compounds through the reaction of nitrogen upon carbide**, by bringing the resistors used for supplying heat to the charge directly into the mass of the carbide, and out of direct contact with the circulating excess N in said charge, and raising said resistor to a temp. sufficient to cause the desired reaction, while feeding N to the charge.

Can., 161,126, Mar. 9, 1915. H. S. MACKEY. **Forming a solvent for extracting metal from ores**, by electrolyzing a soln. of a chloride of an alkali metal in electrolytic contact with a metal of more than one valence so as to form a perchloride of the metal.

Ger., 279,534, May 15, 1913. N. V. PHILIPS' METAAL-GLOEILAMPENFABRIEK. **In a process of drawing very hard metal filaments**, especially for incandescent lamps, the wire is surrounded with a solid layer of an organic binder such as resinous or gummy material, with or without the addition of a lubricant, and in this condition it is drawn through the die plate. Cf. C. A. 9, 894.

Ger., 280,264, Dec. 7, 1912. N. V. PHILIPS' METAAL-GLOEILAMPENFABRIEK. **Completing the exhaustion of incandescent lamps by means of P.**

Ger., 281,015, Feb. 12, 1914. SIEMENS & HALSKE AKT.-GES. **Forming incandescent filaments for elec. incandescent lamps**, with the use, as a binder, of a soln. of bakelite, which upon heating yields a very solid uniform carbon and is highly efficient as a binder, even in small quantities. The filaments have a very uniform structure and but little porosity. If the filaments are too porous, they are again satd. with the same or another binder, and rendered more dense by reheating. The satn. of the filaments is effected preferably *in vacuo*. Cf. C. A. 9, 894.

Ger., 281,442, Jan. 5, 1913. VEREINIGTE CHEM. FABRIKEN LANDAU, KREIDL, HELLER & Co. **Core paste for arc light electrodes**, with fluorides as the illuminating salts. Heretofore water-glass has been commonly employed as the binder for these electrodes, but so great an amt. is necessary that the candle power of the C is materially affected by the SiO_2 content. According to this process, alkali hydroxides in concd. form are used as binders. The usual core materials are made up, *e. g.*, with concd. KOH lye, to a dough-like paste, adding small amts. of a flux to facilitate the formation of slag.

Ger., 281,700, Aug. 22, 1912. E. PODSZUS. **An incandescent body for electric lamps, furnaces, and the like**, is composed of amorphous B, which is sintered together pure or approx. pure, and thereby rendered conductive at the ordinary temp. BN is shaped as desired, with the aid of a suitable binder, and ignited at a very high temp. in a current of NH_3 . Before being worked, the BN is ground as finely as possible, or it is prepared chem. in a fine state. Before being finely divided by grinding, the BN is ignited at a very high temp. C or other catalyzer is employed to effect the dissociation of the BN. The dissociation can be effected in a current of NH_3 only partially, and the filament can be formed on the usual stretching form in a suitable atm. or *in vacuo*.

5. PHOTOGRAPHY.

LOUIS DERR.

Fog in so-called glass-clear films. H. LÜPPO-CRAMER. *Phot. Korr.* 52, 105-6 (1915).—Two photomicrographs show a great increase in the number of Ag grains produced by 20 sec. and 6 min. overdevelopment of a normally clear film. L. DERR.

Masking of the development-accelerating effect of the formation of nuclei. H. LÜPPO-CRAMER. *Phot. Korr.* 52, 107-8 (1915).—Plates bathed in 1% NH_4CNS develop faster in acid metol-Ag developer than untreated plates, while in hydroquinone- K_2CO_3

they develop more slowly and quite differently, giving a brightly reflecting deposit instead of the normal dull one. With glycine- K_2CO_3 and metol- Na_2CO_3 , the treated plates develop faster than when untreated, and show normal deposit. The action on the latent image which produces developable nuclei is masked by the secondary effect of the NH_4CNS on the reduction process.

L. DERR.

Green toning on silver bromide paper. R. NAMIAS. *Boll. chim. farm.* 53, 140 (1914).—A soln. is prepd. from 12 g. Fe_2Cl_6 , 10 g. V chloride, 25 g. NH_4Cl , 25 cc. HCl and 2500 cc. distd. H_2O . The V chloride is first dissolved in warm H_2O ; the HCl is next added and finally the Fe_2Cl_6 with the remainder of the H_2O . Before using the V bath the image is developed in a bath of 5% $\text{K}_3\text{Fe}(\text{CN})_6$.

H. S. PAINE.

Platinum toning bath. R. NAMIAS. *Boll. chim. farm.* 53, 140(1914).—N. proposes the following soln. as a Pt toning bath in photography: oxalic acid 1 pt., HCl 5 pts., K_2PtCl_6 1 pt., distd. H_2O 1000 pts.

H. S. PAINE.

Brit., 1,795, Jan. 22, 1914. UNION PHOTOGRAPHIQUE INDUSTRIELLE ETABLISSEMENTS LUMIERE & JOUGLA REUNIS. Chlorohydroquinone and metol are combined for use as a photographic developer, by the method described in 7,163, 1903, for the prepn. of a combination of hydroquinone and metol. The resultant compn. corresponds with that of a combination comprizing 2 mols. of the metol and 1 mol. of the hydroquinone. The developer is made up with Na_2SO_3 with or without alkali.

Brit., 2,704, Feb. 2, 1914. J. CAMPBELL. Natural color cinematography in which the negative is successively and alternately exposed through rotating color filters. Two filters each formed of 2 colors, 1 cold of a blue and a green, and the other warm of a yellow and a red, are used. The filters transmit light from 4100 to 5600 and 5600 to the red end of the spectrum, resp. The 2 colors may be juxtaposed or superposed in each filter in the form of film, or the 2 colors may be applied to a gelatin or like film by spraying in succession, 1 color being allowed to dry before the other is applied. The positive films may have the gelatin dyed with 2 pairs of appropriate colors so that each picture carries its own color film. Details of the filters employed for taking the negative, and of the dyes used for staining the positive film, are given in the specification.

Brit., 3,435, Feb. 10, 1914. P. D. BREWSTER. Production of a color picture from a single exposure on a negative, applicable for ordinary photography or cinematography. The light emanating from the object is divided into 2 color groups, and the negative is sensitized on both sides. One side is sensitive to the colors of 1 color group (say green or blue) and on the other side is a panchromatic emulsion or 1 sensitive to the other color group (say, red). The blue or green sensitive film is transparent, and is stained to act as a filter for the red sensitive film, and the exposure is taken through a yellow filter. Instead of staining the film, a separate filter may be combined with the base, or the base may be colored. If the films are suitably sensitized for the particular color groups, staining the front film or the base is not necessary. After developing and fixing the negative the Ag images are respectively stained blue or green and red or orange, the 2 colors used being substantially complementary. The negative film is printed on a positive film sensitized similarly to the negative film, and so that each side only prints its own color group. The Ag images on the printed positive are then stained or colored in the corresponding colors. Alternatives are prescribed for the various details of the process. For example, the front of the film may be sensitized for the red color group and the back for the green or blue color group. Cyanine and acridine orange are specified as color sensitizers. The light used for printing may contain only the light of the 2 colors for which the emulsions in the positive have been sensitized. For producing the colored negative and positive, the Ag of the images may be 1st converted into AgI and treated with a basic dye, which ppts. the

iodide, giving an opaque image which may be dissolved out with KCN or in an alum bath containing tannin or tartar emetic. For light filters, gelatin stained with picric acid, naphthol yellow or auracin may be used. To obtain a correct balance of color 1 or other of the color pictures may be reduced or intensified, or the comp. of the printing light may be varied and adjusted.

7. ANALYTICAL CHEMISTRY.

E. G. R. ARDAGH.

Quantitative blowpipe analysis in the field. G. DELIUS. *Mining Sci. Press* 110, 725-6(1915).—Description of portable field outfit with detailed instructions for carrying out the assay.

ISADOR MILLER.

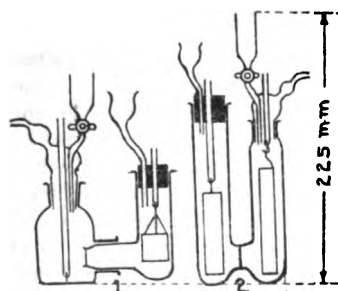
Reagents for analytical purposes. ANON. *Chem. Trade J.* 56, 396(1915).—A joint committee of the councils of the Inst. Chem. and the Soc. Public Analysts has prepared a list of reagents and chemicals giving the standards of purity. The basis of the report is Krauch's work "Chemical Reagents, Their Purity and Tests" as well as the report of the sub-comm. appointed by the 8th Intern. Congr. Appl. Chem., and White's "Analytical Reagents, Standards and Tests."

ISADOR MILLER.

Solubility of glass in water. R. F. VON WALTHER. Dresden. *J. prakt. Chem.* 91, 332(1915).—W. suggests the following as a suitable expt. to begin a course in quant. analysis, to demonstrate the solubility of glass in H_2O : Boil in a common liter flask 500 cc. H_2O with sufficient indicator (alizarin) to produce a pale yellow color, until the color changes to reddish violet. Then add 0.01 N H_2SO_4 until the original yellow color is restored. By continued boiling for 1 hr., 18.3 cc. 0.01 N H_2SO_4 were required.

D. BRESE JONES.

Quantitative determination of minute amounts of arsenic. L. RAMBERG. *Svensk. Kem. Tidskrift* 27, 48-65(1915).—The As is removed from the sample as AsH_3 by passing through it a current of H generated by electrolysis in a specially constructed app. This app. consists of 2 chambers sepd. by a porous plate and may be in either one of



two forms. In one form (see Fig. 1) the cathode consists of Hg on the bottom of one of the chambers; the anode is made of a cylinder of Pt foil. The anode chamber is connected with the cathode chamber by a ground glass tubule and side tube, the connecting tube having a porous plate fused over its open end. In the other app. (Fig. 2) the 2 chambers are in one piece with the porous plate fused in the connecting arm. This form has a thick Pb plate in place of Hg as a cathode. In making a detn. 10% H_2SO_4 is poured into the cathode chamber to just cover the porous plate and into the other side a trifle more is poured. The app. is immersed in cold running water up to its neck. The gas outlet tube is connected with a $CaCl_2$ drying tube. Near the further end of this $CaCl_2$ tube is a side tube leading to the As tube with which it is connected by a heavy rubber tube. A 3-amp. current is passed through the soln. and when the air has all been expelled from the app. the burner under the As tube is lighted and the heat gradually increased during 5 to 10 min. The sample which should not contain over 0.1 mg. As, is introduced into the cathode chamber by way of the funnel tube. In about an hour the As will all have been transferred from the sample to the As mirror in the As tube. The capillary of the As tube containing the As is cut off and placed in a stoppered tube having a capacity of 3 cc. (for mirrors in excess of 0.05 mg. the tube

should hold 5 cc.) and is covered with 3 drops NaHCO_3 and enough 0.002 N I soln. to just fill the tube when the stopper is in place. It is then stoppered and the tube is protected from light by an opaque covering. When the mirror has dissolved (15 min. to 2 hrs.) the tube is emptied and washed into a 20 cc. beaker and titrated with 0.002 N AsO_3 soln. A blank must be run. The Hg cathode gave better results than the Pb cathode. The errors shown by the author's tabulated results range from -0.5 to $+1\%$. Certain precautions are mentioned and a historical summary of 5 pages is given.

A. R. ROSE.

Identification and determination of arsenic in organic compounds. L. BARTHÉ. *Bull. soc. pharm. Bordeaux* 1914, Aug.-Dec.; *Repert. pharm.* 27, 144-7(1915).—B. compared the methods of Bougault and Bressanin for identifying As in org. compds. The reaction of Bougault, that of a mixt. of HCl and H_3PO_4 with sometimes a few drops of an I soln. added, is reducing. That of Bressanin is based on the insolubility of AsI_3 in H_2SO_4 or HCl , KI being the source of the I . The former reaction gave negative results in the cold but when heated for 20 min. ppts. were obtained for Na methylarsenate, atoxyl, arsacetin, "Hectine," "Enesol," salvarsan and neosalvarsan. No ppt. was given with Na cacodylate. Bressanin's reagent gave a ppt. in all the above cases. Bougault's reaction is inconclusive since it also reduces other organo-metallic compds., especially those of Hg . Moreover neither of the above methods is reliable since they do not insure complete decompn. of the organic As compd. In cases of poisoning the Marsh test is indispensable. Individual methods are described for decomp. various As compds. For all quant. detns. as sulfide the As compds. must be oxidized.

J. W. SHIPLEY.

Detection of amyl alcohol in alcoholic solutions. HUGO HOFLANDER. *Boll. chim. farm.* 52, 5(1913).—Twenty-five cc. of the brandy or alc. liquor under exam. are distd. with 1 cc. N KOH . After distn. of as much of the mixt. as possible, 5 cc. of the distillate are boiled for approx. 1 min. with 5 cc. glacial $AcOH$. A single drop of phenylhydrazine is then added to the mixt. and the latter is again boiled. After cooling to room temp. conc. HCl is carefully poured upon the surface of the above liquid; if amyl alc. is present, a pronounced green coloration (emerald green if the conc. of amyl alc. is sufficiently great) is produced at the zone of contact of the 2 liquids. The dark coloration which is sometimes produced at this zone of contact is without importance in so far as the presence of amyl alc. is concerned. The production of the green coloration is attributed to the formation of acetylamylphenylhydrazine hydrochloride. The occurrence of the green coloration under the conditions of the test is believed to be characteristic of amyl alc.

H. S. PAINE.

Rapid organic combustions. MARIE REIMER. *J. Am. Chem. Soc.* 37, 1636-8 (1915).—A method is described whereby, by means of a layer of CeO_2 asbestos 2 cm. long in the usual combustion app., excellent analyses of such substances as succinic, salicylic, benzoic acids, sugar, $C_{10}H_8$, etc., can be made in 9-18 min. and of $AcNH_3$, $AcNHPh$, etc., in 24-8 min.

C. A. ROUILLER.

Morphine in a cadaver. ALIDE GRUTTERINK AND W. VAN RYN. *Pharm. Weekblad* 52, 423-4(1915).—Two and one-half yrs. after death due to morphine, administered in coffee, it was possible to show definitely the presence of this drug in the stomach and liver. After the usual treatment it was detected by the following methods: Marquis' reagent, Fröhde's reagent, by $FeCl_3$ coloration, the coloration with $FeCl_3$ and $K_3Fe(CN)_6$, and the liberation of I from HI . Crystals of morphine were also obtained by soln. in dil. HCl , evapn., soln. in a drop of water, and the addition of Na_2CO_3 . Only a very small amt. was found in the portion from the liver.

P. v. D. M.

Estimation of uranium and phosphorus. H. D. NEWTON AND J. L. HUGHES.

J. Am. Chem. Soc. **37**, 1711-5 (1915).—U was estd. (in the absence of Fe) by reducing with $\text{Ti}_2(\text{SO}_4)_3$, oxidizing the excess Ti salt with Bi trioxide and reduced Bi, filtering off the remaining Bi salt and titrating the U with KMnO_4 . The method was adapted to the detn. of P, if phosphate soln. was treated with $\text{NH}_4\text{C}_2\text{H}_3\text{O}_2$ and HOAc, then with an excess of $\text{UO}_2(\text{NO}_3)_2$, and the ppt. filtered off on a Pt Gooch funnel. After the ppt. was dissolved in 16% H_2SO_4 it was reduced with $\text{Ti}_2(\text{SO}_4)_3$ and titrated with KMnO_4 as above. An agreement between the amt. of P taken and that obtained was found, the errors being about 0.0001 g. E. B. MILLARD.

Improved test for potassium. L. W. WINKLER. *Z. angew. Chem.; Zentr. Pharm.* Apr. 14, 1915; *Pharm. J.* **94**, 741 (1915).—The test for K with tartaric acid often fails, due to supersatn. If tartaric acid is added in powder form, the test always succeeds, probably on account of traces of $\text{KHC}_4\text{H}_4\text{O}_6$ present. In 10 cc. of the neutral liquid dissolve 0.5 g. cryst. AcONa , then add 0.5 g. powdered tartaric acid, shake well. In the absence of K, (NH₄, Rb, Cs), the liquid remains clear. S. WALDBOTT.

Qualitative reaction for the detection of nitrates. A. TINGLE. *J. Soc. Chem. Ind.* **34**, 393 (1915).—The reagent consists of a soln. of 2 g. salicylic acid in 30 cc. H_2SO_4 (d. 1.84). If the substance to be tested is solid it is heated in a test tube with an excess of the reagent. A drop of the resulting liquid is withdrawn on to a cold, white, porcelain slab and 2 or more drops concd. KOH added to alk. reaction. The development of a yellow or orange coloration shows the presence of nitrates. If the material be in soln., 2-3 drops are warmed carefully with 2-3 drops of the reagent to the development of acid fumes. When cool, add a slight excess of KOH as above. A distinct yellow color is obtained from 1 drop 0.1% KNO_3 . The presence of halides does not interfere with the test. ISADOR MILLER.

Determination of chlorine, bromine, and iodine in the presence of each other. A modification of Baubigny's method. JULIUS BEKK. *Chem. Ztg.* **39**, 405-6 (1915).—Ppt. with an excess of AgNO_3 , wash on an asbestos or glass-wool filter, dry and weigh. Ppt. a second portion and treat the moist, washed Ag salts (0.3-0.4 g.) for 30 min. with a soln. of 2 g. $\text{K}_2\text{Cr}_2\text{O}_7$ in 30 cc. concd. H_2SO_4 at 95°, converting the I into HIO_3 and liberating the Cl and Br. Toward the end of the reaction a stream of air is led through to remove any Cl and Br from the soln. which is then dild. to 300-400 cc., filtered and the HIO_3 reduced by adding, drop by drop with const. stirring, a concd. soln. of Na_2SO_3 until a faint odor of SO_2 remains after standing 10 min. (under certain conditions an excess may result in a partial reduction of the AgI). The pptd. AgI is filtered, washed with hot, dil. HNO_3 , dried and weighed. The filtrate contains the Ag formerly with Cl and Br. This is pptd. as AgI, filtered and weighed. From these 3 wts. the Cl, Br, and I are easily calcd. Analyses are given showing the method to be accurate, as a rule, within less than 0.15%. Cf. *C. A.* **5**, 2473. J. H. MOORE.

Sulfites, thiosulfates and polythionates. I. A. SANDER. *Z. angew. Chem.* **28**, I, 9-12 (1915); cf. Feld, *C. A.* **5**, 1886, 3023.—Feld's statement that HgCl_2 reacts with polythionates completely after long boiling is incorrect. With tetrathionate 15 min. are enough when the soln. is boiled. At room temp. more time is necessary. The presence of chlorides retards the reaction. The oxidation of SO_2 by HgCl_2 is not quant. with concns. greater than 2 g. SO_2 per l. At higher concns. SO_2 escapes unoxidized from the boiling soln. If an excess of HgCl_2 soln. is added to a soln. of NaHSO_3 , in the cold, titration of the acid formed corresponds quant. to the amt. of NaHSO_3 taken. For titration of SO_2 2 mols. of NaOH are necessary for each mol. of SO_2 present, the SO_2 being first transformed to NaHSO_3 . These reactions are of value for the detn. of free SO_2 in the presence of H_2SO_4 . Titration with alkali, using methyl orange as indicator, gives the total acid present, the SO_2 having been changed to NaHSO_3 . Addition of

excess of HgCl_2 , and further titration with alkali then gives the amt. of SO_2 originally present. Mixts. of SO_2 and HCl cannot be detd. as the NaCl formed interferes with the action of the HgCl_2 . The method of Feld for the estn. of free SO_2 with thiosulfates and polythionates is not satisfactory since the reaction between MnS and SO_2 is not quant. The following procedure is better: First titrate an aliquot with I , thus detg. the total amt. of thiosulfate and SO_2 present. Titrate the H_2SO_4 formed with NaOH . The amt. of thiosulfate and SO_2 is then known. Then neutralize another aliquot with NaOH , NaHSO_4 being formed. Add excess of HgCl_2 and shake the mixt. occasionally for 30–40 min. After addition of NH_4Cl , titrate the liberated acid with NaOH , using methyl orange as indicator. The amt. of liberated acid due to the thiosulfate and sulfurous acid has been ascertained, in the I titration, and therefore that due to the polythionate is known, and the amt. of the latter can be calcd.

W. H. S.

Colorimetric detection of oxalic acid and manganese. J. F. SACHER. *Chem. Ztg.* 39, 319(1915).—On mixing a dil. soln. of a manganous salt with NaOH or KOH soln., allowing to stand till the $\text{Mn}(\text{OH})_2$ is partially oxidized by the air and then adding dropwise an aq. soln. of $\text{C}_2\text{H}_2\text{O}_4$, the ppt. dissolves and a sharp red coloration results. After adding NaOH , the oxidation is accelerated by warming the soln., which must be cooled before completing the test, as the color does not form at higher temps. Reducing substances (SO_2 , N_2O_5 , Fe^{2+} , etc.) prevent the color formation, as does an excess of $\text{C}_2\text{H}_2\text{O}_4$ or other acid, the soln. becoming colorless or yellow according to the Mn concn. From expts. with KMnO_4 and $\text{C}_2\text{H}_2\text{O}_4$, it is concluded that the color is due to the formation of a double salt. *Oxalic acid*: 0.25 mg. suffices, if soln. is not too dil. Dissolve 2–5 mg. of MnSO_4 in a few drops of H_2O in a test tube, add a drop of NaOH or KOH soln., warm till oxidized, cool; add the soln. to be tested (free from reducing substances) dropwise; with 0.5 cc. of a 0.05% or more soln. of $\text{C}_2\text{H}_2\text{O}_4$ the red color forms. Dil. solns. may be concd. by evapn. If the $\text{C}_2\text{H}_2\text{O}_4$ soln. contains free mineral acid, neutralize with NaOH , acidify with H_2SO_4 , spotting on litmus paper, and proceed as above. S. detects $\text{C}_2\text{H}_2\text{O}_4$ in the presence of HCl , H_2SO_4 , HNO_3 , H_3PO_4 , AcOH , butyric, valeric, citric, tartaric, lactic, benzoic, and salicylic acids, phenol and small amts. of HCO_2H . Tannic acid interferes. In the presence of tannic acid and HCO_2H , the $\text{C}_2\text{H}_2\text{O}_4$ is sepd. as CaC_2O_4 and the latter decomposed with a little H_2SO_4 . *Manganese*: To the acid soln. for test, add NaOH , warm, cool, and add 0.5 N $\text{C}_2\text{H}_2\text{O}_4$ dropwise as above. One part of Mn in 200,000 of soln. is readily detected. S. uses this method for testing lacquers and driers for Mn ; in the presence of Co , the soln. after completing the test is heated to boiling, the Mn complex is destroyed and any color due to Co remains. With larger amts. of Co , on boiling CoC_2O_4 ppts. with a decolorizing

F. W. SMITHER.

Assay of cyanide solutions. C. E. ROODHOUSE. *Mining Sci. Press* 110, 760 (1915).—Modification of the Chiddey process for the detn. of Au and Ag in cyanide solns. To the charge add 20–25 cc. $\text{Pb}(\text{OAc})_2$ soln. (20%) and 1–1.5 g. Zn shavings. Place on hot plate, add H_2O and bring to a boil as quickly as possible. Just before the soln. starts to boil add 1–2 cc. AcOH and boil 1 min. Pour off soln. closely, and add 150 cc. hot 10% HCl ; replace upon the hot plate and cover with watch glasses. Boil 10–12 min. to dissolve the Zn and then fill the beakers with cold water, decant and wash once more with cold water, squeezing the sponges into cubes, after which dry. Time consumed is 45 min. for 12 assays.

ISADOR MILLER.

Determination of gold in blister copper. R. KING. *Mining Sci. Press* 110, 917(1915).—From a well mixed sample, weigh out a $1\frac{1}{2}$ assay ton portion and divide it roughly among 5 Battersea crucibles. In each crucible place 0.8 g. of flowers of S and mix. Cover with from 8 to 10 assay tons of the following stock flux: PbO , 88; Na_2CO_3 , 3; K_2CO_3 , 3; SiO_2 , 6%. Add a light cover of salt. Gradually raise the heat in

the muffle furnace. Fusion is complete in 35 min. See that no Pb is lost in the slag. The Pb button should weigh about 20 g. Scorify the 5 Pb buttons with 1 g. of SiO_2 in a 3 in. Bartlett-shaped scorifier. Continue scorification until the "eye" of Pb is about $\frac{1}{4}$ in. in diam. See that no particles of Pb remain in scorifier after pouring into a shallow mold. After cleaning the Pb of slag, it should be free from Cu and should weigh about 10 g. Cupel and part for 1 hr. in a water bath in a mixt. of 7 parts of H_2O and 1 part of HNO_3 . Wash bead and part in concd. HNO_3 for $\frac{1}{2}$ hr. Wash, dry, anneal and weigh. Ag results by this method are too low, but the method is satisfactory for Au.

E. W. BOUGHTON.

Technical examination of ferrovanadium. A. HEINZELMANN. *Chem. Ztg.* 39, 285-7 (1915).—The properties, uses, comp., analysis, etc., of Fe-V are briefly discussed. H. has found in a few cases a C content as high as 6% and an Al content of 10-15%; the latter could be worked with a file. *Method:* treat 0.5 g. of the fine alloy in a large Pt crucible or a deep 100 cc. Pt dish with a little H_2O , add 10 cc. concd. HF, cover and let stand till evolution of H is over; add dropwise 2 cc. of 25% HNO_3 and after the main reaction is over (about 3 min.) warm on the steam bath till reaction is complete and alloy is in soln. Wash off cover with a little H_2O , evap. to dryness on steam bath, add 10 cc. of concd. H_2SO_4 and heat on sand bath to SO_3 fumes; cool, add about 100 cc. of H_2O and boil till salts dissolve, giving a clear emerald green soln. of V^{IV} , V^{V} , and Fe^{II} . Transfer to a 200 cc. flask, make up to mark with H_2O , mix and use 50 cc. for detn. of Fe and V. To the aliquot in a spacious Erlenmeyer flask add a few drops of H_2O_2 till soln. becomes decidedly reddish brown, dil. to 250 cc., neutralize with Na_2CO_3 soln. till a slight turbidity remains. Add 40-50 cc. of concd. SO_2 soln. and heat slowly to boiling (to reduce Fe^{II} to Fe^{I} and V^{V} to V^{IV}), add 20 cc. of 30% H_2SO_4 , insert stopper provided with inlet and outlet tubes and boil 20 min. (till SO_2 is expelled) with a current of washed CO_2 passing through flask. Titrate hot with 0.1 N KMnO_4 the Fe^{II} + V^{IV} = A. To det. V, add 0.1 N $(\text{NH}_4)_2\text{Fe}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$ soln. from a buret till in slight excess (use $\text{K}_2\text{Fe}(\text{CN})_6$ and spot plate) and then 3-5 cc. more; add 0.1 N KMnO_4 till the spot test with $\text{K}_2\text{Fe}(\text{CN})_6$ shows no blueing after 20 sec., read buret and titrate with the KMnO_4 till faintly reddish brown; reading = B, which multiplied by 0.00512 = wt. of V. $A - B \times 0.00559 = \text{Fe}$. The method may be executed in a HCl soln. if the HCl concn. is kept below 0.25 N; in this case, instead of adding 20 cc. of 30% H_2SO_4 , add 20 cc. of the Zimmermann-Reinhardt "titrating mixt." (67 g. MnSO_4 , 138 cc. H_3PO_4 , (d. 1.70), 130 cc. concd. H_2SO_4 , H_2O to make 1 l.). Methods for Al, P, As, C, etc., will be reported in another paper.

F. W. SMITHER.

The influence of phosphoric acid in the determination of "available" chlorine in "chloride of lime." E. KEDSODY. *Mitt. kgl. Materialprüfungsamt.* 32, 534-5 (1914); through *Chem. Zentr.* 1915, I, 806-7.—In the detn. of "available Cl" in CaOCl_2 by adding HCl and KI and titrating with $\text{Na}_2\text{S}_2\text{O}_3$, the addition of H_3PO_4 or Na_2HPO_4 will obviate any error that would be caused by Fe^{II} or chlorates. F. W. SMITHER.

The determination of small quantities of boric acid. G. HALPHEN. *Ann. fals.* 8, 1-2 (1915); *J. Soc. Chem. Ind.* 34, 278.—A modified Bertrand and Agulhon method (cf. C. A. 8, 884, 1312, 2005). H_3BO_3 is collected as Me borate in 0.2 cc. of N NaOH soln.; this is then evapd. to dryness in a small test tube and the residue dissolved in 1 cc. of H_2O plus 2 cc. HCl (1.162). Standards containing known amts. of H_3BO_3 are similarly treated. To all tests is then added 1 cc. of an Et acetate soln. of turmeric, and the resulting red colors compared after 50 min.

H. S. BAILEY.

Factor to be used for calculating the phosphoric acid in Neumann's method. S. L. JODDI. *J. Am. Chem. Soc.* 37, 1708-10 (1915).—Neumann's method for P as modified by Gregersen was both accurate and reliable, but the factor 0.554 (mg. of P per cc. of 0.5 N alkali) was too low. The factor found here was 0.57. It was found best

to allow for CO_2 in the reagents by running a blank rather than by overtitrating with H_2SO_4 , removing CO_2 by boiling, and titrating back with alkali. E. B. MILLARD.

Ionization constants of indicators (PAULUS) 2. Analysis of hypochlorite solutions (GRIFFIN) 18.

8. MINERALOGICAL AND GEOLOGICAL CHEMISTRY.

EDGAR T. WHERRY.

Heat transformation of polymorphic minerals. P. N. LASCHENKO. Novocherkassk, Russia. *Proc. Don Polytech. Inst.* 2, 46 pp. (1913).—Heating curves and tables of data for barite, quartz, chalcedony, witherite, marble, iceland spar, aragonite, CaO , opal, magnetite, cassiterite, rutile, brucite, and anatase. B. R. HONOVSKI.

Sulfur from decomposed stibnite from Salva, Casal di Pari, Grosseto. E. QUERCIGH. Univ. Turin. *Atti accad. Lincei* 24, I, 73-9 (1915).—Cf. *Ibid* 23, I, 201. S crystals from this source were measured and are described. E. J. W.

The formation of hard salts, and the secondary transformation of Zechstein salts in relation to the equilibrium scheme of van't Hoff. M. RÓZSA. Budapest. *Z. anorg. Chem.* 91, 299-319 (1915).—Continuation of C. A. 9, 281. A discussion of the processes of metamorphism involved in posthumous transformation in salt beds, resulting in the production of hard salt and other secondary products. G. W. M.

The tachhydrite occurrence in the potash-salt deposits of the Mansfeld basin. P. KLING. Halle. *Dissertation*, Halle 1913; *Centr. Min. Geol.* 1915, 11-7, 44-50.—Detns. are given of Ca and Mg in the salt deposits at frequent intervals to depth of 300 m., with complete analyses, including detns. of Ca and Mg sol. in EtOH, and the corresponding mineral comps., of material from 7 different levels. The max. % of tachhydrite ($\text{CaCl}_2 \cdot 2\text{MgCl}_2 \cdot 12\text{H}_2\text{O}$) present in any sample, calcd. from the EtOH-sol. Ca, was found to be about 10% at 265-272 m. The properties of tachhydrite are then described, and its paragenesis discussed; it shows peculiar replacement phenomena with reference to carnallite. Consideration of the genetic relations, especially the reactions between the various salts present, shows that the tachhydrite is secondary. As the yellow color of tachhydrite has been ascribed to FeCl_3 and to organic matter, without definite proof in either case, this question was further studied. The Fe content proved to be about 0.06%, of which 0.04-0.05 is united to Cl, the remainder being present as hematite; both FeCl_2 and FeCl_3 could be detected. The hematite is irregularly distributed, and is probably derived from decomposed carnallite; no inclusions of FeCl_3 solns. could be found. Crystn. expts. showed that FeCl_3 can not enter into isomorphous combination with tachhydrite, but that FeCl_2 can do so by replacing MgCl_2 to the extent of $\frac{1}{10}$ the amt. of FeCl_2 present in the soln. The yellow color of the mineral therefore arises from the oxidation of original isomorphously combined FeCl_2 to FeCl_3 . Finally it was found that a soln. containing too little CaCl_2 for tachhydrite to form yields at 50° minute isometric crystals with the comp. of MgCl_2 , perhaps + 4 H_2O . E. T. W.

Tschermak's article on "the chemical composition of aluminous augite." H. E. BOEKER. Frankfurt. *Centr. Min. Geol.* 1915, 1-3; cf. B., C. A. 8, 1556; T., C. A. 9, 1447.—T.'s theory that the aluminous augites are combinations of 4 isomorphous components was previously shown by B. to be inapplicable, but as T. has recently reasserted it, B. now points out that as the result of recent expts. it is known that solid soln. plays an important role in such silicates, and although certain end compds. may be assumed to be present for convenience, the real mode of combination of the oxides is as yet unknown.

The minerals are best regarded as solid solns. of the oxides found on analysis, with definite limits of satn. E. T. W.

Rhodusite and abriachanite. G. MURGOCI. *Compt. rend.* 160, 631-3(1915).—Soda-amphiboles, rich in sesquioxides, possess optical properties which vary according to the ratio of Fe_2O_3 to Al_2O_3 . The minerals in question are the most highly ferruginous of the members of the glaucophane series. Two types are noted in this series: rhodusite, with the plane of the optical axis parallel to g' (010) as in riebeckite, and another type containing Al, with this plane perpendicular to g' , as in osannite; this latter type may be called abriachanite. L. W. RIGGS.

The water in stilbite is chemically united. A. BEUTELL AND K. BLASCHKE. Breslau. *Centr. Min. Geol.* 1915, 4-11.—The mineral used was from the granite of Striegau and had the comp. SiO_2 56.35, Al_2O_3 16.80, CaO 7.56, Na_2O 0.82, K_2O 0.58, H_2O 17.79, sum 99.90%, which indicates the formula $\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot 6.4\text{H}_2\text{O}$. On dehydration *in vacuo* the mineral gave an essentially continuous curve, but on rehydrating with H_2O vapor the curve showed breaks at many points, corresponding to 14 definite hydrates; the final product had the comp. (doubled because of presence of half mols. of H_2O in some of the intermediate compds.) $\text{Ca}_2\text{Al}_2\text{Si}_{12}\text{O}_{28} \cdot 14\text{H}_2\text{O}$. It is thus believed that the H_2O of stilbite is chem. combined, although here as in many other cases the dehydration curve does not show the true relationship, because the union is so weak that cohesion makes several different hydrates decompose simultaneously. In these cases only hydration curves are dependable. E. T. W.

A meerschaum from the Agram mountains. FRAN TUCAN. Agram (Croatia). *Centr. Min. Geol.* 1915, 73-7.—A white to reddish fibrous mineral occurring in veins in serpentine was analyzed and found to have the comp. of meerschaum, $\text{H}_2\text{Mg}_3\text{Si}_4\text{O}_{10} \cdot 2\text{H}_2\text{O}$; its $d_{100} = 2.02$. The work of Michel on meerschaum (*C. A.* 7, 3097-8) is reviewed, and the presence of 2 phases, a colloid and a crystalloid, questioned, since crystals of the present material, stained by methylene blue and acid-fuchsin, are intensely pleochroic, from blue to red, and therefore look different when viewed in perpendicular directions; the mineral is thus basophilous, but it is completely crystalline and anisotropic. The behavior of the mineral toward a number of other dyes is described. E. T. W.

Monazite from Bom Jesus dos Meiras, Bahia, Brazil. J. UHLIG. Bonn. *Centr. Min. Geol.* 1915, 38-44.—Crystals of monazite of unusual habit from this new locality are described, and 2 analyses of it, as well as 2 of associated magnesite, are given. The monazite is unusual in containing only 0.05% ThO_2 . Methods of analysis are described in detail. E. T. W.

The turquois. JOSEPH E. POGUE. *Mem. Nat. Acad. Sci.* 12, Part II, No. 3, 206 pp.(1915).—A monograph on this mineral including all available information on its history, mineralogy, geology, ethnology, archeology, mythology, folklore, and technology (cf. *C. A.* 8, 1254). No new chem. data are given, but what is known as to its comp. is summarized under "Mineralogy." E. T. W.

Alunite and pyrophyllite in Triassic and Jurassic volcanics, B. C. C. H. CLAPP. Can. Geol. Survey. *Econ. Geol.* 10, 70-88(1915).—See *C. A.* 9, 1022. A. A. K.

The systematic classification of ore deposits. A. SACHS. Breslau. *Centr. Min. Geol.* 1915, 77-82.—The classifications used by previous writers are briefly outlined, and the following new plan proposed: I. primary; (A) pneumatogenous, (1) syngenetic, (2) epigenetic; (B) magmatogenous, (1) syngenetic, (2) epigenetic; (C) hydatogenous, (1) syngenetic, (2) epigenetic; II. secondary. Examples of each class are given and discussed. E. T. W.

Observations on contact metamorphic ore deposits. B. PRESCOTT. *Econ. Geol.*

10, 55-69(1915).—Any hypothesis of contact metamorphism must explain the following: At least to the greatest depth reached the intrusion is often a solidified mass capable of fracture at the time of formation of contact silicates. Ore bodies are localized on points of limestone protruding into the igneous rock. When the latter has embayed the former, megascopic development of metamorphism is almost invariably absent. Marmorization of limestone is often absent when the neighboring monzonite shows heavy silicate development. Mineralizers appear to have been ascending and to have come from below the greatest depth yet reached.

A. A. KLEIN.

Composition of waters in mines of sulfide ores. E. T. HODGE. *Econ. Geol.* 10, 123-39(1915).—Some 50 analyses of mine H_2O are given, and grouped into 5 classes as a result of a survey of the chem. comp., conc., reaction, environment, associated rocks and temps. of waters analyzed. The action of each class is discussed.

A. A. K.

Temperatures that obtain in zones of chalcocitization. W. H. EMMONS. *Econ. Geol.* 10, 151-60(1915).—The est. of heat generated by oxidation of pyritic Cu deposits is somewhat above rather than below the amt. necessary to raise av. mine water 12.7° . The temp. at which chalcocitization takes place is about 30° .

A. A. KLEIN.

Relation of ore deposits to different types of intrusive bodies in Utah. B. S. BUTLER. U. S. Geol. Survey. *Econ. Geol.* 10, 101-22(1915).—These bodies are of 2 types, laccoliths and stocks. The ore deposits associated with the laccoliths and deeper truncated stocks are of slight commercial importance while those associated with the apically truncated stocks are deposits of great value. The lack of large deposits associated with laccoliths is due to the fact that after intrusion they were sealed off from the deep seated source and the amt. of material was too small and differentiation too incomplete to furnish large deposits. In the stocks the differentiation was greater at depth. H_2O and other mineralizers in soln. rose toward the surface while heavier minerals sank to greater depth. The deeper truncated stocks are regarded as probably remnants from which the portion in which the metals were conc. has been eroded.

A. A. KLEIN.

Geology and ore deposits of Red Cliff, Colo. A. H. MEANS. *Econ. Geol.* 10, 1-27(1915).—The deposits may be divided into: fissure veins in granite, carrying Au, Ag, Cu, Pb, Zn; replacements in quartzite consisting of sphalerite, galena, Au, Ag; replacements in limestone comprizing sphalerite, chalcopyrite, pyrite and smithsonite. Two theories of origin are discussed.

A. A. KLEIN.

Silver in argentiferous galena ores. A. E. NISSEN AND S. L. HOYT. Univ. Minn. *Econ. Geol.* 10, 172-9(1915).—From a metallographic study, using HNO_3 as etching agent, the following conclusions have been reached: Ag occurs as argentite in some primary and in some secondary argentiferous galena ores. The limit of solid soln. is below 0.2% Ag_2S . A eutectic is not developed in concs. below 2.7% Ag_2S .

A. A. KLEIN.

Copper deposits in the red beds of Oklahoma. A. E. FATH. U. S. Geol. Survey. *Econ. Geol.* 10, 140-50(1915).—Cu minerals occur as nodules and as replacements of carbonaceous material. The ore is of very low grade. The Cu is a replacement of an earlier sulfide mineral and its pptn. follows the general rules of secondary sulfide enrichment.

A. A. KLEIN.

Iron ores of igneous origin in eastern Greece and their transformations. C. A. KENAS. *Compt. rend.* 160, 633-5(1915).

I. W. RIGGS.

The iron mines of Suhl. PETER RUSSWURM. *Z. prakt. Geol.* 22, 273-7(1914).—R. outlines the history of the mines located near the "Randspalte" south of the Thüringian Forest, some of which have been worked for several centuries. The ores appear in part as metasomatic replacements of Zechstein, and in part as veins of hematite.

To the first group belong the Stahlberg mines and to the latter those at Suhl. The hematite is of excellent quality, containing some Mn, but free from S and P. Some of the gang is high in SiO_2 , but in general it is an easily smelted ore. H. L. OLIN.

Notes on the genesis of the Huelva district pyrite and manganese ore deposits. R. PILZ. Heidelberg. *Z. prakt. Geol.* 22, 373-7(1914).—P. concludes that the Mn deposits are probably of sedimentary origin, while the schists originated chiefly from deep-sea sediments. M. E. SPARKS.

Pitchblende of Cornwall, Eng. R. A. F. PENROSE, JR. *Econ. Geol.* 10, 161-71 (1915).—Pitchblende occurs mostly as one of the minerals of the Cu deposits, also with Sn deposits. It is generally associated with Cu, Fe, Bi, Ni, Co, Pb, and Ag minerals, arsenopyrite, fluorite, autunite, torbernite, zippeite, and uraconite. The ores are much altered. A. A. KLEIN.

Occurrence and origin of bauxite deposits of Arkansas. W. J. MEAD. *Econ. Geol.* 10, 28-34(1915).—Bauxite and associated clays are products of surface weathering of syenite by normal processes of rock decomp. and are not chem. sediments. They have developed *in situ* as shown by the downward secondary conc. of Al_2O_3 . The texture of the kaolinized syenite has been essential to the alteration of the kaolin to bauxite. The oolitic or pisolitic texture has developed from the amorphous types of bauxite. Besides kaolin, halloysite is also an intermediate decomp. mineral. A. A. KLEIN.

Occurrence of bauxite in central Georgia. JOEL H. WATKINS. *Mining Eng. World* 42, 1073-5(1915).—The bauxite occurs as well defined beds in Cretaceous sediments. It is believed to have formed by the alteration of pure clay in place. E. T. W.

Gypsum in Canada. ANON. *Engineering* 99, 467-9(1915); cf. C. A. 6, 1834; 9, 1022.—An abstract of a rept. of Can. Bur. Mines (1912). 550,000 t. are produced annually. The largest deposits are in Nova Scotia, where beds 100 ft. thick, of 90% $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ are found; but it is found also in every province except Saskatchewan. W. B. JOHNSON.

Geology of the Alpine salt deposits in the Berchtesgaden region, with special reference to the Reichenhaller salt springs. GEORG GILLITZER. Munich. *Z. prakt. Geol.* 22, 263-72(1914).—G. reviews earlier work, discusses geology of the region, and then explains his view of the origin of the salt springs. In principle he agrees with Gumbel, but with modification, considering the springs due to erosion, by water from above, of underground salt deposits. M. E. SPARKS.

The mode of origin of coal. EDWARD C. JEFFREY. *J. Geology* 23, 218-31(1915).—The 2 opposed views in regard to the origin of coal are the "*in situ*" theory and the "transport" hypothesis. J. cites evidence derived entirely from a study of the coal itself. Thin sections were studied under the microscope from samples obtained from numerous states and countries and ranging in age from Devonian to the present epoch. The results, as far as bituminous coals are concerned, from whatever geological horizon obtained, showed in all instances the presence of a greater or less amount of spore material. The high spore content is interpreted as clear evidence of the formation of the coal in open water, as against the peat hypothesis. Coal is thus not to be regarded as a compost heap, but a sedimentary deposit. Where the spore material is abundant a cannel or an oil shale results. Where it is plentiful but not superabundant we have coking and gas coals, and where the spore content is small, lean or ordinary bituminous coals are formed. W. F. HUNT.

The demonstration of pumice-formation. K. ENDELL. Berlin. *Centr. Min. Geol.* 1915, 69-72.—A small crucible is filled with pieces of obsidian from Lipari the

size of peas, placed in a vertical tube furnace heated to about 500° , and then raised as rapidly as possible to 1000° . The expansion of enclosed gases (HCl , SO_2 , CO_2 , etc., according to Brun) causes the formation of a spongy mass of pumice-like material, which swells up above the mouth of the crucible. Rocks of deep-seated origin do not form a sponge, but m. slowly to a glass. The mineralogical changes observed on heating a specimen of granite are described. E. T. W.

The principle of saturation in petrography. S. J. SHAND. Stellenbosch, S. Africa. *Geol. Mag.* [6] 1, 485-93(1914).—S. reaffirms his belief (*C. A.* 8, 889) in the principle that rocks indicate by their minerals whether SiO_2 was present in excess or not when they consolidated from the magma; and conversely that if the magma was satd. certain minerals necessarily resulted—in this opposing recent views of Scott who holds that temp. is an essential factor. (*Ibid* 319.) R. C. WELLS.

The principle of saturation. A. SCOTT. *Geol. Mag.* 2, 160-3(1915).—Reply to Shand (cf. preceding abstr.). R. C. WELLS.

Studies on the Pfahl of the Bavarian Forest and its associated rocks. H. OCHOTZKY. Würzburg. *Dissertation*, Würzburg, 1914; *Centr. Min. Geol.* 1915, 50-1.—Continuation of *C. A.* 8, 1946. The rocks of this region are chiefly granitic in character, but there are also marginal areas of basic rocks. Much intrusion of lamprophyric and aplitic material has also occurred, some injection gneisses having been formed. As a consequence of tectonic phenomena considerable metamorphism has occurred, but the resultant rocks are identical in chem. comp. with the original ones, differing only in structure and mineral content. The quartzite of the Pfahl itself owes its origin to thermal processes, having been deposited by juvenile waters. The rocks are radioactive to only an insignificant degree. E. T. W.

Contributions to the petrography of Java and Celebes. JOSEPH P. IDDIGS AND EDWARD W. MORLEY. *J. Geology* 23, 231-46(1915).—I. and M. record the chem. analyses and petrographic descriptions of leucitic lavas from Mt. Mouriah, Java, and point out certain chem. and mineral relationships between these lavas and the shonkinites and nephelite syenites in the vicinity of the Pic de Maros in Celebes. The leucitic and shonkinitic rocks are chem. similar, being low in SiO_2 , high in K_2O , and relatively high in Al_2O_3 and CaO . Mineralogically this is expressed by leucite in the lava of Mt. Mouriah and of orthoclase and biotite in the rocks from Pic de Maros, while augite is a prominent constituent in both. The main contrast between the 2 groups is the crystn. of leucite and absence of nephelite, without any considerable amount of orthoclase and biotite, in the leucitic lavas, while in the intrusive rocks of the Pic de Maros there is no leucite but considerable nephelite in some instances, abundant orthoclase and biotite and an absence of noticeable amts. of Ca-Na feldspar. W. F. HUNT.

Some rocks of Terra del Fuoco. I. Eruptive rocks. FREDERICO MILLOSEVICH. Florence. *Atti accad. Lincei* 24, 1, 22-7(1915).—Amphibole-granite, aplite, granite pegmatite, syenite-diorite pegmatite, amphibolitic diorite, porphyrite, augite-porphyrity, uraltic diabase and peridotite with quartz (quartzose wehrlite) from this locality are described. E. J. WITZEMANN.

Granitic area of Rokan (Middle Sumatra) and contact phenomena in the surrounding schists. A. BROUWER. *Proc. Akad. Wetenschappen* 17, 1190-1202(1915).—A description of the biotite-granites, mica-granites, quartz-diorites, gneissoid-granites, and pegmatites of this region is given; the surrounding schists and their contact phenomena are also described. At the contact of the granites a narrow zone of schists has been feldspatized and the sharp contrast between igneous rocks and sediments has disappeared. Farther away from the contact this feldspatization is lacking. Biotite is the mica found in the feldspatized hornfels near the contact with the granite, mus-

covite appearing farther away. This metamorphism is of an entirely different character from that of the contact-zones of the type "Steiger Schiefer" but is more like that described in Brittany and in the Pyrenees. The pneumatolytic character of the contact metamorphism is shown by the presence of feldspars and tourmaline in the pegmatites.

R. L. SIBLEY.

Two new constituents in the syenite from Ditro. B. MAURITZ. *Földtani Közlöny* 43, 124-7; *Chem. Zentr.* 1915, I, 568-9.—Red or bluish pebbles of corundum are found near the contact between syenite and schist. The rock is not a normal syenite, for all the components are xenomorphic, and microcline, nepheline and titanite are absent. It may be considered a special facies, but may also be regarded as molten schist, injected into the magma. In normal structured schistose syenite from the Ditro road at Tolgyos, scapolite is found in small rounded granules. W. B. J.

Malchite and related dike-rocks in the Odenwald. B. SANDKÜHLER. *Abh. gross. hess. geol. Landesanst.* 5, 193-258(1913); *Neues Jahrb. Min. Geol.* 1915, I, ref. 58-9.—The geological relations show that malchite is a granitic lamprophyre rather than an aplitic gabbro-diorite, as usually assumed. This is confirmed by the chem. character, especially the low SiO_2 and R_2O and the high RO . There are all gradations between malchite and true lamprophyres. E. T. W.

The Permian eruptive rocks from the Bavarian Palatinate. I. KUSELITE. M. SCHUSTER AND A. SCHWAGER. *Geogn. Jahresh.* 23, 43-59; *Chem. Zentr.* 1915, I, 568.—Kuselites are intermediate alkali-rocks, with predominating Na_2O and more MgO than CaO , therefore classed as augite-keratophyres. They form, with their higher MgO content, one pole of the keratophyres, while the other is composed of MgO -poor, and partly alkali-rich rocks, the two poles being related to each other as diorite to granite. They are further related to the augite- and bronzite-porphyrates on the one hand, (also to certain quartz-biotite (augite) porphyrites) and to the orthophyres on the other hand. Indeed, kuselite and augite-orthophyre stand in such a relation as the keratophyres and augite-orthophyres of the Harz. W. B. JOHNSON.

A porphyrite from Dürrenhennersdorf, Saxon Lausitz. JOHANNES BEGER. *Leipzig. Centr. Min. Geol.* 1915, 65-9.—A petrographic description with analysis of the rock of a small dike. In structure it is like kuselite (cf. preceding abstr.), but in comp. it clearly belongs in the series of quartz-porphyrates and porphyrites. E. T. W.

Geology of the North American Cordillera at the 40th parallel. II. REGINALD A. DALY. *Geol. Survey Canada, Dept. Mines Memoir* 38, 547-799(1915).—Chiefly petrographic and physiographic with the following chem. considerations: (1) Until more is known of the behavior of silicate rocks at very high pressures, it is impossible to say how much cooling tension is left unrelieved by compressive extension at the end of the period in which conditions have been ripened for mountain building. (2) The chem. soln. of rock is probably more rapid beneath the forest cap than it is above the tree line, where the amount of vegetable acid is at a minimum. (3) D. proposes a theory to account for the development of dolomites and limestones of pre-Silurian age. Recalling that the evolution of higher animal types from primordial soft-bodied, simple types was very slow, and supposing that the bulk of marine animals were free swimming and that the sea was thoroughly tenanted with such animals, then during life's evolutionary period it was impossible for animals to secrete limy structures. The carcasses of countless animals would after death fall to the sea floor and decompose. During the putrefaction, $(\text{NH}_4)_2\text{CO}_3$ is given off in large volumes and this substance rapidly converts the chloride and sulfate of Ca into the carbonate. The chem. process is fundamentally the same whether the Ca is abstracted from the ocean water through the building of calcareous hard parts or through pptn. by decaying carcasses. Putre-

faction caused the generation of H_2S from sulfates, and this, being poisonous, delayed the evolution of bottom scavengers. The scavenging system, once established, made it possible for river-borne Ca salts to accumulate in the sea. Na and Mg salts are the dominant salts in the sea today and it is simplest to assume that they are so because of a slow evolution of an ocean tending towards a max. ionic stability. The sulfates are relatively subordinate because of the very extensive pptn. of insoluble sulfides and carbonates through the chem. influences of living or putrefying animals. When the acid radicals became either destroyed or permanently bound to bases more powerful than CaO the conc. in the sea water of $CaCO_3$ introduced by rivers first became possible. Then only could have been initiated the epoch in which a series of lime-secreting animals could be evolved unless we assume that a relatively sudden influx of river-borne Ca salts might produce an excess over the amt. used to remove the acid radicals present. $MgCO_3$ comes down only after all the Ca has been pptd. and then only after standing for some time. The hydrous carbonate of Mg can be pptd. by $(NH_4)_2CO_3$ emitted from decaying animal remains, but the pptn. is much slower than in the case of $CaCO_3$ and is retarded by the presence of Ca salts in the soln. (4) The effusive types of rocks are slightly richer in SiO_2 and alkalis and poorer in Fe oxides, MgO and CaO than the respective plutonic rocks. This relation is a result of some kind of magmatic differentiation, probably gravitative. (5) The idea that basalt might have given the world's granites through weather-leaching and remelting of the leached out products was shown to be unsound by considering the Na:K ratio; if this were the case, the ocean would contain 3 times as much Na as at present. (6) A new theory of volcanic action is offered: that the emission of incandescent matter at the earth's surface takes place by the partial or complete foundering of batholithic roofs. The heat emanating from a central vent of a volcano is not primary but is the product of chem. reactions chiefly among the gases in the lava columns and this explains the long lives of many volcanoes for the vents are kept open by the manufacture of heat by exothermic gaseous reactions as well as by the convective transfer of this heat. (7) A new classification of igneous intrusive bodies based on the method of intrusion is given and an application of the theory to the 49th parallel rocks is included.

R. L. SIBLEY.

The work of Lacroix on the laterites of French Guinea. L. L. FERMOR. *Geol. Mag.* 2, 28-36, 77-81, 123-28(1915).—F. discusses L.'s nomenclature of laterites, which is based on the proportion of "lateritic constituents." Gibbsite is the only cryst. hydroxide of Al found; bauxite is merely a rock of variable comp., containing colloidal Al_2O_3 . Limonite is $2Fe_2O_3 \cdot 3H_2O$, while its colloidal variety is called stilpnosiderite (Ullmann, 1814); goethite and turgite are not mentioned. The cryst. form of Al silicate is kaolinite, the colloidal form existing in 2 varieties, the cryptocryst. halloysite and an isotropic form. Attempts to differentiate the silicates from the hydroxides by staining were abandoned. It is believed that the Ti exists as $TiO_2 \cdot H_2O$ and $TiO_2 \cdot 2H_2O$ for which the term *doellerite* is proposed. Three distinct types of laterite are found to result from (1) nepheline-syenites, gabbros, diabases and peridotites; (2) micaceous schists and granites; (3) alluvium composed of debris of non-lateritic origin. Although clays and laterites seem to be the products of decomp. in temperate and tropical regions, respectively, they are not confined to their respective regions. R. C. W.

Outbreak of the mud-volcano Djautepe, Kertsch, March 18, 1914. V. SEDLCHIKOV AND G. KULGAVOV. *Novocherkassk. Centr. Min. Geol.* 1915, 106-13.—The geology of the region and the history of the volcano are briefly outlined, and the recent eruption described. The material emitted is a mixt. of clayey material and H_2O . Exam. showed the presence of quartz, limestone, clay, and glauconite, the last giving a green color to the mass. Qual. tests for Si, Fe, Al, Mn, Ca, K, Na, Cl, P, and S were obtained.

E. T. W.

The gaseous exhalations of Etna. II. G. PONTE. Univ. Catania. *Atti accad. Lincei* 23, II, 402-8(1914); cf. *C. A.* 9, 1449.—The exhalations are at first free from H_2O vapor, which they acquire from the air. Exhalations of eruptions in 1910 and 1911 showed a lower O content as compared with the atmosphere. The O was retained by the lava and used in the oxidation of its constituents. P. found by direct expt. that lava absorbs O and that as a result the FeO content diminishes and the Fe_2O_3 increases. E. J. WITZEMANN.

Radioactivity and the earth's thermal history. A. HOLMES. *Geol. Mag.* 2, 102-11(1915).—Continuation of *C. A.* 9, 1293. The effect of the generation of radio-thermal energy in the earth's crust is to slow down the normal rate of cooling and it is shown that if the earth had originally a temp. of 1000° at or just below the surface the effect of radioactivity sufficient to maintain nearly $\frac{3}{4}$ of the present flow of heat would be to increase the period of cooling from 22 to 1600 million years. The method of estg. geological time by detg. the Pb-U ratios in minerals indicates that the oldest igneous rocks have an age of about 1500 million years. R. C. WELLS.

Coal fields of Canada (DOWLING) 21.

9. METALLURGY AND METALLOGRAPHY.

WILLIAM BRADY, WILLIAM T. HALL.

Biographical notice of John Birkinbine. R. W. RAYMOND. *Bull. Am. Inst. Mining Eng.* 1915, 1437-42.—An obituary. A list of papers published by Mr. Birkinbine is given. E. J. C.

Yields and wastes with special reference to puddling. J. E. FLETCHER. *Iron Coal Trades Rev.* 90, 564-6(1915).—The amt. of fettling oxides, $FeO \cdot Fe_2O_3$, required in puddling 100 lbs. of a standard pig iron containing C 3.5, Si 1.5, P 1.0 and Mn 1.0% is approx. as follows: for elimination of C 17.0 lbs., Mn 1.6 lbs., Si 4.7 lbs., and P 4.0 lbs. F. gives extensive tables showing the possible reactions of the oxide with C, Mn, Si and P and points out that they are dependent largely upon temp. conditions. By a study of these reactions it is easy to compute with fair accuracy the yields possible when working with any class of pig iron of given chem. analysis. H. L. OLIN.

Relative efficiency of various amalgams in the recovery of gold. F. A. THOMSON AND R. KEEFER. *Met. Chem. Eng.* 13, 367-70(1915).—Plain Hg excelled any of the amalgams in the treatment of a simple Au ore, when free from impurities. In the presence of sulfates, such as are frequently found in oxidized ores, the extn. was much reduced and plain Hg no longer gave the best results. With 5% of $ZnSO_4$ mixed with the ore plain Hg dropped to 4th place in comparison with certain amalgams; with $MnSO_4$, to 7th place; and with $FeSO_4$, to 8th place. When their av. performance under all conditions was considered, Pb and Sn amalgams gave the best results, with plain Hg 3rd. The relative effect of sulfates in lowering the extn. has also been detd. $FeSO_4$ caused an av. drop of 15.4%, $MnSO_4$ of 20.1%, $ZnSO_4$ of 25.8%. The injurious effect is due to the coating of the plates caused by the presence of sulfates, and in general the amalgams which gave high extns. showed less tendency to coat than the others. It appears that Hg has a greater affinity for Au when pure than when any other metal is amalgamated with it. In those cases where an amalgam shows a higher extn. than Hg alone, the effect is not caused by any increased efficiency due to the presence of the foreign metal, but rather to the superior resistance of the amalgam to the effects of impurities. With reference to ability to remain bright and clean in the presence of sulfates T. and K. have confirmed Aaron's results so far as Cd-amalgam is concerned,

this heading the list; the other amalgams follow about in the order named: Pb, Sn, Au, Ag, Na and Zn. Plain Hg was coated worst of all. C. A. NOWAK.

Effect of carbon in contact with auriferous cyanide solutions. W. R. FELDMANN. *Inst. Mining and Met., Bull.* 127; *Met. Chem. Eng.* 13, 389(1915): cf. C. A. 9, 1891.—By post-treating, with sulfide solns., sand residues from which a max. possible extn. had previously been recovered by cyanide treatment, a further extn. has been obtained, from a larger number of samples, and there is some promise that an economical post-treatment may be evolved on these lines. The pptn. of the Au from the sulfide solns. (in which the Au is held as alk. aurocyanide with hardly any free alk. cyanide, but a large excess of alk. sulfide) appears to be best effected by contact with metallic Cu. C. A. NOWAK.

The working up of lime and magnesia copper ores poor in copper and rich in silica. C. BINDER. *Chem. Ztg.* 39, 370(1915).—B. found that by treating for a few hrs. coarsely pulverized ores containing 1.5% Cu with the alkaline waste liquor from cellulose factories (38° Bé.), 0.82% Cu was removed, and that by adding tartaric acid 1.41% Cu was removed. The latter method seems applicable to sulfide ores also. J. H. MOORE.

The trend of modern blast furnace construction. A. E. MACCOUN. *Proc. Eng. Soc. Western Penn.* 30, 935-72(1915).—Paper and symposium. More substantial hearth jackets are being used with the preference for cast steel or iron jackets with water cooling pipe coils cast into each segment of jacket. The construction of the bosh has been greatly strengthened. Furnace shells of heavy steel plate are employed. A modern 500 ton furnace should have 4 stoves of approx. 22 ft. diam., 100 ft. high, each having 60,000 sq. ft. heating surface. Checker walls should be as thin as is consistent with structural strength. A 500 ton furnace requires 2500 h. p. for operation, of which 1800 h. p. is for blowing engines. H. L. OLIN.

Siphons on solution samplers. ANON. *Eng. Mining J.* 99, 863(1915).—Small particles interfered with the operation of the samplers of the Copper Queen Consolidated Mining Co., Bisbee, Ariz., and the balance weight had to be placed so far from the center of rotation that its fastenings were loosened by the jar of its motion. The removal of the siphons allowed the weight to be placed nearer the center of rotation and the small quantity of H₂O left in the pockets did not cause jar, not being rigidly attached. W. B. J.

The Rainbow (cyanide) Mill, Oregon. W. M. DAKE, JR. *Eng. Mining J.* 99, 1103-6(1915).—A detailed description with flow sheet of this cyanide mill. It is equipped for all-slime treatment and uses Pachuca tanks for agitation. Zn-dust pptn. is practiced, the melting being done in oil-fired tilting furnaces. The ore is quartz and andesite carrying gold. Extn. reaches 95.6%. E. J. C.

Large blast-furnace gas engines. H. HUBERT. Liège Univ. *Engineering* 99, 662-6, 688-9(1915).—An illustrated review of recent progress in the design of large blast-furnace gas engines, with special reference to Belgian practice. E. J. C.

Effect of mineralized waters in cyanide mills. T. B. STEVENS AND W. S. BRADLEY. *Ma. Chem. Eng.* 13, 368(1915).—From their experience S. and B. make the following recommendations for the use of mineralized waters: (1) If "salt water" is used it is not usually possible to obtain a protective alkalinity, but it is advantageous to add a small amt. of CaO in order to make use of the protective action of pptd. Mg(OH)₂. (2) A mixt. of "salt and fresh waters" is to be avoided as diln. of the NaCl present causes pptn. of insol. Ca and Mg salts, but if they have to be used the addition of Ca to produce a protective alkalinity is to be desired. (3) The use of all "fresh water" is by far the most satisfactory, but sufficient CaO should be added to it to render it

alk. before it is introduced into the treatment tanks. (4) Unless there be other adverse reasons against it, crushing in cyanide soln. is to be favored when using mineralized H_2O , as the quantity of "make-up water" required is kept at a minimum by doing so. A great deal depends on knowing the exact comp. of the H_2O , and work done in finding out exactly how the positive radicals contained in the dissolved salts are combined with the negative radicals is time well spent. C. A. NOWAK.

Cyaniding practice of Churchill Milling Co., Wonder, Nevada. E. E. CARPENTER. *Bull. Am. Inst. Mining Eng.* 1915, 1317-32.—The ore is chiefly hard oxidized quartz containing some sulfides. Talc occurs in places; this occasionally gives trouble. Tables show tonnage, recovery, costs, etc. The av. content of Au is 0.216 oz., of Ag 19.48 oz. Value is rated at \$15.52. Au recovery varied from 93.8 to 97.3%, Ag from 89.4 to 93.7%. *Treatment:* The ore passes through 2 in. grizzly to Blake crusher, then through stamps, Chilsan mill, Dorr classifier and tube mill. The ore first comes in contact with cyanide in the stamp batteries and in passing those, and the others mentioned, also a (Dorr) thickener, 76.4% of the Au and 72.2% of the Ag are extd., indicating that the ore is unusual. Agitation and washing in Pachuca tanks, thickening, etc., follow. The classifier overflow runs to a thickener from which the overflow goes to pptn. tanks. Thickened slime goes to 4 Pachuca tanks. Tank No. 1 usually shows 4.5 KCN and 1.6 CaO. In winter steam is used in the uplift column, bringing the temp. at times to 85° or 90° F. Oliver filters with dry vacuum are used. Two 8 ft. filters usually suffice, but if the ore contains much talc, a third 14 ft. filter is used. By special arrangement in washing the cake, a material amt. of cyanide is saved. For pptn. shavings cut from sheet Zn are used. Effective pptn. is about 95.2%. Daily tonnage is 2 to 2.5 tons of soln. per cu. ft. of Zn in 24 hrs. Consumption of chemicals per ton of ore: NaCN 1.72, Zn 1.63, Pb 0.94 lb. For good extn. much $Pb(OAc)_2$ is required. The ppt. contains in the dry 63.5% bullion, of which 6.15 is Au and Ag. No treatment with acid is necessary. It is dried down to about 20% H_2O , and smelted in a furnace using crude oil. E. WALLER.

Testing oil for flotation process. J. COURTS. *Australian Mining Standard* Apr. 8, 1915; *Met. Chem. Eng.* 13, 389-90 (1915).—Of the many tests required for this process, one of the most important is the testing of the active floating agent. Conditions of the tests should follow as closely as possible the presumed actual conditions of operation. C.'s discussion pertains mainly to eucalyptus and resinous oils. The testing of oils is carried out by comparing the sample with measured quantities of a standard oil. Detailed procedure is given. C. A. NOWAK.

Comparative furnace efficiency. R. J. WEITLANER. *Met. Chem. Eng.* 13, 357-61 (1915).—W. has tried to bring the question of comparing furnace efficiencies on a more uniform basis by means of the heat content in metal and he has given simple formulas by which this may be easily obtained. These formulas can also be used to develop a uniform system of cost comparison. C. A. NOWAK.

Brit., 4,639, Feb. 23, 1914. J. A. HESKETT. In the treatment of iron ores a mixt. of 6 parts of Fe ore or residue and 1 part of coal, together with powdered flux, is coked for use in smelting.

Brit., 4,744, Feb. 24, 1914. W. PLAYER and W. BRACE. Cleaning sheet metal by drawing it between a series of blocks of wood and felt or like material arranged to press on opposite sides of the sheet, and then straightening it by passage over, under, or around one or more bars.

Brit., 4,779, Feb. 24, 1914. W. A. MCADAMS. An aluminium alloy contains also Ag, and Cd or Ti, or both, all in comparatively small proportions.

Can., 160,494, Feb. 9, 1915. J. H. REID. Separating metals, by fusing the metals in an electric crucible, introducing a gas adapted to form salts with each of the metals, and then sepg. the salts.

Can., 160,495, Feb. 9, 1915. J. H. REID. Separating cobalt and nickel, by melting the metals, introducing P vapor and then sepg. the P compd.

Can., 160,671, Feb. 16, 1915. G. H. CLEVINGER. Separating silver from high grade ore by treating the ore in a tube mill to reduce it to a very finely divided condition in the presence of Hg and a strong soln. of alk. cyanide.

Can., 160,693, Feb. 16, 1915. A. H. HIGGINS. The concentration of ores by agitating the ore with water containing a mineral frothing agent and also a chemical agent that facilitates the sepn. of some metalliferous constituents by flotation and dissolves certain other constituents.

Can., 160,778, Feb. 16, 1915. J. S. IRELAND. Oxidizing sulfide ores, by first mixing a quantity of pulverized ore with a quantity of concd. HNO_3 , then withdrawing the NO produced and mixing it with air, producing NO_2 , and forcing the NO_2 into and through the ore mass continuously throughout the process to accelerate the reaction.

Can., 160,847, Feb. 23, 1915. W. J. ROSE. The separation of zinc sulfides and lead sulfides in ores by first submitting the ores to flotation sepn. to obtain a float concentrate of mixed ZnS and PbS and then submitting the concentrates to flotation, sepn. with agitation and aeration in a dil. soln. of Na_2CO_3 to obtain a float concentrate relatively rich in Zn and a residue relatively rich in Pb.

Can., 160,848, Feb. 23, 1915. F. J. LYSER. Separation of lead sulfide from zinc sulfide in ores by first submitting the ores to a flotation sepn. by violently agitating them in H_2O to beat in air with frothing agent to an extent just sufficient for the flotation of the PbS as a froth and sepg. the froth.

Can., 160,850, Feb. 23, 1915. H. LAVERS, A. H. PIPER and H. H. GREENWAY. Separation of sulfides and gang by submitting the powdered ore to flotation sepn. with agitation and aeration and with a frothing agent in a sepg. medium or circuit of H_2O containing in soln. an alkali substance, so as to obtain a froth of sulfides while the gang sinks.

Can., 160,851, Feb. 23, 1915. A. R. LIVINGSTONE. Concentration of minerals by feeding the mixture into a body of H_2O , progressively raising it through the surface of the H_2O , meeting the emerging top layer by a down-flowing film of H_2O , and floating the top layer thereby into the main body of H_2O at the surface.

Can., 160,910, Feb. 23, 1915. E. C. JORDAN. Obtaining metals from ores, metalliferous sands and the like by placing P in a suitable retort, placing the metalliferous material to be treated above P, heating the retort and collecting the metal driven off by the heat.

Can., 160,937, Feb. 23, 1915. T. M. OWEN. Froth flotation separation of metallic sulfides from alimes, by augmenting the flotation quality of certain sulfides in relation to certain other sulfides, by adding to and agitating with the pulp a limited proportion of free alk. KMnO_4 or MnO_2 .

Can., 160,982, Mar. 2, 1915. H. L. SULMAN and H. F. K. PICARD. Extraction of nickel from silicate ores, by treating the ore with a mineral acid in such a quantity as to act as a selective solvent of the Ni over Mg compounds forming the gang materials and precipitating the Ni from the soln. of the salts of Ni and other metals.

Can., 161,128, Mar. 9, 1915. J. E. BUCHER. Purifying a metal, by effecting a reaction in which the metal to be treated, a powerful reducing element, and the elements C and N participate.

Can., 161,190, Mar. 9, 1915. J. S. ISLAND. Reduction of ores by subjecting the ore to the action of HNO_3 and coincidentally introducing into the mass as a catalyst an oxide of nitrogen.

Ger., 281,444, Oct. 14, 1913. Addition to 280,979 (C. A. 9, 1601). WÄRME-VERWERTUNGS-GES. M. B. H. Process of utilizing the cooling of slag in containers with jacketed walls through which H_2O is conducted at such a rate of flow that it is not vaporized. In order to increase the cond. of the molten mass of slag, an Fe mesh is imbedded, and after the slag has cooled this mesh serves in handling the block.

Ger., 281,474, Dec. 16, 1913. Addition to 280,979 (C. A. 9, 1601). WÄRME-VERWERTUNGS-GES. M. B. H. In a process of utilizing the cooling of slag, a non-conducting material, such as loam, is interposed between the molten slag in the vessel and the water jacket, in order to prevent steaming during the first stages of operation.

Ital., 125,103; 393,231, Jan. 29, 1913. O. BRAUT. In a process of extracting copper from porphyritic ores, and the like, the crushed ore is mixed with about 10% of alkali chloride and heated for a short time not above a red heat, when it is allowed to cool to 80° and treated with a soln. containing 5% of HCl . The Cu is pptd. from the soln. by means of metallic Fe.

Ital., 130,637; 398,215, Mar. 17, 1913. L. AURICCHIO. Process of mfg. a high speed steel containing homogeneous Fe 72-76, W 14-19, Cr 2-6, ferro-vanadium 0.4-0.4, Co 0.2-0.6, ferro-manganese 0.3-0.55, ferro-silicon 0.15-0.25.

10. ORGANIC CHEMISTRY.

C. A. ROUILLER.

Polarimetric researches on the modifications which tartaric acid undergoes during fusion. G. BRUHAT. *Ann. chim.* 3, 121-40(1915).—Biot (*Ann. chim. phys.* [3] 29, 35) reported that the $[\alpha]_D$ of *d*-tartaric acid (A) in H_2O was the same after as before fusion, but that if H_3BO_3 was added to solns. of (A) the $[\alpha]_D$ of the fused product was at first $< [\alpha]_D$ of (A), gradually increasing until the $[\alpha]_D$ of the 2 solns. were identical. Bruhat has repeated Biot's work with a delicate Lippich polarimeter, using green ($\lambda = 546 \mu\mu$) and yellow ($\lambda = 578 \mu\mu$) light, and recording the temp. accurately to 0.05° . The concns. of (A) solns. were detd. by titration. Initial rotations were detd. as soon after soln. of fused (A) as possible. A large number of readings, taken at frequent intervals, indicate that $[\alpha]_D$ of solns. of fused (A), to which no H_3BO_3 has been added, diminishes progressively during 3 months, finally reaching a const. value. 2 stages of the reaction were noted—a stage of rapid decrease in $[\alpha]_D$, completed in a few hrs., and a subsequent stage of very gradual decrease in $[\alpha]_D$. B. has clearly shown these phases of the reaction by means of tabulated data and graphs. When fused (A) solns. are treated with H_3BO_3 , the reaction also proceeds in 2 stages: a period of slight initial decrease in $[\alpha]_D$ being followed in less than a day by a period of gradual increase in $[\alpha]_D$. The latter period is also marked by an increase in rotatory dispersion. Other chemists have reported that during fusion (A) is first converted into metatartaric acid (its isomer), which on further heating forms ditartaric acid, $(\text{C}_4\text{H}_4\text{O}_6)_2\text{O}$ (B), which in turn passes into tartrelic acid and finally into the insol. tartaric anhydride. B. interprets his results as follows: In the aq. solns. of fused (A) alone, the slight initial decrease in $[\alpha]_D$ is probably due to the rapid reconversion of meta-tartaric into (A), whereas the 2nd phase of gradual decrease in $[\alpha]_D$ marks the slow hydration of (B) with formation of (A). (The presence of (B) in B.'s solns. was demonstrated by formation of the H_2O -sol. Cu salt.) In the case of fused (A)- H_3BO_3 solns., the explanation is as follows: H_3BO_3 is without action on (B) but reacts with (A) as rapidly as

it is formed from (B), yielding tartaroboric acid (C), which has an $[\alpha]_D$ 4 times as great as that of (A) and much greater than that of (B). The formation of (C) is characterized by augmented rotatory dispersion.

LOUIS E. WISE.

Syntheses by means of organometallic zinc derivatives. γ -Chloro ketones and their transformation products. III. HENRI WOHLGEMUTH. *Ann. chim.* 3, 141-93 (1915); cf. *C. A.* 9, 1602.— γ -Cl ketones, when heated with dry, powdered KOH at 140–70°, yield trimethylenic ketones, $R.CH.CH(COR').CH_2$ (cf. Lipp, *Ber.* 22,

1207). If R' is an aryl group, R' is ordinarily a by-product of the reaction. The following products were synthesized: *methylcyclopropyl ethyl ketone* (A), from $MeCHCl-(CH_2)_2COEt$, b_{700} 144–5°, possessing a penetrating, rather pleasant odor; *oxime*, liquid, b_{11} 99–100°; *semicarbazone*, leaflets, m. 96°; *methylcyclopropyl phenyl ketone*, from $MeCHCl(CH_2)_2Bz$, $b_{16.5}$ 121°, purified by means of its *semicarbazone*, microcrystals, m. 187°; *p-nitrophenylhydrazones*, brick-red prisms, m. 109°; *cyclopropyl p-tolyl ketone*, leaflets, m. 48°; *semicarbazone*, plates, m. 208–9°. When oxidized with concd. aq. $KMnO_4$, (A) yielded *methylcyclopropylglyoxylic acid*, $CH_3.CHMe.CHCOCO_2H$ (B),

b_{17} 100–1°; *semicarbazone*, microcryst., m. 174°; *phenylhydrazones*, yellow needles, m. 133° on a Hg bath. On treatment with $KMnO_4$, (B) remains unchanged, but 30% H_2O_2 readily converts it into $CH_3.CHMe.CHCO_2H$ (cf. Marburg, *Ann.* 294, 131),

b_{14} 96.5°, d_4^{20} 1.0269, n_D 1.4411; Ca salt, brilliant plates; *acid chloride*, b_{11} 39.5°, possessing a disagreeable odor; *anilide*, prismatic needles, m. 113.5°. When a mixt. of Et_3NH and $MeCHCl(CH_2)_2COEt$ was heated at 150° for 16 hrs. the products formed were (A) and γ -diethylaminobutyl ethyl ketone (in poor yield), b_{12} 101–3°; *semicarbazone*, leaflets, m. 144°. By means of a similar reaction, γ -diethylaminopropyl ethyl ketone (C), b_{11} 95–6°, was obtained in 70% yield. The *picrate* of (C) does not crystallize. Its *semicarbazone*, m. 108°. When treated with 4% Na-Hg (C) is readily converted into γ -diethylaminopropylethylcarbinol, $b_{14.5}$ 110°; *phenylurethan hydrochloride*, platelets, m. 99°; *benzoate* (of C), b_{12} 182°. γ -Cl and γ -Br ketones are not acted upon by Mg. $MeCHCl(CH_2)_2COEt$ does not react with KCN, $CHNa(CO_2Et)_3$, $NaCH(CN)CO_2Et$, or $MeC(ONa):CHCO_2Et$. $EtMgBr$ reacting with $MeCHCl(CH_2)_2COEt$ gives rise to γ -chlorobutyldiethylcarbinol, $MeCHCl(CH_2)_2C(OH)Et_2$, b_{12} 108–9°, readily dehydrated by heating with KOH in MeOH, with the formation of α -methyl- α' -diethyltetrahydrofuran, $CHMe.CH_2.CH_2.CEt_2.O$, b_{700} 151–2°, whose vapors impart a red color to pine

shavings moistened with HCl. Similarly, W. synthesized γ -chloropropyldiethylcarbinol, b_{10} 99–100°, and its deriv., α , α' -diethyltetrahydrofuran, b_{700} 144–5°, possessing an odor suggesting camphor, whose vapors give a reddish brown coloration when the pine-shaving test is applied. The γ -Cl ketones when treated with KCN + HCl at –3° yield the corresponding cyanohydrins. 6-Chloro-3-heptanol-3-nitrile, $MeCHCl-(CH_2)_3C(OH)CN$ (D), viscous liquid, b_{14} 151–2° (slight decompn.) with an odor resembling that of cherry pits; when heated with concd. HCl at 100° for several hrs., it yielded largely α -ethyl- α' -methyltetrahydrofuran- α -carboxylic acid (E), viscous, b_{11} 116–7°, whose *amide*, leaflets, m. 69°, was formed when (D) was heated for several hrs. with 4 mols. KOH in dil. EtOH. The *ethyl ester* of (E), $b_{9.8}$ 84°. 6-Chloro-3-hexanol-3-nitrile, b_{10} 154–5°. α -Ethyltetrahydrofuran- α -carboxylic acid, b_{16-7} 126–7°, b_{718} 234–5°; *ethyl ester*, b_{10} 82–3°.

LOUIS E. WISE.

Synthesis of 1,7-heptanediol and some derivatives of hexane, heptane and octane. R. DIONNEAU. *Ann. chim.* 3, 194–268(1915).—A collective article (cf. *Compt. rend.* 142, 91; 145, 127; *Bull. soc. chim.* 7, 327; *C. A.* 7, 3117).

LOUIS E. WISE.

Diketotriazines. Syntheses of substituted semicarbazides. J. BOUGAULT. *Compt. rend.* 160, 625-7(1915); cf. *C. A.* 9, 598, 1174.—The 4-Me and 4-Et derivs. of $\text{PhCH}_2\text{C}:\text{N}:\text{NH}:\text{CO}:\text{NH}:\text{CO}:$ (A), when heated with dil. NaOH yield $\text{MeNHCONHN}:-$

$\text{C}(\text{CH}_2\text{Ph})\text{CO}_2\text{H}$ (B), m. 194° , and $\text{EtNHCONHN}:\text{C}(\text{CH}_2\text{Ph})\text{CO}_2\text{H}$ (C), m. 141° , resp. The corresponding 4- CH_2Ph deriv. of (A) under these conditions gives rise to a mixt. of phenylpyruvic acid α -benzylsemicarbazone (D), m. 168° , forming a H_2O -sol. sodium salt, and the β -isomer (E), m. 170° , giving a fairly insol. sodium salt. By treating (B) and (C) with cold concd. HCl for several days, removing with Et_2O the free $\text{PhCH}_2\text{COCO}_2\text{H}$ formed in the hydrolysis, and neutralizing the residue with Na_2CO_3 , MeNHCONHNH_2 , m. 112° , and EtNHCONHNH_2 , m. below 100° , resp., were obtained. Under these conditions, (D) and (E) yield the same 4-benzylsemicarbazide, m. 111° . All of these semicarbazides give rise to cryst. hydrochlorides and form condensation products with aldehydes and ketones.

LOUIS E. WISE.

Basic salicylates. OECHSNER DE CONINCK AND GERARD. *Compt. rend.* 160, 627-8(1915).—Just as $o\text{-HOC}_6\text{H}_4\text{CO}_2\text{H}$ forms basic salts of bivalent metals, so the substituted salicylic acids give rise to amorphous, insol. salts of the general type $\text{XC}_6\text{H}_3\text{CO}_2\text{M}^+\text{O}^-$. The following metallic derivs. were prepd. (but the position of

the substituent group is not given): lead bromosalicylate, $\text{BrC}_6\text{H}_3\text{CO}_2\text{Pb.O.H}_2\text{O}$; lead

dibromosalicylate (without H_2O); barium chlorosalicylate (1 mol. H_2O); lead aminosalicilate (without H_2O); basic lead salicylsulfonate, $\text{HOC}_6\text{H}_3\text{SO}_3\text{Pb.O}_2\text{C.PbO}$; barium

iodosalicylate; barium diiodosalicylate; barium nitrosalicilate; copper salicylate (A), with 1 mol. H_2O , easily removed by heating at $97-8^\circ$. On heating (A) in the presence of H_2O , decompn. takes place with the formation of CuO , PhOH and CO_2 .

LOUIS E. WISE.

Saturated hydrocarbons from "vacuum tar." AMÉ PICTET AND MAURICE BOUVIER. *Compt. rend.* 160, 629-31(1915); *Ber.* 48, 926-33(1915); cf. *C. A.* 8, 414.—P. and B. in continuing their researches on "vacuum tar" (*goudron de vide*) have examd. 60 kg. of heavy oil produced by distg. under 15-20 mm. 1.5 tons of petroleum from the Montrambert (Loire) region. After removal of the unsatd. hydrocarbons by means of liquid SO_2 the following liquid cyclic hydrocarbons were isolated. They are probably homologs of cyclohexane: C_9H_{18} , b_{710} $135-7^\circ$, d_{20} 0.759, n_D^{20} 1.4212; $\text{C}_{10}\text{H}_{20}$, b_{780} $172-4^\circ$, d_{20} 0.7765, n_D^{20} 1.4196; $\text{C}_{11}\text{H}_{22}$, b_{780} $189-91^\circ$, d_{20} 0.7838, n_D^{20} 1.4234; $\text{C}_{12}\text{H}_{24}$, b_{780} $211-3^\circ$, d_{20} 0.7862, n_D^{20} 1.4293; $\text{C}_{13}\text{H}_{26}$, b_{780} $227-9^\circ$, d_{20} 0.7953, n_D^{20} 1.4379; $\text{C}_{10}\text{H}_{20}$, b_{780} $160-1^\circ$, d_{20} 0.768, n_D^{20} 1.4272. The 1st 5 of these compds. are identical with 5 hydrocarbons found by Mabery (cf. *J. Am. Chem. Soc.* 19, 470, et al) in Canadian and Californian petroleum. By distg. the heavy oil under 15 mm., $\text{C}_{10}\text{H}_{20}$ (A), needles, m. $62-3^\circ$, d_{25} 0.9128, was obtained and found to be identical with melene, obtained from beeswax by Brodie (*Ann.* 71, 156). (A) is a component of the original, undistd. oil, from which it can be isolated by extn. with boiling C_6H_6 . It is also found in the paraffin obtained from Galician petroleum.

LOUIS E. WISE.

Trimagnesium citrate and the so-called basic magnesium citrates. E. LÉGER. *Compt. rend.* 160, 660-3(1915).—A tri-Mg citrate (13 mols. H_2O) (A), square plates, was formed by satg. a concd. hot citric acid soln. with MgCO_3 . (A) crystallizes very slowly on cooling and L. assumes the formation of an intermediate hydrate containing less H_2O of hydration. When a concd. soln. of (A) is heated for 20 hrs. on a H_2O bath or at 110° , a tri-Mg citrate (9 mols. H_2O) (B), prisms, is formed. (A) loses all of its H_2O at $150-5^\circ$, whereas (B) is completely dehydrated only at 175° . By heat-

ing 3 mols. $(\text{AcO})_2\text{Mg}$ in boiling EtOH with 2 mols. citric acid a 3rd tri-Mg citrate (7 mols. H_2O) (C), sol. in 2 parts H_2O , is formed. (C) in concd. soln. is gradually converted into the less sol. (A). (C) is probably slowly formed when anhydrous tri-Mg citrate is exposed to moist air. (B) is readily sol. in NH_4OH with the formation of the compound, $\text{Mg}_3(\text{C}_6\text{H}_5\text{O}_7)_2 \cdot 2\text{NH}_4 \cdot 5\text{H}_2\text{O}$. Kammerer has previously prepd. (B) and has also described 3 basic Mg citrates (cf. *Ann.* 148, 311; 170, 181), the existence of which L. considers problematical (L. gives no analytical data in this article).

LOUIS E. WISE.

Synthesis of α -glycerophosphoric acid. O. BAILLY. *Compt. rend.* 160, 663-6 (1915); cf. *C. A.* 9, 1745.—To 18 g. of $\text{O:P(ONa)}_2(\text{OCH}_2\text{CH:CH}_2)$ (A) in 500 cc. H_2O kept at 15° were gradually added 14 g. KMnO_4 in 500 cc. H_2O . After standing for several hrs. the mixt. was filtered, neutralized, treated with 12 g. CaCl_2 in a few cc. H_2O , filtered to remove traces of $\text{Ca}_3(\text{PO}_4)_2$ and the filtrate treated with an equal vol. of EtOH, thus pptg. crude Ca α -glycerophosphate (B), which after washing with 45% EtOH, to remove chlorides, was freed from residual (A) by treating the ppt. with 49 vols. H_2O at 85° , in which (A) is nearly completely insol. From the filtrate from (B) a 25% yield of pure (B) was obtained by addition of EtOH. (B) responds to all the tests for the α -salt and is free from the β -isomer. B. gives a table of solubilities of the Ca, Sr and Ba α - and β -glycerophosphates.

LOUIS E. WISE.

Blue adsorption compounds of iodine. II and III. Derivatives of 2- and 4-pyrone. GEORGE BARGER and WALTER W. STARLING. Roy. Holloway Coll., Surrey and Goldsmith Coll., London. *J. Chem. Soc.* 107, 411-24 (1915); *Proc.* 30, 303.—A part of this work has been previously outlined (cf. *C. A.* 8, 3292; 9, 991). The additive products formed by interaction of I and synthetic compds. are either mixed crystals (solid solns.) or adsorption compds., in which case the org. compd. (amorphous or in colloidal soln.) is the adsorbent. B. and S. have traced the effect of constitution on adsorptive power and have discussed the influence of substituent groups upon adsorption. The addition of I by org. compds. is probably the result of residual affinity. In the following characterization of products prepd. by treating α -pyrones with I, M.C. = mixed crystals, A.A. = amorphous adsorption compds., and the concn. of free I at which adsorption takes place is expressed by the number of l. containing 1 g.-atom (e. g. "at 500" means "in 0.002 N I"). Unless otherwise stated, the compds. were formed by mixing the substance in EtOH with an aq. I soln. Coumarin forms M.C., blue pleochroic needles at 500; pale gray at 5000; not perfectly white at 20,000. 3,3-Dicoumaryl forms no M.C., but transitory A.A. at 100. 3-Acetylcoumarin forms M.C., gray, metallic, pleochroic plates (similar to those of coumarin) below 600, transitory A.A., blue from concd. EtOH soln. at 1000 or by rapid cooling, changing to colorless crystals in a few seconds. 3-Benzoylcoumarin (A) forms M.C. at 300, opaque, strongly pleochroic blue needles. At 100-200, 20-30% EtOH solns. of (A), on cooling, deposit large colorless needles followed by a sepn. of clusters of thin M.C. 7-Hydroxy-, 7-hydroxy-4-methyl-, 7-hydroxy-3,4-dimethyl-, 7,8-dihydroxy-, and 7,8-dihydroxy-4-methylcoumarin yield additive compds. with I only when the reactions are carried out in concd. alk. solns. (not in EtOH). Benzoates of these pyrones, in EtOH, all yield blue A.A. at 100 (with the exception of the 7,8,4-(BzO)₂Me deriv., which yields M.C., curved needles). Corresponding acetates do not react with I. The affinity of hydroxycoumarins for I may be increased by the introduction of a Ph group on the pyrone ring (e. g., 7-hydroxy-4-phenylcoumarin yields transitory A.A. at 1000). 7-Benzoyloxy-4-methyl-3,4-dihydrocoumarin does not react with I. 4,3- β -Naphthapyrone instantly yields blue A.A. at 7000, after a few min. at 10,000. H^+ has a favorable effect on this adsorption. 4,3- β -Naphthapyrone-2-carboxylic acid forms A.A. at 2000, the adsorption being markedly increased by the presence of small

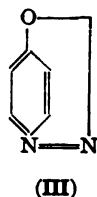
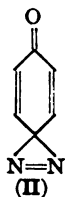
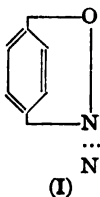
amts. of CaCl_2 (and even by tap water). 4-Methyl-1,2- α -naphthapyrone forms no M.C., gives transient blue A.A. at 5000. 2-Phenyl-4,3- β -naphthapyrone gives a dark blue coloration at 1000, only on standing in the presence of H^+ or multivalent cations. The following products or colorations were obtained from γ -pyrones: 2-Phenyl-6-methylpyrone yields M.C. at 10 after 0.5 hr., the formation being favored by H^+ . 2,6-Diphenylpyrone yields A.A. up to 20,000, but no M.C. Benzo- γ -pyrone gives a crimson to purple color at 1000; its 2- CO_2H deriv. also gives a crimson coloration at 1000, as well as M.C., pleochroic needles. Na 6-methylbenzopyrone-2-carboxylate solns. give transitory A.A. up to 50, no M.C. The isomeric 7- and 8-Me derivs. behave similarly. 6,8-Dimethylbenzopyrone-2-carboxylic acid in alk. soln. at 1000-10,000 gives a crimson-purple A.A.; at <500 blue A.A. (unless an excess of KI is present). 5-Methyl-8-isopropylbenzo- γ -pyrone-2-carboxylic acid gives no blue A.A., but yields a blue amorphous substance at 10. 1,4- α -Naphthapyrone crysts. very rapidly, but shows a momentary blue coloration at 20,000. On rapid cooling a mixt. of blue flakes and colorless crystals is pptd., the latter disappearing slowly (*most* slowly in the presence of a protective colloid-like gelatin). 1,4- α -Naphthapyrone-2-carboxylic acid shows slow adsorption at 5000 from glacial AcOH , and at 20,000 from alkali. In no case did xanthone derivs. yield M.C. Xanthone forms A.A. up to 500 in neutral, up to 1000 in 0.1 *N* acid solns. 3-Hydroxyxanthone gives only a faint purple coloration at 200, in alkali. The 2-isomer has as its limits 6000 (in EtOH) and 10,000 (alkali). Similar limits were observed for 2,4- and 4,6-dihydroxyxanthenes. β -Phenonaphthaxanthone forms A.A. at 200 from neutral, at 5000 from acid solns. α -Dinaphthaxanthone, m. 240° , prepd. from $\alpha,\beta\text{-C}_{10}\text{H}_6(\text{OH})\text{CO}_2\text{H}$, forms A.A. at 20,000 and on standing, at 50,000. Flavone (*B*) gives immediate A.A. at 10-100, and M.C., blue needles, at 4000 after standing for a few min. Formation of both products is favored by H^+ . 6- and 7-Methylflavones behave similarly to (*B*); the 8-isomer forms no M.C., but gives A.A. at 1,000. All 3 isomers are 5-10 times as sensitive in *N* HCl as in neutral soln. 5-Methyl-8-isopropylflavone adsorbs very slowly, although adsorption becomes evident rather suddenly, as if after an "induction period." Multivalent cations and H^+ delay whereas multivalent anions ($\text{SO}_4^{=}$, $\text{PO}_4^{=}$, etc.) accelerate adsorption. 8-Hydroxyflavone forms no M.C., A.A. at 10 in neutral medium, transitory A.A. at 500 (H^+). 3'-Hydroxyflavone forms A.A. (from alkali) slowly at 8000. 4'-Isomer forms A.A. (from alkali) at once at 25,000. 6,4'-Dihydroxyflavone forms transitory A.A. at 1000; 5,7-isomer (chrysin), pale blue A.A. slowly at 10,000 from neutral soln., accelerated by 0.1 *N* HCl. 5,7,4'-Trihydroxyflavone (apigenin), A.A. from alkali at 2000, more slowly at 5000 (related to saponarin which forms A.A. at 4000 from alkali). 7,3',4'-Trihydroxyflavanol (fisetin) forms black A.A. from alkali at 10; green A.A. (more slowly) at 100. 2',3'-Dimethoxyflavone gives no typical I reaction. 7,3'-Diethoxyflavone forms A.A., purplish brown at 100, crimson-purple to blue at 5000, yellow to pale blue at 10,000. Both indenoflavone (*C*) and α -naphthafavone (*D*) form A.A. at very high dilns. Their color reactions with I are more sensitive than the starch-I reaction. In the presence of multivalent cations (*C*) reacts with I up to 125,000, and (*D*) gives colorations at 150,000 (on standing). Starch gives no coloration beyond 50,000 or 60,000, and is not rendered more sensitive by electrolytes. β -Naphthafavone is much less sensitive than (*D*), but gives a blue coloration at 10,000 in the presence of H^+ . Flavanones with a reduced pyrone ring are indifferent to I. Thiocoumarin at 100-1000 forms a dark-colored ppt. changing to gray crystals. Thioxanthone does not react with I. Methylthioxanthone forms black A.A. at 10, reddish brown colloidal soln. at 100. 1,4-Dimethylthioxanthone adsorbs slowly at 100 (instantaneously if CaCl_2 is present); slowly at 1000, in the presence of CaCl_2 . The 2,4-isomer forms M.C. at 100-1000. Methoxythioxanthone reacts at once at 100 (with blue coloration), more slowly at 3000, in the presence of Ca^{++} or H^+ at 10,000.

1,4-Dimethoxythioxanthone gives a green coloration at 30,000; a blue coloration if Ca^{++} is present. 2-Hydroxythioxanthone reacts up to 500; 2-methyl-(5,6,7 or 8)-monohydrothioxanthone reacts up to 10,000. 1-Hydroxy-4-ethoxythioxanthone does not react. Chloromethoxythioxanthone (cf. Marsden and Smiles, C. A. 5, 3567) and naphthathioxanthone both adsorb I up to 10,000. β -Aminonaphthathioxanthone gives a greenish coloration, up to 1000 in neutral soln., a reddish brown coloration up to 100,000 in the presence of H^+ . 3,6-Dimethylphenothioxin gives deep blue M.C. at 20. Naphthathioxin gives a reddish brown coloration which becomes bluish green on boiling (concn. of I not given), owing to a partial oxidation to the corresponding oxide, which is itself colored deep blue at 100, and yields gray M.C. at 1000. Iso-naphthathioxin oxide does not react with I, nor does naphthathioxin dioxide. Thioflavone forms M.C. at 1000. The 6-methyl deriv. reacts slowly at 5000-10,000. The 5,8- Me_2 deriv. gives A.A. at 300, but is 100 times more sensitive in the presence of H^+ (the concn. of H^+ affecting the adsorption being *much* below that affecting Congo red). The 6,8- Me_2 deriv. adsorbs at 200 in neutral, at 20,000 in acid soln. The 8-HO deriv. adsorbs only in acid up to 30. The 6-MeO deriv. reacts at 30,000 in neutral, at 50,000 in acid soln. The 8-MeO deriv. reacts at 1000 in neutral, at 5,000 in acid soln. α -Thionaphthaflavone reacts up to 100,000 in acid soln. The β -isomer is colored blue in neutral soln. at 1000, in acid soln. at 100,000. LOUIS E. WISE.

Mangostin: a crystalline substance allied to the resins. JOHN R. HILL. Inst. Med. Res., Kuala Lumpur, Federated Malay States, and Davy-Faraday Lab., London. *J. Chem. Soc.* 107, 595-601 (1915).—Mangostin (A) occurs in all parts of the mangosteen tree (*Garcinia mangostana*). The dried fruit skins contain about 5% each of a cryst. resin (A) and a non-cryst. resin. (A) was first isolated by Schmidt (*Ann.* 93, 83 (1865)), who assigned the formula $\text{C}_{20}\text{H}_{22}\text{O}_6$. (A) has the typical resin properties, burning with a smoky, luminous flame, causing friction and vibration when rubbed between the fingers, and dissolving in alkalies, alc., Et_2O , and many other solvents. (A) was obtained by concg. the alk. ext. of the dried skins *in vacuo*, shaking the syrupy residue with H_2O , and dissolving the dried insol. portion in warm PhH containing a little Et_2O . Recrystd. repeatedly from alc. containing a little H_2O , it forms flat, pale yellow needles, m. $181-2^\circ$. The analyses and mol. wt. detns. in PhOH and $(\text{CO}_2\text{Me})_2$ gave results agreeing with $\text{C}_{22}\text{H}_{24}\text{O}_6$. (A) is insol. in carbonates, dissolves in alkalies with a red color, and is reprecipitated by CO_2 and acids and gives a greenish brown color with FeCl_3 . It contains 1 MeO and 2 phenolic OH, the latter being shown by titration and by the action of Me_2SO_4 and dil. aq. KOH, which yield *dimethylmangostin*, $\text{C}_{24}\text{H}_{28}\text{O}_6$, faintly yellow, silky needles, m. 123° . (A) and warm HNO_3 gave $(\text{CO}_2\text{H})_2$, even when HOAc was used as diluent. Concd. KMnO_4 also gave $(\text{CO}_2\text{H})_2$. Fusion with 5 parts KOH at about 250° gave a volatile oil with the odor of AmOH. The aq. soln. of the fusion was acidified and extd. with Et_2O , yielding BzOH, isolated as the Ca salt. In another expt. the aq. soln. of the fusion was satd. with CO_2 , shaken out with Et_2O and then with alc., which did not mix with the soln. The alc. soln. containing K salts was evapd., acidified with H_2SO_4 , and distd. with steam. The resulting volatile acids were purified through the Ba and Na salts and finally sepd. as the Ag salts. HOAc and $\text{C}_4\text{H}_7\text{CO}_2\text{H}$ were found. Boiled with HI for 12 hrs., (A) yields a substance, $\text{C}_{22}\text{H}_{22}\text{O}_6$, faintly yellow, silky needles, m. $180-1^\circ$, changes into short rhombs with identical properties on standing overnight in the mother-liquors when crystd. from alc., gives a deep green color in alc. with FeCl_3 ; its *methyl derivative*, prepd. with Me_2SO_4 and aq. KOH containing a little alc. to facilitate soln., m. 216° ; the *monoacetyl derivative*, using Ac_2O and NaOAc, m. $218-9^\circ$. M. HEIDELBERGER.

Constitution of internal diazo-oxides (diazophenols). GILBERT T. MORGAN AND JAMES W. PORTER. Dublin. *J. Chem. Soc.* 107, 645-59 (1915).—Exception is taken

to Klemenc's characterization of these compds. as internal diazonium salts (I) (C. A. 8, 2706) and a summary of the arguments in favor of the quinopediazide (II) and *eso*-diazo-oxide (III) structures is given. Preference is given to (III), since the *peri*-diazo-oxides obtained from 1,8-HOC₁₀H₆NH₂ cannot be formulated on the basis of (II). The 2-NO₂ deriv. of (III) was prepd. (1) from 2,4-O₂N(H₂N)C₆H₃OH and NaNO₂ in dil. H₂SO₄, and (2) diazotization of 4,3-Cl(O₂N)C₆H₃NH₂ (A) followed by partial neutralization. It explodes violently at 168° and couples readily with alk. β -C₁₀H₇OH to form 3-nitro-4-hydroxybenzeneazo- β -naphthol, orange-red leaflets, m. 216°, sol. in H₂SO₄ with a crimson color. (A) is best prepd. according to Claus and Stiebel (Ber. 20, 1380



(1887)), except that the yield is made almost quant. by working at low temps. and using HNO₃ free from HNO₂. 3,4-O₂N(H₂N)C₆H₃OH (B) was obtained in finely divided form by dissolving in a warm mixt. of 2 parts HOAc and 10 H₂O and cooling; with an excess of EtNO₂ the soln. gave, on evapn. to dryness after filtering off impurities, 3-nitrobenzene-4-diazo-1-oxide, brown needles, explodes with moderate violence at 119°; also obtained from a cooled Et₂O-alc. soln. of (B) and N₂O₅ from HNO₃ and As₂O₃. With alk. *m*-C₆H₄(OH)₂ it gives 2-nitro-4-hydroxybenzeneazoresorcinol, brownish red crystals, m. 212° (decompn.). 2,5-H₂N(O₂N)C₆H₃OH was prepd. from *p*-O₂NC₆H₄NH₂ through the azoimide, at as low a temp. as possible in order to prevent tar formation. With NaNO₂ in dil. HCl it gives 5-nitrobenzene-2-diazo-1-oxide, acicular crystals or garnet prisms, darkens 95°, blackens 105°, explodes with extreme violence 111°; 4-nitro-2-hydroxybenzeneazo- β -naphthol, bright red, sepd. from soln. as the monopotassium salt, green crystals with a bronze luster, explodes on heating; a table is given of the intensely colored salts of the dye with a no. of other metals. If *m*-H₂NC₆H₄OH is dissolved in warm Ac₂O and the soln. allowed to cool, *m*-AcNHC₆H₄OH is obtained. This, added slowly with stirring and cooling with ice-salt to 6 parts HNO₃ (d. 1.4), gave a mixt. (80% of the theory) of the 4- and 6-NO₂ derivs. easily sepd. through the sparing solubility of the 4-compd. in alc. Diazo-oxides could not be prepd. from these, but the diazonium salts were characterized by the prepn. of azo derivs. which sepd. as sparingly sol. alk. salts and were liberated by mineral acids. 4-Nitro-3-hydroxybenzeneazoresorcinol, dark red crystals, m. 196°; 2-nitro-5-hydroxybenzeneazo- β naphthol, red, does not m. below 260°; 4,6,3-(O₂N)₂(H₂N)C₆H₃OH, diazotized with EtNO₂, gave 2,4-dinitro-5-hydroxybenzeneazo- β -naphthol, brown-red needles, does not m. below 260°.

M. HEIDELBERGER.

Method for distinguishing tautomeric, isomeric, and polymeric from polymorphic substances. NEVIL V. SIDGWICK. Oxford. *J. Chem. Soc.* 107, 672-8(1915).—"Let *A* be the more sol. of the 2 forms *A* and *B*. A satd. soln. of *A* is made in a suitable solvent, and to this (at const. temp.) is added some solid *B*. If the forms are polymorphic, and both give the same mols. in soln., then since the soln. is satd. with *A*, which is the more sol. form, *B* will not dissolve. . . . At any rate, the concn. of the soln. will not increase." If, however, the forms are tautomeric, isomeric, or polymeric, "then *A* and *B* will each dissolve as such. . . (if the tautomeric change is not too rapid) and the soln. will become stronger. . . ." The simplest way of following the change in concn. is by the f. p. method. In this way, using PhH as solvent, it is shown, among other examples, that the 2 forms of *p*-O₂NC₆H₄OH, *p*-BrC₆H₄NHAc, and 2,4-C₆H₃-

NHAc are polymorphic, those of benzoylcamphor tautomeric (enol and ketone), that *d*- and *l*-camphoric anhydrides are isomeric and that the 2 forms of BzCH:NNHPh are tautomeric.

M. HEIDELBERGER.

Formaldehyde salts. H. FRANZEN AND L. HAUCK. Karlsruhe. *J. prakt. Chem.* 91, 261-84 (1915); cf. *C. A.* 8, 3423.—Several metallic salts of CH_2O were prepd. and studied with regard to the possibility that they may be intermediate compds. in the polymerization of CH_2O to sugar. Their suggested structural formulas and manner of formation is illustrated in the case of the Ca salt, *e. g.*, $2\text{CH}_2(\text{OH})_2 + \text{Ca}(\text{OH})_2 = \text{Ca}(\text{OCH}_2\text{OH})_2 + 2\text{H}_2\text{O}$. The length of the chain in these compds. varies with the different metals. When very dil. solns. of CH_2O with $\text{Ca}(\text{OH})_2$ are used, it is suggested that a salt of the comp. $\text{HOCH}_2\text{OCaOH}$ (a) is formed, and that in the formation of sugars from CH_2O 2 mols. of (a) condense with elimination of $\text{Ca}(\text{OH})_2$ to form $\text{HOCH}_2\text{CH}(\text{OH})\text{OCaOH}$, which similarly condenses with another mol. of (a) to form the $\text{HOCH}_2\text{CH}(\text{OH})\text{CHO}$ deriv., and that this product finally in the same way yields the hexose. The lead salt, $\text{CH}_2[(\text{OPbOCH}_2)_2\text{OPbOH}]_2 \cdot 2\text{H}_2\text{O}$, prepd. by shaking for 24 hrs. in 650 cc. H_2O , 72 g. of 40% CH_2O with the $\text{Pb}(\text{OH})_2$ obtained from 113.6 g. $\text{Pb}(\text{OAc})_2$ and 24 g. NaOH , and drying *in vacuo* over KOH and H_2SO_4 , was obtained as a white powder having a strong odor of CH_2O . It gives a clear soln. with cold, dil. HNO_3 and AcOH . On standing in the dark in a closed flask for 8 weeks, its CH_2O content fell from 9.42 to 6.37%, and when heated at 140° it was gradually converted into another form with very little evolution of free CH_2O . Calcium salt, similarly prepd., shows the same properties as the Pb salt. It is decompd. by both alc. and H_2O . Strontium salt, $\text{CH}_2(\text{OSrOCH}_2\text{OH})_2 \cdot 7\text{H}_2\text{O}$, white powder, decomp. on standing, forming a brown substance having the odor of caramel. An attempt to prep. the barium salt in the same way gave a product which after standing *in vacuo* for 2-3 days over KOH and H_2SO_4 decompd. vigorously, giving a yellowish brown liquid having the odor of burned sugar. The following salts were also prepd.: magnesium salt, from MgO and CH_2O , white powder; zinc salt, $\text{CH}_2(\text{OZnOH})_2 \cdot 2\text{H}_2\text{O}$, by shaking 12 g. NaOH in 50 cc. H_2O + 18 g. of 40% CH_2O with 43 g. ZnSO_4 in 100 cc. H_2O , white powder, sol. in dil. acids; cadmium salt, $\text{CH}_2[(\text{OCdOCH}_2)_2\text{OCdOH}]_2 \cdot 9\text{H}_2\text{O}$, prepd. like the Zn salt, white powder; copper salt, $\text{Cu}(\text{OCH}_2\text{OCuOCH}_2\text{OH})_2 \cdot 2\text{H}_2\text{O}$, green powder. Attempts to prep. the Al, Fe, Ni and Na salts were unsuccessful. D. BRESE JONES.

Nitrotolylglycine. W. POLLAK. Vienna. *J. prakt. Chem.* 91, 285-306 (1915).— $\text{BrCH}_2\text{CO}_2\text{H}$ reacts readily with 2,4- and 2,6- $\text{H}_2\text{N}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{Me}$ with the formation of the corresponding glycine derivs., but there is practically no reaction when $\text{ClCH}_2\text{CO}_2\text{H}$ is used. 2,4- $\text{O}_2\text{N}(\text{H}_2\text{N})\text{C}_6\text{H}_3\text{Me}$ with the above AcOH derivs. yielded mere traces of the glycine derivs. The reaction is expressed by the following equations: $3\text{C}_7\text{H}_6(\text{NO}_2)\text{NH}_2 + \text{BrCH}_2\text{CO}_2\text{H} = \text{CH}_2(\text{NHC}_7\text{H}_4\text{NO}_2)\text{COH} \cdot \text{C}_7\text{H}_6(\text{NO}_2)\text{NH}_2$ (a) + $\text{C}_7\text{H}_6(\text{NO}_2)\text{NH}_2 \cdot \text{HBr}$; (a) + $\text{NaOH} = \text{CH}_2(\text{NHC}_7\text{H}_4\text{NO}_2)\text{CO}_2\text{Na} + \text{C}_7\text{H}_6(\text{NO}_2)\text{NH}_2 + \text{H}_2\text{O}$. These glycine derivs. have strong acidic properties, dissolving readily in alkali carbonates. The following derivs. of 2,4- $\text{H}_2\text{N}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{Me}$ were prepd.: on slowly heating 3 mols. amine with $\text{BrCH}_2\text{CO}_2\text{H}$ up to 90° , the fused product suddenly solidified, at the same time changing from reddish to yellowish brown. Further heating for 3 hrs., then boiling with H_2O , making alk. with NaOH , filtering off the $\text{H}_2\text{N}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{Me}$ and acidifying the filtrate with dil. HCl , gave 1,2,4-nitrotolylglycine (b) in 85% yield, lustrous, yellow needles from H_2O , m. 140° ; silver salt, small needles, unstable in the air; copper salt, $[\text{C}_7\text{H}_6(\text{NO}_2)\text{NHCH}_2\text{CO}_2]_3\text{Cu} \cdot \text{H}_2\text{O}$, beautiful green crystals, m. 195° ; methyl ester, from the Ag salt and MeI , yellow needles, m. 108° ; ethyl ester, from alc. HCl , reddish brown needles, m. 42° ; 1,2,4-aminotolylglycine hydrochloride, by reducing (b) with Zn dust and HCl , brown crystals from alc., m. 98° . Diazotized and coupled with alc. β -naphthol it gave a dye, and also a reddish brown dye with "R" salt; on heating for 4-5 hrs.

at 150–60°, (b) gave 1,2,4-dinitroditolyl- α,γ -diacipiperazine, bright yellow compd. by pptg. from AcOH with H₂O, m. 186°, insol. in alkalis. It is decompd. into its components by boiling with alc. KOH. In a similar way the following derivs. of 4,2-H₂N-(O₂N)C₆H₄Me were prepd.: 1,4,2-Nitrotolylglycine, yellow prisms from alc., m. 130°; ammonium salt, reddish brown prisms, m. 135°, which with (AcO)₂Pb forms the lead salt, microscopic orange needles; copper salt + H₂O, green crystals, m. 160°. From 2,6-H₂N(O₂N)C₆H₄Me the following derivs. were obtained: 1,2,6-Nitrotolylglycine, yellowish brown prisms from alc., m. 152°; silver salt, very unstable; lead salt + H₂O, grayish yellow compd., m. 170°. Somewhat similarly, 2,5- and 3,6-H₂N(O₂N)C₆H₄Me gave the following derivs.: 1,2,5-Nitrotolylglycine (c), reddish brown crystals from alc., m. 192°; on heating it does not yield a piperazine deriv.; lead salt, yellow compd.; barium salt + 0.5 H₂O, from the acid + BaCO₃, yellowish brown needles; NaNO₂ gives with (c) in dil. HCl the nitroso derivative, C₇H₆(NO₂)N(NO)CH₂CO₂H, m. 110°; ethyl ester, from 2 mols. 2,5-H₂N(O₂N)C₆H₄Me and ClCH₂CO₂Et at 130–40° for 2 days, also by esterifying (c) with HCl, crystals from C₆H₆, m. 87°; methyl ester, from the Ag salt and MeI, yellow needles from C₆H₆, m. 82°; 1,3,6-nitrotolylglycine, yellow crystals from H₂O, m. 145°. It gives colored, cryst., salts with most of the bases. D. B. J.

β -Naphthol sulfide and iso- β -naphthol sulfide. II. O. HINSBERG. Freiberg. *J. prakt. Chem.* 91, 307–24(1915); cf. *C. A.* 9, 209.—A continuation of the study of the properties and isomerism of β -naphthol sulfide (a) with iso- β -naphthol sulfide (b). With warm NaOH (a) decomp. with loss of CO₂, while (b) is hardly affected. Na₂S converts the red oxidation product (c) of (a) (formerly called dehydronaphthol sulfide) into (b). On boiling with 7–10% NaOH (b) is converted into (a), but if a trace of Na₂S is present the transformation is prevented. By dissolving (b) + β -C₁₀H₇SO₂Cl in C₆H₄N, and allowing the soln. to stand for several days, di- β -naphthosulfone-iso- β -naphthol sulfide, (C₁₀H₆OSO₂C₁₀H₇)₂S, was obtained as crystals from AcOH, m. 110° (decompn.). Yellow needles of β -naphthol disulfide, m. 171°, were obtained by reducing the sulfoxide (d), (HOC₁₀H₆)₂SO, with Zn and AcOH. It is assumed that the disulfide is formed by atm. oxidation of the intermediate reduction product α,β -C₁₀H₆(SH)OH. On warming (d) for a short time with HI (d. 1.96) it is nearly quant. decompd. into SO₂ and β -C₁₀H₇OH, and when allowed to stand in a closed vessel for 6 days with MeOH satd. with HCl it likewise gave β -C₁₀H₇OH and SOCl₂. The product obtained by Henriques (cf. *Ber.* 27, 2993 (1984)) by the action of H₂NNHPh on (c) is not, as he reported, a di-, but a monophenylhydrazone. H. has now further obtained a mono-*p*-nitrophenylhydrazone, red needles from AcOH, m. 207°, which with concd. H₂SO₄ gives a green color, changing to violet on warming. Therefore, (c) has only 1 CO, and its structure is represented by the formula O:C₁₀H₆:S.C₁₀H₆.O, to which

the name iso- β -naphtholsulfonium anhydride is assigned. Semicarbaside, brownish red crystals from MeOH, decomp. 115°. On standing for several days at room temp. with MeOH satd. with HCl, (c) is converted into a yellow powder identical with Christopher and Smiles' chloronaphthioxin (*C. A.* 6, 3265). (c) is unaffected by HClO₄. By adding 1 mol of 30% H₂O₂ in AcOH to (b) in acetone, and allowing the mixt. to stand for 12 hrs., a quinkhydrone derivative + CHCl₃ (e) was obtained as yellow needles from petr. ether + CHCl₃, m. 141° (decompn.). It can be obtained free from CHCl₃ by pptg. from acetone with H₂O. It then m. 143° (decompn.). Heated to const. wt. at 130–40° it yielded (b), (c) and some (e). A similar decompn. occurs when it is boiled for a few min. with 5% NaOH. When oxidized with H₂O₂ + AcOH it gave a compound, yellow leaves from AcOH, m. 70–80°. A further study of the properties of dehydro- β -naphtholsulfone (f) confirms the constitution previously assigned to it, C₁₀H₆.O.O.C₁₀H₆.SO₂. It yields no phenylhydrazones or oximes. On reduction

with Zn and AcOH it gives in 70–80% yield a β -dinaphthol, fine needles from petr. ether + CHCl_3 , m. 197° . This compd. differs essentially from the known dinaphthol obtained by oxidation of β - $\text{C}_{10}\text{H}_7\text{OH}$, which m. 216° , but it may be identical with Kauffmann's dinaphthol, m. 195° (Ber. 15, 807 (1882)). By boiling for 10 mins. with Ac_2O and AcONa the dinaphthol gave a *diacetate*, hair-like needles from alc., m. 113° . On reduction, either with Zn + MeOH + NH_4OH , or with Na_2S in MeOH, (f) yields *iso- β -naphthol sulfone* (g), $(\text{HOC}_{10}\text{H}_6)\text{SO}_2$, white, amorphous powder, becomes yellow and sinters 85° , m. to a thick fluid 110° and a thin liquid 125° . With alk. $\text{PhN}:\text{NCl}$ it gives a colorless soln. (the isomeric naphthol sulfone gives a yellowish red ppt.). When oxidized with $\text{K}_3\text{Fe}(\text{CN})_6$ it gave (f). On heating at 100° , or by the action of AcOH, Ac_2O and HCO_2H (g) loses 1 mol. H_2O , forming an *anhydride*, to which is assigned the constitution, $\text{O}:\text{C}_{10}\text{H}_6:\text{SO}:\text{C}_{10}\text{H}_6\text{O}$, because of its similarity to (c) in giving with

AcCl isodichloronaphthioxin, yellow crystals, m. 234° . With $p\text{-O}_2\text{NC}_6\text{H}_4\text{NHNH}_2$ it gave a *dihydrazone*.
D. BRÉESE JONES.

Methenyldiphenylhydrazine. M. BUSCH AND W. DIETZ. Univ. Erlangen. J. prakt. Chem. 91, 325–9 (1915).—That the various m. ps. which have been given to methenyldiphenylhydrazine (a) may be due to the structure isomerism, $\text{Ph}(\text{NH}_2)\text{NCH}:\text{NPh}$ (b) and $\text{PhNHNHCH}:\text{NPh}$ (c), led B. and D. to a further study of its properties and constitution. Only 1 product, pale yellow leaves, m. 109.5° , was always obtained by several different methods of prepn. (cf. Walther, J. prakt. Chem. 53, 473; 57, 223; Dains. Ber. 35, 2503; Schmidt, Ber. 36, 2481). The following method of prepn. and reactions show that (c) represents its true structure. A mixt. of 2 mols. P_2O_5 with PhNH_2 + PhNHNHCHO in C_6H_6 was warmed on a H_2O bath for 1 hr. After distg. off the C_6H_6 , washing with H_2O , and neutralizing with NH_4OH , a poor yield of (a) was obtained. It yields on oxidation in C_6H_6 with HgO *benzenesomethananil*, $\text{PhN}:\text{NCH}:\text{NPh}$, red, stout, radiating needles, m. $62\text{--}3^\circ$, which on standing for 1–2 days decmps., leaving a brown, tarry residue. It is also decmpd. by alc., with evolution of gas and formation of methenyldiphenylamidine. The main reaction obtained by warming equimol. amts. of (a) with BzH is expressed by the equation: $\text{PhNHN}:\text{CHNPh} + \text{BzH} = \text{PhNHN}:\text{CHPh} + \text{PhNHCHO}$. This is also accompanied by the reaction: $\text{PhNHNHCH}:\text{NPh} + \text{BzH} = \text{PhNHNHCHO} + \text{PhCH}:\text{NPh}$.

D. BRÉESE JONES.

Preparation of picrates from alkylpyridinium and analogous bases. R. F. VON WALTHER. Dresden. J. prakt. Chem. 91, 329–31 (1915).— $\text{C}_4\text{H}_5\text{N}$ reacts readily with Et picrate on warming, with formation of *ethylpyridinium picrate*, $\text{C}_4\text{H}_5(\text{NO}_2)_3\text{N}(\text{OEt})\text{C}_6\text{H}_3$, yellow leaves from abs. alc., m. 91° . It is decmpd. by boiling H_2O , and by dil. HCl . It can also be prepd. by heating a mixt. of pyridine picrate with $\text{HC}(\text{OEt})_3$ for 1 hr. at $130\text{--}40^\circ$. In a similar way quinoline gave *ethylquinolinium picrate*, yellow leaves from abs. alc., m. 151° , unstable toward dil. mineral acids and dil. alkalies.

D. BRÉESE JONES.

Hydrazones of cyclohexylhydrazine. N. KIZHNER. J. Russ. Phys. Chem. Soc. 46, 1409–11 (1914).—With a view of examg. the behavior of cyclohexylhydrazine (a) with sugars, it was made to react with glucose, fructose, arabinose, mannose (b) and rhamnose (c). It was found that in no case could compds. of the osazone type be obtained, the tendency of (a) to form hydrazones being far less pronounced than that of PhNHNH_2 , only (b) and (c) giving such compds. *Mannose cyclohexylhydrazosone*, $\text{C}_6\text{H}_{11}\text{O}_4:\text{NNHC}_6\text{H}_{11}$ (possibly with 1 mol. of H_2O), needles, m. 143° , $[\alpha]_D^{25} 2.65^\circ$. *Rhamnose cyclohexylhydrazosone*, $\text{C}_6\text{H}_{11}\text{O}_4:\text{NNHC}_6\text{H}_{11}$, needles, m. $123\text{--}4^\circ$, $[\alpha]_D^{25} 7.37^\circ$. The formation of these cryst. compds. may be utilized for sepg. (b) or (c) from their mixts. with the other 3 of the above sugars.

H. M. GORDIN.

Synthesis of 2-methyl- β -hydrindone by the action of α -bromisobutyryl bromide on benzene in presence of aluminium chloride. N. KIZENER. *J. Russ. Phys. Chem. Soc.* 46, 1411-27 (1914).—With the object of prepg. the unsatd. ketone BzCMe:CH_2 (a), $\text{Me}_2\text{CBrCOBr}$ was made to react with C_6H_6 in presence of AlCl_3 . It was expected that the product of the reaction would be the bromo ketone BzCBrMe_2 (b), and that this, by treatment with alc. KOH, would yield (a). While (b) was not isolated, its formation was proved by a detn. of the amt. of HBr produced. But the interaction of (b) with KOH gave such an insignificant amt. of (a) that the latter could not be isolated in pure condition, while the chief reaction product was β -methyl- α -hydrindone (c) (yield, 60%). That some (a) was formed in the reaction was proved by the fact that the higher fractions from which most of the (c) had been removed gave upon bromination and subsequent treatment with alkalis CHBr_3 , BzOH and a cryst. compound, $\text{C}_{20}\text{H}_{22}\text{O}_2$ (d), m. 190° . (d) is not affected by boiling Ac_2O , Br, PhNHNH_2 , or concd. NH_3 at 210° . Its formation from (a) is due to the action of H_2O : $2\text{C}_{10}\text{H}_{10}\text{O} + \text{H}_2\text{O} = \text{C}_{20}\text{H}_{22}\text{O}_2$. With fuming HNO_3 (d) interacts to form a dinitro compound, $\text{C}_{10}\text{H}_{10}(\text{NO}_2)_2\text{O}_2$, m. 64° , whose formation is supposed to be preceded by hydration: $\text{C}_{10}\text{H}_{22}\text{O}_2 + \text{H}_2\text{O} = 2\text{C}_{10}\text{H}_{12}\text{O}_2$. This compd. is then nitrated by the HNO_3 . The unexpected formation of (c) may be due either to an isomerization of (b), under the influence of AlCl_3 , to $\text{BzCHMeCH}_2\text{Br}$ which then loses HBr and changes to (c), or to a direct isomerization of (a) to (c) caused by the alc. KOH, or it may be accounted for by assuming the intermediate formation of $\text{C}_6\text{H}_4\text{CO.CMe}_2$, which, owing to the instability of 4-mem-

bered rings, isomerizes to (c). (c) is a liquid of a BzMe odor, b_{710} 249° , b_m 136° , d_4^{20} 1.064, n_D^{20} 1.5543; sol. in concd. HBr with a red color; diln. of this soln. with a little H_2O ppts. an unstable hydrobromide, $\text{C}_{10}\text{H}_{10}\text{O.HBr}$, which upon the addition of much H_2O decomps. with regeneration of (c). The semicarbazone, m. 198° , the oxime, m. $105-6^\circ$, and the amine of (c) (Kipping, *J. Chem. Soc.* 83, 913) were prepd. The latter had d_4^{20} 0.9939, n_D 1.541. The hydrazone of (c), made by acting on the latter with $\text{N}_2\text{H}_4\text{H}_2\text{O}$, m. 72° , b_{14} 166° , is decompd. by boiling dil. H_2SO_4 with regeneration of (c). By reducing (c) with Na in alc. was obtained β -methyl- α -hydrindol, $\text{C}_6\text{H}_4\text{CH}_2\text{CHMe.CHOH}$ (e), b_{760} 243° , becomes partly cryst. on standing; it is most

probably a mixt. of *cis* and *trans* isomers. Upon reduction of (e) with HI at 210° was obtained β -methylhydrindene, b_{717} $183-5^\circ$, d_4^{17} 0.9034, n_D 1.507, is not affected by KMnO_4 , but vigorously reacts with fuming HNO_3 , giving NO_2 compds. Upon bromination (c) gave β -bromo- β -methyl- α -hydrindone, $\text{C}_6\text{H}_4\text{CH}_2\text{CBrMe.CO}$ (f) (yield, 95%), m.

$71-2^\circ$. Reduction with the Cu-Zn couple in presence of a trace of PtCl_4 reconverted (f) into (c). In absence of Na_2CO_3 (f) is not affected by KMnO_4 , while in presence of Na_2CO_3 it goes into soln. and is then oxidized by KMnO_4 to $\alpha\text{-C}_6\text{H}_4(\text{CO}_2\text{H})_2$. If alkali be added to a trace of (f) in alc. and the soln. evapd. to dryness, a black residue remains which dissolves in H_2O with an intense indigo-blue color. The color disappears upon addition of acids. From the acid soln. Et_2O exts. an oily substance which dissolves in alkali with blue color. The blue soln. oxidizes on exposure to the air, the color changing to green and finally to yellow. The absorption spectrum of the blue liquid resembles that of solns. of indigosulfonic acid. With $p\text{-BrC}_6\text{H}_4\text{NHNH}_2$ (f) gives the compound $\text{C}_{10}\text{H}_8\text{:NNHC}_6\text{H}_4\text{Br}$, transparent prisms of the color of $\text{K}_3\text{Fe}(\text{CN})_6$, m. $122-3^\circ$. The constitution of this compd., assuming that no condensation took place, is either $\text{C}_6\text{H}_4\text{CH}_2\text{C}(\text{:CH}_3)\text{:NNHC}_6\text{H}_4\text{Br}$ or $\text{C}_6\text{H}_4\text{CH:CMe.C:NNHC}_6\text{H}_4\text{Br}$.

When boiled with K_2CO_3 (f) yields β -methyl- β -hydroxy- α -hydrindone (yield, 70%), m. 57° , dissolves in alkalis with formation of salts; evapd. with alc. alkalis it gives the blue color reaction of (f); semicarbazone, m. 169° .

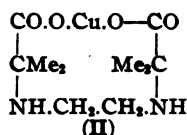
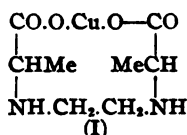
H. M. GORDIN.

Velocity of hydrogenation of tetramethylbutindiol in presence of colloidal palladium under different conditions. YU. S. ZAL'KIND AND P. V. PISHCHIKOV. *J. Russ. Phys. Chem. Soc.* 46, 1527-39(1914).—In a former investigation (*C. A.* 8, 1419) it was established that, in presence of colloidal Pd, acetylene glycols readily unite with 2 atoms of H, changing to ethylene glycols, while the further addition of H, if it takes place at all, is considerably slower. In the present work an exam. was made of the influence of temp. concn. of catalyzer, concn. of reacting glycol, and nature of solvent on the velocity of the reaction. As glycol tetramethylbutindiol (a) was taken, while as solvents only EtOH, MeOH and H₂O could be used, the reaction in other solvents (acetone, iso-BuOH and iso-AmOH) being too slow. By varying each of the above factors at a time the following results were obtained: The usual equation for calcg. the velocity const. of a monomol. reaction was found inapplicable in this case, the value of this const. gradually increasing with the length of time the hydrogenation is permitted to go on. This is supposed to be due to (a) itself acting as a negative catalyzer. With the gradual disappearance of (a) its retarding influence on the velocity diminishes, thus causing the const. gradually to increase. If the catalytic influence of (a) be taken into consideration we must use Henri's equation (*Z. physik. Chem.* 39, 194): $1/t \times \log [(a+x)/(a-x)] = k(1+ex)$, in which k is the velocity const. of the reaction, e the const. characterizing the catalytic effect of (a), a the initial concn. of (a), and $a-x$ its concn. at the time t . If $e = 2$, H.'s equation fits the reaction under consideration. The value of k was found to be an almost linear function of the temp. Between 10-20° the increase in the value of k per 1° is 0.0021, and the ratio of k at 20° to k at 10° is 1.75. This rather large value is characteristic of chem. action, showing that in the hydrogenation of (a) chem. factors are paramount. Increasing the concn. of the catalyzer also causes k to increase, but while with low concns. of catalyzer (up to 1 mg.) k grows faster than this concn.; for high concns. of catalyzer k is almost proportional to this concn. With respect to the concn. of (a), it was found that with alc. as solvent there is a definite optimum of concn. when k is a max., and that the increase of k caused by increasing the concn. of the catalyzer is less in dil. than in concd. solns. As to the influence of the solvent, k is greatest in MeOH and smallest in H₂O, showing that the solvent too has a catalytic effect. The retarding influence of (a) on the velocity of the reaction was proved by a series of expts. in which additional quantities of it checked the increase of k , in some cases causing the latter to remain const. for 10 min., and then even gradually to decrease. Whether other acetylene glycols exercise a similar retarding influence on k will be examd. later. Numerous tables and several diagrams illustrate the work. H. M. GORDIN.

Action of nitric acid on saturated compounds. S. S. NAMEYKIN AND A. K. RUZHENTSOVA. *J. Russ. Phys. Chem. Soc.* 46, 1540-4(1914).—In a previous article (*C. A.* 5, 3246) it was shown that cyclohexylnitromethane, C₆H₁₁CH₂NO₂ (a), when oxidized with HNO₃, yields as chief product adipic acid (b), and that 2 explanations of the reaction were possible: either (a) is first converted into C₆H₁₁CO₂H (c), or the oxidation is direct without the intermediate formation of (c). In order to decide between these 2 points of view, the acids (c), cyclopentylcarboxylic (d) and cyclobutylcarboxylic were oxidized with HNO₃. It was found that in these cases no trace of dibasic acid (adipic or glutaric) was produced. Hence the 1st explanation cannot be correct. On the other hand, the oxidation of C₆H₁₁CH₂OH and C₆H₁₁CHO gave (b), while cyclopentylcarbinol, cyclobutylcarbinol and the aldehyde corresponding to (d) gave glutaric acid, which is in accord with the 2nd explanation. H. M. GORDIN.

Polymembered rings in the copper salts of bisimino acids. N. A. SHLEZINGER. *J. Russ. Phys. Chem. Soc.* 46, 1575-9(1914).—Detns. of the mol. wt. by the f. p. method and of the elec. cond. of Cu ethylenebis- α -iminopropionate (I) and ethylenebis- α

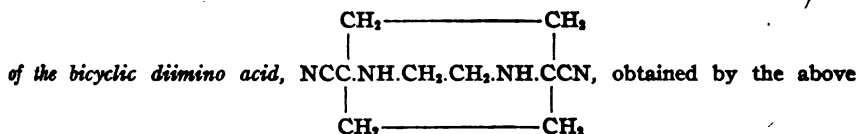
iminoisobutyrate (II) (cf. following abstr.) showed them to be completely un-ionized. Hence they must be regarded as inner salts whose formulas contain 11-membered



rings. Since in accord with Bayer's strain theory only 4- and 5-membered rings are characterized by great stability, the exceptional stability of these salts must be ascribed to the influence of the divalent Cu.
H. M. GORDIN.

Ethylenebis- α -imino acids. N. A. SHLEZINGER. *J. Russ. Phys. Chem. Soc.* 46, 1579-97 (1914).—The new acids here described were synthesized from the corresponding nitriles made by Zelinskii and Stadnikov's method (*Ber.* 39, 1722), substituting $(\text{CH}_2\text{NH}_2)_2 \cdot 2\text{HCl}$ for $\text{NH}_4\text{Cl} : (\text{CH}_2\text{NH}_2)_2 \cdot 2\text{HCl} + 2\text{KCN} + \text{R}_2\text{CO} = [\text{CH}_2\text{NHC}(\text{CN})\text{R}]_2 + 2\text{KCl} + 2\text{H}_2\text{O}$. The sapon. of these nitriles presented considerable difficulty, the usual methods of sapon. decomp. them into HCN , $(\text{CH}_2\text{NH}_2)_2$ and aldehydes. Only the nitrile from Me_2CO is readily saponifiable, most of the others requiring concd. H_2SO_4 for sapon., while some could not be sapon. at all. The free acids obtained from the nitriles are completely insol. in neutral solvents, but dissolve in acids or alkalis. No Ni and Co salts of these acids could be obtained, but their Cu salts were made by boiling them with $\text{Cu}(\text{OH})_2$. Their esters are comparatively stable (during 3 months), and require prolonged boiling with H_2O or acid for sapon. The refraction of the esters is normal. The above equation indicates the materials from which the following compds. were made: *Ethylenebis-[α -iminoisobutyric] acid*, $[\text{CH}_2\text{NHC}(\text{CO}_2\text{H})\text{Me}]_2$, powder, does not m. 245° ; *hydrochloride*, $\text{C}_{10}\text{H}_{10}\text{N}_4\text{O}_4 \cdot 2\text{HCl}$, glittering needles, does not m. 245° ; *copper salt*, $\text{C}_{10}\text{H}_{10}\text{N}_4\text{O}_4\text{Cu}$, blue crystals, sol. in H_2O , is a non-electrolyte, and has normal mol. wt. (detd. by the f. p. method; cf. preceding abstr.); *methyl ester*, m. $39-40^\circ$, b_{18} 170° , volatile when warmed, and has a basic odor; *hydrochloride* of this ester, $\text{C}_{12}\text{H}_{14}\text{N}_4\text{O}_4 \cdot 2\text{HCl}$; *ethyl ester*, oily liquid of a peculiar odor, b_{18} $171-2^\circ$, d_4^{20} 0.9934, n_D^{20} 1.4432, gives a cryst. *hydrochloride*. *Nitrile*, transparent, oblique plates, m. $55-6^\circ$; *hydrochloride*, $\text{C}_{10}\text{H}_{10}\text{N}_4 \cdot 2\text{HCl}$, snow-white crystals, m. $93-4^\circ$ (decompn.). *Ethylenebis-[α -iminopropionic] nitrile hydrochloride*, $[\text{CH}_2\text{NHC}(\text{CN})\text{Me}]_2 \cdot 2\text{HCl}$. The acid is indistinctly cryst., m. about 262° (decompn.); *hydrochloride*, needles, m. (not sharply) 214° (in a capillary); *copper salt*, resembles the preceding Cu salt; *ethyl ester*, mobile liquid of a feeble, basic odor, b_{18} 170° , d_4^{20} 1.0297, n_D^{20} 1.4483. *Ethylenebis-[α -iminodactylic] acid*, not quite pure; *hydrochloride*; *nitrile hydrochloride*; *amide*, m. $175.6-6.6^\circ$; *amide hydrochloride*. *Ethylenebis-[α -iminophenylacetic] acid*, does not m. 250° ; *hydrochloride*, glittering needles; *copper salt*; *methyl ester*, non-volatile, very viscous, yellowish liquid, d_4^{20} 1.1501, n_D^{20} 1.5448; *ethyl ester*, resembles the preceding Me ester, d_4^{20} 1.1091, n_D^{20} 1.532; *ethyl ester hydrochloride*. *Nitrile*, m. $122-3^\circ$; *hydrochloride*, has no definite m. p., decomp. in a capillary $148-54^\circ$. *Ethylenebis-[α -imino- α -phenylpropionic] acid*, amorphous, turns yellow 155° ; *hydrochloride*; *copper salt*; *nitrile*, oblique plates, m. $108-9^\circ$. *Ethylenebis-[α -imino- α , α -diphenylacetic] nitrile*, m. $158-63^\circ$ (decompn.), could not be sapon. to the corresponding acid. *Piperazine-2,3-diphenyl-2,3-dicarboxylic nitrile*, $\text{PhC}(\text{CN})\text{NH}.\text{CH}_2\text{CH}_2\text{NH}.\text{C}(\text{CN})\text{Ph}$, m. 123° (decompn.); unites with EtOH to

form the cryst. compound $\text{C}_{18}\text{H}_{18}\text{N}_4.\text{EtOH}$, m. $248-9^\circ$, and with MeOH to form the cryst. compound $\text{C}_{18}\text{H}_{18}\text{N}_4.\text{MeOH}$. The acid corresponding to this nitrile could be obtained only as *hydrochloride*, $\text{C}_{18}\text{H}_{18}\text{N}_4\text{O}_4 \cdot 2\text{HCl}$, and as a blue *copper salt*. The *nitrile*



method from 1,4-cyclohexanedione, decomps. 110° The acid corresponding to it could not be prepd.

H. M. GORDIN.

Color of mixtures of anilines with aromatic nitro compounds. E. V. BIRON AND O. M. MORGULEVA. *J. Russ. Phys. Chem. Soc.* 46, 1598–613 (1914).—While PhNH_2 is colorless and PhNO_2 only slightly yellowish, mixts. of them are intensely colored. With a view of detg. the reason thereof, 17 mixts. of 7 different anilines with PhNO_2 and with *o*- and *m*- $\text{MeC}_6\text{H}_4\text{NO}_2$ were examd. colorimetrically and spectroscopically. The changes in the absorption spectra and in the intensity of coloration as found experimentally, were plotted against the changes in the mol. concns. of the anilines, and the results compared with the values obtained from the equation of the theoretical curve: $J = 4x(1 - x)$, in which J is the mol. intensity of color, and x the fraction of the anilines per mol. of mixt. The equation is based upon the assumption that the intensities of color are proportional to the masses x and $1 - x$ of the components, making $J = 1$ when $x = 0.5$. The exptl. values of J are $J = iV$, where i is the observed intensity of color for any given mixt., and V is the mol. vol. of this mixt. at 20° . The results showed that the observed changes in J corresponding to changes in x did not coincide with the locus of the theoretical curve. Hence Ostromuiskii's assumption that the color is due to the formation of definite compds. consisting of 1 mol. each of aniline and a NO_2 compd. ("Theory of the Benzene Ring and the Ethylene Union," 1910, 58) cannot be correct. That there is some relation between the color of a mixt. of aniline with a NO_2 compd. and the concn. of the former in the mixt. is clear, but the law of this relation is at present unknown. The mixts. of PhNO_2 have a more intense color than those of *o*- $\text{MeC}_6\text{H}_4\text{NO}_2$, while those of *m*- $\text{MeC}_6\text{H}_4\text{NO}_2$ occupy an intermediate position. The intensity of color also varied with the nature of the aniline, some giving intensely colored mixts., while others gave mixts. whose color varied within wide limits.

H. M. GORDIN.

Article of E. V. Biron and O. M. Morguleva. (Color of mixtures of anilines with aromatic nitro compounds.) E. I. ORLOV. *J. Russ. Phys. Chem. Soc.* 47, 185–90 (1915).—The failure of Biron and Morguleva (preceding abstr.) to correlate their exptl. data with the theoretical values is due to the use of an equation which does not take into consideration the possibility of formation of intermediate products whose nature and amt. vary with the concn. x of the anilines. With the equation: $J = 4mx(1 - mx)$, the agreement between expt. and theory is very much improved. The coeff. m indicates the velocity const. due to the intermediate reactions for any given value of x . Since when $J = 1$, $mx = 0.5$, the value of m for any value of x is $m = 0.5/x$. Some of B. and M.'s tables are recalcd. on the basis of this equation, showing much better agreement between theory and expt. B. and M. are also criticized for having assumed in their calcs. of $V (= iV)$ that the mol. vols. V of the mixts. are proportional to the mol. vols. of the components. This is wrong because the new substances produced in the reaction may have entirely different sp. gr. than the original components. The values of V should be calcd. by detg. the sp. gr. of the mixts. themselves. As possible intermediate products, PhN(OH)(NHPh)O , $\text{PhN(OH)}_2\text{NPh}$, and several others are suggested.

H. M. GORDIN.

Tri- α -thienylcarbinol. A. E. CHICHIBABIN AND N. N. GAVRILOV. *J. Russ. Phys. Chem. Soc.* 46, 1614–9 (1914).—The yield of di- α -thienyl ketone (α) by Gattermann's method (*Ber.* 18, 3013) being very low, it was prepd. by the action of $\text{C}_6\text{H}_5\text{S}$

on the α - $\text{C}_6\text{H}_5\text{SCl}$ (b) in presence of AlCl_3 . (b) was made by converting α - $\text{C}_6\text{H}_5\text{SI}$ into $\text{C}_6\text{H}_5\text{SMgI}$ (c), and treating the latter with CO_2 . The interaction of (c) with (a) gave *tri- α -thienylcarbinol*, $(\text{C}_6\text{H}_5\text{S})_3\text{COH}$ (d). The latter is easily sol. in dil. mineral acids, even in dil. AcOH , giving solns. having an intense brown-yellow color. The solns. are extremely unstable, depositing on standing dark green flakes which are insol. in acids and in org. solvents. In absence of much acid the color of the solns. disappears upon the addition of much H_2O . Owing to its instability, (d) could not be obtained in pure condition, nor could any of its salts with $(\text{CO}_2\text{H})_2$, $\text{C}_6\text{H}_5(\text{NO}_2)_3\text{OH}$ or other acids be prepd. By mixing, however, solns. of (d) in concd. HCl with concd. solns. of the chlorides of Bi, Sb, Zn, Cd, Hg or Sn, difficultly sol. double chlorides are produced. In this way was made the salt $\text{ZnCl}_{2.2}(\text{C}_6\text{H}_5\text{S})_3\text{CCl}$, dark orange crystals having a green fuchsin-like luster. These salts are stable, and even their aq. solns. keep for a long time before they begin to deposit bluish green flakes. They are readily sol. in excess of the above metallic chlorides, indicating the existence of a series of more sol. double salts. Alkali chlorides do not ppt. solns. of (d) in HCl , nor do they make these solns. more stable. The fact that (d) is sol. even in dil. acids shows that, as a base (or pseudo-base), it occupies an intermediate position between Ph_3COH which is sol. in strong acids only, and bases of the fuchsin type. In respect to the degree of hydrolysis (d) resembles rather the latter than Ph_3COH . With regard to its constitution, $(\text{C}_6\text{H}_5\text{S})_3\text{CCl}$ is either a *p*-quinoid compd. $(\text{C}_6\text{H}_5\text{S})_3\text{C}:\text{C}:\text{CH}:\text{CH}:\text{CH}:\text{SCl}$,

or a carbonium salt. With trivalent C the above formula may be written $(\text{C}_6\text{H}_5\text{S})_3\text{CC}:\text{CH}:\text{CH}:\text{CH}:\text{SCl}$. At any rate in (d) we have a substance that is nearly

related to the dyes, without containing any typical auxochrome groups. H. M. G.

Absorption spectra and constitution of benzene derivatives. V, VI, VII and VIII. N. A. VALYASHKO AND M. V. BOLTINA. *J. Russ. Phys. Chem. Soc.* **46**, 1741-830 (1914).—**V. Dialdehyde-, dinitro- and aldehydonitrobenzenes.** In former investigations (C. A. **5**, 2101; **7**, 2226; **8**, 1422) it was proved that, as shown by the absorption spectra, the C_6H_4 ring exists in 2 isodynamic forms, an α and a φ (phenolic) form, and that different substituents favor 1 or the other of these forms, auxochrome groups favoring the φ , while chromophore groups favor the α form. So far only monosubstituted compds. have been examd. The present work concerns the disubstituted isomeric $\text{C}_6\text{H}_4(\text{CHO})_2$, $\text{C}_6\text{H}_4(\text{NO}_2)_2$ and $\text{C}_6\text{H}_4(\text{CHO})\text{NO}_2$. Several solvents were used, and in some cases HCl , EtONa or MeONa was added to the soln. The diagrammatic and profusely tabulated results may be summarized as follows: The above 3 groups of compds. have each 3 absorption bands, showing oscillation between the φ and the α forms. The general character of the spectra of disubstituted compds., when the substituents are identical, is the same as of the monosubstituted compds., the introduction of the 2nd CHO or NO_2 influencing chiefly the intensity of the bands, without displacing them towards 1 or the other end of the spectrum. In this respect the 2nd CHO and NO_2 resemble the Me and CO_2Me groups, with this difference, however, that, in accord with their auxochrome character, the latter increase the intensity of the φ bands, while the former intensify the α bands. The introduction of both chromophores and auxochromes increases the intensity of the α band for the *o*- and of the φ band for the *p*-isomers, displacing them towards the red end of the spectrum, while the *m*-isomers occupy an intermediate position in this respect, more nearly resembling, however, the *o*-compds. All these changes cannot be ascribed to quinoid rearrangements, because the displacement is entirely different for salts of *o*- and *m*- $\text{C}_6\text{H}_4(\text{NO}_2)_2\text{OH}$ on the 1 hand, and of *o*- and *m*- $\text{C}_6\text{H}_4(\text{NO}_2)_2$ on the other, though in both cases there is a transformation into the aci form. In accord with the differences in the character of the spectra is the difference in the reactivity of the isomers,

$m\text{-C}_6\text{H}_4(\text{CHO})_2$ and $m\text{-C}_6\text{H}_4(\text{NO}_2)_2$, being less reactive than their *o*- and *p*-isomers. VI. Tautomerism of acetanilide. For this compd. (a) 2 formulas have been proposed: PhNHCOMe (b) and PhN:C(OH)Me (c). In order to decide between them, the absorption spectrum of (a) was examd., both in presence and in absence of alkali, and compared with the spectra of substances of known comp. It was found that in neutral soln. the spectrum of (a) resembled that of PhNMeCOMe , while in alk. soln. it resembled partly the spectrum of the latter, and partly that of PhN:C(OMe)Me . Hence in neutral soln. the formula of (a) is (b), while in alk. soln. part of (b) changes to (c). The change is most probably accompanied by formation of PhN:C(ONa)Me (Hantzsch, *Ann.* 296, 91). Since in (b) the C of the CO, being satd. with O, is incapable of using up much of the affinity of N, it is impossible to explain why spectroscopically the Ac behaves like a chromophore (antiauxochrome). Hence Smedley's formula MeC:O:NHPh for (a) (*C. A.* 3, 1529) is preferable to (b). The spectrum of

$\alpha\text{-C}_6\text{H}_4\text{NH.C.Me:N}$ in alc. showed 3 bands, α_1 , α_2 and φ . With increasing thickness

of the layer of soln. the φ band increases considerably, the α_1 band decreases, while the α_2 band increases very much in intensity. VII. Mono- and diacetoxybenzenes, phenylenediamines, diacetylphenylenediamines and some toluene derivatives. The changes in the spectrum of C_6H_6 caused by the introduction of substituents are due to the fact that they destroy the uniformity of satn. of its C atoms and change the distribution of affinities in the mol., different substituents exercising different influences in this respect. Since expts. prove that groups which are capable of using up more of the affinity of C than H tend to produce the φ state, it was to be expected that certain substituents in certain positions would cause radical changes in the character of the spectra. This was corroborated by a spectroscopic exam. of the above substances. Thus the acetylation of phenols reduces the intensity of the φ band and displaces it towards the red end of the spectrum. It also causes the appearance of the α_2 band, making the spectrum resemble somewhat the aldehyde type. If another AcO be introduced in the *m*-position to the 1st, the change towards the aldehyde type becomes still more pronounced, and the α_2 band becomes still more intense. When, however, the 2nd AcO is in the *p*-position to the 1st, the change in this direction is checked, and when in the *o*-position the change is even reversed, the intensity of the α_2 band becoming 3 times weaker than for mono-Ac compds. S.'s formula C:O:OH (*l. c.*) for the CO_2H group

is in better accord with the spectroscopic data and better explains the difference in behavior of the CO in acids, aldehydes and ketones than the formula C(:O)OH . Similarly, if the AcO group be assigned the formula MeC:O:O we have an explanation of

its chromophore character. In the case of the PhMe derivs. it was found that the replacement of H in the Me with satd. atoms or groups changes the character of the spectra, making them approach the aldehyde type. VIII. Benz-anti-aldoxime and benz-syn-aldoxime. According to Hartley and Dobbie (*J. Chem. Soc.* 77, 509), the spectra of these 2 compds. are identical. This is incorrect. While in general character the 2 spectra are similar, both resembling the spectrum of BzH, they differ in the intensity of the bands and in the extent of change caused by formation of salts. It is possible that the *syn* compd. exists in 2 tautomeric forms.

H. M. GORDIN.

Magnesium complexes of pyrrole, indole and carbazole in their relation to chlorophyll. V. V. CHELINTZEV AND B. V. TRONOV. *J. Russ. Phys. Chem. Soc.* 46, 1876-86(1914).—According to Willstätter (*C. A.* 1, 441), chlorophyll is a Mg org. compd., in which the Mg is linked to 4 pyrrole (a) groups, and the assimilation of CO_2 by plants is a reaction of the Grignard type. Since, however, the Mg in all the Mg org. compds.

known at present is extremely mobile, these compds. being readily decompd. by H_2O , while chlorophyll is very stable towards H_2O , W.'s formula cannot be accepted, unless it be shown that, unlike the usual Mg org. compds., the combinations of Mg with substances of the (a) type are not affected by H_2O . This C. and T. tried to prove by treating (a), indole (b) and carbazole (c) with $PrMgI$ and examg. the behavior of the resulting compds. with H_2O . It was found that the reaction at a low temp. yields complexes which begin to decomp. at ordinary temp. and completely decomp. at 70° with formation of $\underline{CH:CH.CH:CH.NMgI}$, $\underline{C_6H_4.CH:CH.NMgI}$ and $\underline{C_6H_4.C_6H_4.NMgI}$,

resp. All of these, when treated with H_2O , decomp. within a few min. with evolution of heat. Hence W.'s formula for chlorophyll requires further proof. While the last of the above 3 compds. doubtless has the above formula, the other 2 may also be $\underline{NH.CH:CH.CH:CH.CMgI}$ and $\underline{NH.C_6H_4.CH:CH.CMgI}$, resp. Expts. were also made in

order to see whether the above 3 Mg org. compds. were capable of uniting with (a), (b) and (c), resp., forming compds. of higher valences of N and I. It was found that the addition of (a), (b) and (c) to their Mg org. compds. had no thermal effect whatever. Even $EtOMgI$ which is characterized by its tendency to form complexes of higher at. valences did not cause any reaction with the 3 Mg org. compds. Evidently the double unions of the C atoms linked to the N greatly reduce the basic properties of the latter upon which depends its ability to form compds. of higher at. valences. A similar influence of double unions was observed with furane and thiophene which were also found to be incapable of forming complexes of higher valences. On the other hand, as is shown in another article (next abstr.), piperidine and tetrahydroquinoline give such complexes under the same conditions.

H. M. GORDIN.

Magnesium derivatives of piperidine, tetrahydroquinoline and hydroacridine, and the theory explaining their relative ability to form complexes. V. V. CHRENTZEV AND B. V. TRONOV. *J. Russ. Phys. Chem. Soc.* 46, 1886-98(1914).—Expts., similar to those made with pyrrole, indole and carbazole (preceding abstr.), were made with piperidine (a), tetrahydroquinoline (b) and hydroacridine (c). As shown by the thermal effects, their Mg org. compds. are readily decompd. by H_2O with evolution of considerable heat, and the compds. of (a) and (b) are capable of uniting with (a) and (b), resp., forming mono-, di- and, possibly, also triamines, in the case of the Mg org. compd. of (a), and mono- and diamines in the case of that of (b), while the Mg org. compd. of (c) gave no such complexes at all. The formulas of the mono-amines given by the Mg org. compds of (a) and (b), resp., are $C_6H_{10}:N.Mg.NH:I:C_6H_{10}$ and $C_6H_{10}:N.Mg.NH:I:C_6H_{10}$, while the corresponding diamines are, resp., $C_6H_{10}:N.Mg.NH:(C_6H_{10}):I:NH:C_6H_{10}$ and $C_6H_{10}:N.Mg.NH:(C_6H_{10}):I:NH:C_6H_{10}$. In the triamines the I is pentavalent. The difference in this respect between (a) and (b) on the 1 hand, and (c) on the other is due to the presence in (a) and (b) and the absence in (c) of double unions at the C atoms linked to the N (cf. preceding abstr.).

H. M. GORDIN.

The quaternary salts of hexamethylenetetramine. III. Monohalogenacylated aromatic amines and their hexamethylenetetraminium (hexamethylenetetrammonium) salts. WALTER A. JACOBS and MICHAEL HEIDELBERGER. Rockefeller Inst. *J. Biol. Chem.* 21, 103-43(1915); cf. *C. A.* 9, 1610.—The halogenacylated amines were combined with hexamethylenetetramine (a) in the manner previously described (*C. A.* 9, 1612). *Chloroacetylaniline* (a) compound, m. $158-9^\circ$ (decompn.); *bromoacetylaniline* (a) compound, m. 163° (decompn.); *chloroacetylmethylaniline* (a) compound, m. $168-73^\circ$ (gas evolution); *chloroacetyldiphenylamine* (a) compound, retains a mol. of $CHCl_3$ (crystn. at 100° in vacuo, decomps. $158-61^\circ$; *chloroacetylphenylglycinanilide*, m. $118-20^\circ$ (cor.); (a) compound, m. $157-8^\circ$; *chloroacetyl- ω -anilinoacetophenone*, m. $117-8^\circ$ (cor.); (a) compound, m. $169-9.5^\circ$ (decompn.); *chloroacetyl-o-toluidine* (a) compound, m. $148-9^\circ$

(decompn.); *bromoacetyl-o-toluidinoacetophenone*, m. 107–7.5°; (a) compound, m. 175–6° (decompn.); *chloroacetyl-m-toluidine*, m. 90–1.5° (cor.); (a) compound, m. 173–4°; *chloroacetyl-p-toluidine* (a) compound, m. 176–8° (decompn.); *chloroacetyl-m-xylydine* (a) compound, m. 171–2°; *chloroacetyl-p-cumidine* (a) compound, m. 170–1° (decompn.); *chloroacetyl-α-naphthylamine* (a) compound, m. 164–5° (decompn.); *chloroacetyl-β-naphthylamine* (a) compound, m. 177–8° (decompn.); *chloroacetyl-o-chloroaniline*, m. 73.5–4° (cor.); (a) compound, m. 158–60° (decompn.); *p-bromochloroacetylaniline* (a) compound, retains CHCl_3 of crystn.; *2,4,6-tribromochloroacetylaniline*, m. 221–2° (cor.); no (a) compd. could be isolated; *m-iodochloroacetylaniline*, m. 121.5–2.5° (cor.); (a) compound, turns greenish 170°, m. 175° (decompn.); *5-iodochloroacetyl-o-toluidine*, m. 161.5–2.5° (cor.); *5-iodochloroacetyl-o-toluidine* (a) compound, m. 190–2° (decompn.); *m-nitrochloroacetylaniline* (a) compound, m. 162–3°; *p-nitrochloroacetylaniline*, m. 182–4°; *m-nitrochloroacetyl-p-toluidine* (a) compound, m. 163–4° (decompn.); *m-chloroacetylaminodimethylaniline*, m. 101.5–2.5° (cor.); (a) compound, m. 151–2° (decompn.); *p-chloroacetylaminodimethylaniline* (a) compound, contains CHCl_3 of crystn., m. 145–8°; *p-chloroacetylaminodiethylaniline*, m. 83–4° (cor.); (a) compound, m. 159–60° (decompn.); *p-nitrosodipropylaniline hydrochloride*, violently decomps. 160–5°; *p-aminodipropylaniline*, b_m 155.5–6.5°; *p-chloroacetylaminodipropylaniline*, m. 121–1.5° (cor.); (a) compound, m. 165–8° to a tar; *p-chloroacetylaminooethylbenzylaniline*, m. 106–8°; (a) compound, m. 163–4° (decompn.); *p-chloroacetylaminooazobenzene*, $\text{p-PhN}_2\text{C}_6\text{H}_4\text{NHCOCH}_2\text{Cl}$, m. 159.5° (cor.); (a) compound, dyes silk light yellow, m. 153–4°; *chloroacetylaminooazotoluene*, m. 171–2.5° (cor.); (a) compound, m. 167–9°. The following dyes were prepd. but no purified (a) compds. could be obtained: *β-Naphthaleneazochloroacetyl-β-naphthylamine*, m. 181.5–2.5° (cor., decompn.), bright orange needles, sol. in H_2SO_4 with a deep violet color; *benzeneazobenzeneazochloroacetyl-β-naphthylamine*, $\text{C}_{10}\text{H}_6(\text{NHCOCH}_2\text{Cl})\text{N}_2\text{C}_6\text{H}_4\text{N}_2\text{Ph}$, m. 190° (cor., decompn.), brick-red, micro-needles; *o-tolueneazo-o-tolueneazo-β-naphthylamine*, m. 174–7°, glistening, dark violet-brown leaflets; *o-tolueneazo-o-tolueneazochloroacetyl-β-naphthylamine*, m. 122–6° to a tar, dark brown, micro-cryst. powder; *o-tolueneazo-α-naphthylamine*, m. 97–7.5°, rosettes of orange-red hairs; *o-tolueneazo-α-naphthaleneazo-β-naphthylamine*, sinters above 140°, m. 173–8°, black-brown, micro-cryst. powder, sol. with intense blue color in H_2SO_4 . *p-Chloroacetylaminobenzeneazodimethylaniline*, m. about 205°, chocolate-brown micro-plates; (a) compound, m. 167–8.5°, dyes silk a brown-orange; *p-acetaminobenzeneazodiethylaniline*, softens 186°, fluid at 192°, orange-brown plates; *p-aminobenzeneazodiethylaniline*, m. 149–50° (cor.), dark brown crystals; *p-chloroacetylaminobenzeneazodiethylaniline*, m. 160.5–2°; (a) compound, m. 172–3°, dyes silk brown-orange; *p-acetaminobenzeneazodipropylaniline*, m. 178° (cor.), small orange needles; *p-chloroacetylaminobenzeneazodipropylaniline*, m. 112–4° (cor.), orange-brown micro-crystals; (a) compound, sinters above 100°, m. 180–1°, dyes silk brown-orange; *p-acetaminobenzeneazoethylbenzylaniline*, m. 148–50° (cor.), yellow-brown spears with violet luster; *amino deriv.*, used for the prepn. of *p-chloroacetylaminobenzeneazoethylbenzylaniline*, m. 140–1.5° (cor.), brown crystals; (a) compound, m. to a tar 140°, ochreous micro-plates; *m-bromodiethylaniline*, b_m 139.5–142°; *p-acetaminobenzeneazo-2'-bromo-4'-diethylaminobenzene*, reddens above 160°, m. 163.5–4° (cor.); its violet dil. HCl soln. dyes silk a deep yellow; *benzeneazo-2'-chloroacetyl-amino-4'-dimethylaminobenzene*, m. 109.5–10 (cor.), scarlet tablets; its dil. HCl soln. dyes silk orange; it gives a poor yield of very impure (a) compd.; *4-nitrobenzeneazo-2'-chloroacetyl-amino-4'-dimethylaminobenzene*, m. 220°, dark violet-brown, triboelec. micro-crystals, does not readily combine with (a). The following substances were obtained in expts. which were not completed: *p-diethylaminobenzenazo-β-naphthylamine*, m. 117–20°, maroon plates; *p-diethylaminobenzeneazochloroacetyl-α-naphthylamine*, m. 145° to a thick tar, chocolate-brown micro-crystals; *o-chloroacetylaminophenol* (a) compound,

m. 155°; *o*-chloroacetylaminophenyl benzoate, m. 107.5–8.5° (cor.); (a) compound, retains CHCl₃ of crystn.; *o*-chloroacetylaminophenyl *p*-nitrobenzoate, m. 163.5–4°; (a) compound, m. 171–2°; *m*-chloroacetylaminophenol, m. 134.5–6° (cor.); (a) compound, retains Me₂CO of crystn., decomps. 168°; *benzenesazo-m*-chloroacetylaminophenol, m. 200° (cor., decompn.); (a) compound, decomps. from 202–30°; its dil. NaOH soln. dyes silk pale yellow; chloroacetyl-*o*-anisidine, m. 48–8.5° (cor.); (a) compound, m. 151–3°; α -iodopropionyl-*o*-anisidine, m. 95–6.5° (cor.), would not form the (a) compd.; β -iodopropionyl chloride, b₁₅ 80.5–1.5°; β -iodopropionyl-*o*-anisidine, m. 89–91° (cor.); (a) compound, m. 172–3°; chloroacetyl-*o*-anisidinoacetophenone, m. 101.5–2.5° (cor.); (a) compound, m. 145° (decompn.); chloroacetyl-*p*-anisidine, m. 121.5–2.5° (cor.), (a) compound, m. 164–7° (decompn.); *o*-chloroacetylaminobenzyl alcohol, m. 103° (cor.); (a) compound, m. 144–5° (decompn.); *o*-chloroacetylaminobenzyl benzoate, m. 113–3.5° (cor.); (a) compound, darkens above 140°, m. 154–5°; ethyl *p*-chloroacetylaminobenzoate (a) compound, m. 155–6° (decompn.); diethylaminoethyl *p*-chloroacetylaminobenzoate (chloroacetylnovocaine) m. 63–4.5° (cor.); (a) compound, m. 128–9°; *m*-chloroacetylaminacetophenone, m. 113.5–14.5° (cor.); (a) compound, m. 165–6° (decompn.); *p*-chloroacetylaminoleucomalachite green, sinters above 80° and softens to a tar; (a) compound, m. 189–90° (decompn.); *o*-chloroacetyl-amino-*p*′, *p*′-tetraethyldiaminotriphenylmethane (a) compound, m. 177–8° (decompn.); *p*-chloroacetyl-amino-*p*′, *p*′-tetraethyldiaminotriphenylmethane (a) compound, m. 168–9°; 6-chloroacetylaminquinoline, m. 153–5° to a red tar; hydrochloride, decomps. above 250°; (a) compound, m. 203–4° (decompn.). IV. Monohalogenated simple amines, ureas, and urethans, and the hexamethylenetetraminium salts derived therefrom. *Ibid* 145–52.—The salts formed from the halogenacyl compds. and (a) are all easily sol. in H₂O and, on standing, the solns. decomp., liberating HCHO and other products, which, contrary to the behavior observed with the aromatic compds., remain in soln. α -Iodopropionamide, m. 159–60.5° (cor.), glistening needles, would not unite with (a); β -iodopropionamide, m. 141.5–2.5° (cor.); (a) compound, m. 169–70° (decompn.); chloroacetyl-methylamide, m. 45–6° (cor.); (a) compound, m. 173–4° (decompn.); chloroacetyl-dimethylamide, b₁₁ 98.5–9.5° (cor.), m. 15.5° (cor.); (a) compound, m. 160–2° to an orange liquid; chloroacetyl-ethylamide, b₁₁ 97.5–8.5°, m. 22–2.5° (cor.); (a) compound, m. 167–8° (decompn.); chloroacetyl-diethylamide, b₁₁ 125.5–30.5°; (a) compound, m. 174°, effervescing above 190°; chloroacetyl-piperidide, b₁₁ 143.5–5.5° (cor.); (a) compound, becomes pasty 168–70°, m. 184° with gas evolution; methylenebisiodoacetamide, decomps. 227–9° with evolution of I; the pure (a) compd. was not obtained; ethylenebischloroacetamide, m. 174–6° (decompn.); chloroacetylurea (a) compound, m. 176–7° when freshly prepd.; after some weeks it m. 191–2°; chloroacetyl-methylurea (a) compound, sinters 149–51°, gradually m. and decomps. 178°; chloroacetylbenzylurea, m. 153–5° (cor.); (a) compound, m. 160°; chloroacetylurethan (a) compound, m. 166–7°.

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The quaternary salts of hexamethylenetetramine. V. Monohalogenacetyl derivatives of amino alcohols and the hexamethylenetetraminium (hexamethylene-tetrammonium) salts derived therefrom. WALTER A. JACOBS AND MICHAEL HEIDELBERGER. Rockefeller Inst. *J. Biol. Chem.* 21, 403–37(1915).—[Of the chloroacetyl-amines described in Paper II (*C. A.* 9, 1612) only chloroacetylbenzylamine and chloroacetyl-*o*-methylbenzylamine were prepd. from the amines and CH₂ClCOCl. The others were prepd. by the method of Einhorn (*Ann.* 343, 207, 1905; *C. A.* 2, 2682) in which HOCH₂NHCOCH₂Cl is used to introduce the —CH₂NHCOCH₂Cl group.—ABSTR.] An attempt was made to prep. a series of compds. of the esters of chloroacetylaminomethanol with hexamethylenetetramine (a). Although addition occurred, the product obtained was always the compd. of the base with the alc., not the ester. With higher alcs., it was found that both alc. and ester reacted smoothly to form stable

salts. The chloroacetyl amino alcs. were prepd. from the NH_2 alcs. and ClCH_2COCl . These were then acylated with the acid chloride in $\text{C}_6\text{H}_5\text{N}$. In some cases the aminoethyl esters were treated with ClCH_2COCl , but this is less satisfactory than the former procedure. Mol. rearrangements readily occurred with propanol derivs. in the 2nd method. For the method of prepg. the (a) compds. see C. A. 9, 1610. Hydroxymethylchloroacetamide (a) compd., m. $154-5^\circ$ (decompn.). Chloroacetylaminomethyl benzoate, m. $73-3.5^\circ$ (cor.). Anisate (*p*-methoxybenzoate), m. $106-7^\circ$ (cor.). Chloroacetylaminomethanol, $b_{0.25-0.35}$ $141-5^\circ$ (cor.). Iodoacetylaminomethanol, from the Cl compd. and NaI, not purified; (a) compound, m. $142-3^\circ$ (decompn.): trimethylamine compound, m. $138-9^\circ$ (cor.). Chloroacetylaminomethyl benzoate, m. $69-9.5^\circ$ (cor.); (a) compound, darkens 158° , m. 162° (decompn.). Chloroacetylaminomethyl *o*-toluate, m. $65-5.5^\circ$; (a) compound, m. 168° (decompn.). Chloroacetylaminomethyl *p*-toluate, m. $106-7.5^\circ$ (cor.); (a) compound, m. $161-2^\circ$. Chloroacetylaminomethyl β -naphthoate, m. $137-9^\circ$ (cor.); (a) compound, m. $174-6^\circ$ (decompn.). Chloroacetylaminomethyl *o*-nitrobenzoate, syrup; (a) compound, m. 174° . Chloroacetylaminomethyl *m*-nitrobenzoate, not purified; (a) compound. Chloroacetylaminomethyl *p*-nitrobenzoate, m. $127-8^\circ$ (cor.); (a) compound, m. $182-2.5^\circ$ (decompn.); trimethylamine compound, m. $175-6^\circ$ (cor.). Chloroacetylaminomethyl *p*-aminobenzoate, from the NO_2 compd. and SnCl_2 , m. $117-8.5^\circ$ (cor.). Chloroacetylaminomethyl *p*-[azodiethylaniline]-benzoate (chloroacetylaminomethyl ester of *p*-carboxybenzenazo-*p'*-diethylaminobenzene), from the diazotized aminobenzoate and Et_2NPh , m. 116° ; (a) compound, m. $179-81^\circ$, dyes silk a bright orange. Chloroacetylaminomethyl *o*-acetoxybenzoate m. 117° (cor.); (a) compd., m. $154-6^\circ$ (decompn.). Chloroacetylaminomethyl anisate (*p*-methoxybenzoate), m. $96.5-7^\circ$ (cor.); (a) compound, m. $153-4^\circ$ (decompn.). Chloroacetylaminomethyl cinnamate, m. $120-2^\circ$ (cor.). Chloroacetylaminomethyl ethyl ether, from $\text{NH}_2\text{CH}_2\text{CH}_2\text{OEt}$ and ClCH_2COCl , b_{15} 132° (cor.); (a) compound, m. $135-45^\circ$. Aminoethyl *o*-tolyl ether (*o*-methylphenoxyethylamine), from *o*-methylphenoxyethyl bromide and NH_3 , b_{15} 128° . Chloroacetylaminomethyl *o*-tolyl ether, from the NH_2 ether, $b_{0.7}$ $168-9^\circ$, m. $39.5-40.5^\circ$ (cor.); (a) compound, m. 162° . Chloroacetylaminomethyl ethanol, $b_{0.8}$ $130-5^\circ$. Chloroacetylaminomethyl *p*-nitrobenzoate, m. $73.5-4^\circ$ (cor.); (a) compound, m. $154-5^\circ$. Chloroacetylaminomethyl phenylaminoethanol, m. $67.5-8.5^\circ$ (cor.). Chloroacetylaminomethyl *p*-nitrobenzoate, m. $115-6^\circ$ (cor.); (a) compound, m. $167-8^\circ$. Bromoacetylaminomethyl phenylaminoethanol, m. $58-60^\circ$ (cor.). *p*-Dimethylaminophenylaminoethanol, from $p\text{-NH}_2\text{C}_6\text{H}_4\text{NMe}_2$ and $\text{CH}_2\text{Cl.CH}_2\text{OH}$, b_{16} $215-7^\circ$ (cor.), m. $32.5-5^\circ$ (cor.). Chloroacetyl-*p*-dimethylaminophenylaminoethanol, m. $85.5-7^\circ$ (cor.). *p*-Methoxyphenylaminoethanol, from $p\text{-NH}_2\text{C}_6\text{H}_4\text{OMe}$ and $\text{CH}_2\text{ClCH}_2\text{OH}$, b_{18} $188-91^\circ$, m. $43.5-4.5^\circ$ (cor.). γ -Bromopropyl-*p*-nitrobenzamide, from $p\text{-O}_2\text{NC}_6\text{H}_4\text{COCl}$ and $\text{CH}_2\text{BrCH}_2\text{CH}_2\text{NH}_2$, m. $107.5-8^\circ$ (cor.). γ -Aminopropyl-*p*-nitrobenzoate hydrobromide, by rearrangement from the above amide on heating in H_2O , m. $185-5.5^\circ$ (cor.). Upon treating with NaOH the free base seps. as an oil and gradually rearranges to γ -hydroxypropyl-*p*-nitrobenzamide, m. $102.5-3.5^\circ$ (cor.). γ -*p*-Nitrobenzoylaminoethyl chloroacetate, from the above amide and $(\text{ClCH}_2\text{CO})_2\text{O}$, m. $93-106^\circ$. γ -Chloroacetylaminopropyl-*p*-nitrobenzoate (the base was liberated from the HBr salt after the acid chloride had been added), m. $78-9^\circ$ (cor.); (a) compound, m. $178-9^\circ$. γ -Chloroacetylaminopropyl anisate (*p*-methoxybenzoate), as the nitrobenzoate, m. $72.5-3^\circ$ (cor.); (a) compound, m. $167-8^\circ$. Chloroacetylaminoisopropanol, $b_{0.8}$ $131-2^\circ$ (cor.), m. $33-4.5^\circ$ (cor.); (a) compound, decomps. $171-2^\circ$. Chloroacetylaminoisopropyl-*p*-nitrobenzoate, m. $133.5-4.5^\circ$ (cor.); (a) compound, darkens above 170° , m. $180-2^\circ$ (decompn.). Aminoisopropyl-*p*-nitrobenzoate hydrobromide, as the normal compd., m. $221-2^\circ$. The free base rapidly rearranges to hydroxyisopropyl-*p*-nitrobenzamide, m. $168-9^\circ$. *p*-Nitrobenzoylaminoisopropyl chloroacetate, from the amide and $\text{ClCH}_2\text{CH}_2\text{COCl}$, m. $89-94^\circ$; (a) compound, m. $175-8^\circ$ (decompn.). δ -Chloroacetylaminobutanol, $b_{1.7}$ $165-7^\circ$ (cor.), m. 30° (cor.); (a) compound, m. 125° . δ -Chloroacetylami-

butyl *p*-nitrobenzoate, m. 79° (cor.); (a) compound, darkens above 165° , m. $170-2^{\circ}$. β -Chloroacetylaminio- γ -butanol, $b_{0.3}$ 119° , m. $38-9^{\circ}$; (a) compound, m. $167-9^{\circ}$. Chloroacetylaminio- γ -butyl *p*-nitrobenzoate, m. $117-8^{\circ}$ (cor.); (a) compound, m. $189-91^{\circ}$ (decompn.). γ -Chloroacetylaminio- β -pentanol, $b_{0.3}$ $126-8^{\circ}$, m. $52-60^{\circ}$; (a) compound, m. $167-8^{\circ}$ (decompn.). Chloroacetylaminomethyl methyl ethyl carbinol (α -chloroacetylaminio- β -methyl- β -butanol), $b_{0.7}$ 134° (cor.); (a) compound, m. 170° (decompn.). γ -Chloroacetylaminio- β -methyl- β -butanol, $b_{0.4}$ 122° (cor.); (a) compound, m. $174-5^{\circ}$ (decompn.). α -Phenyl- α -hydroxy- β -chloroacetylaminioethane, m. $109-9.5^{\circ}$ (cor.); (a) compound, m. 179° (decompn.). α -*p*-Tolyl- α -hydroxyethylamine, from *p*- $\text{MeC}_6\text{H}_4\text{CH}(\text{OH})\text{CN}$ and Na-Hg , m. $68-9^{\circ}$ (cor.). α -*p*-Tolyl- α -hydroxy- β -chloroacetylaminioethane, m. $81-2^{\circ}$ (cor.). α -*p*-Methoxyphenyl- α -hydroxyethylamine, by reduction from anisaldehyde cyanohydrin. α, β -Diphenylchloroacetylaminioethanol, from the NH_3 alcohol and $(\text{ClCH}_2\text{CH}_2\text{CO})_2\text{O}$, m. $194-4.5^{\circ}$; (a) compound, m. 174° (decompn.). α, β -Isodiphenylchloroacetylaminioethanol, prep'd. as its isomer, m. $156-7^{\circ}$ (cor.); (a) compound, m. $197-9^{\circ}$ (decompn.). β -Phenyl- β -hydroxy- α -chloroacetylaminopropane, viscous oil; (a) compound, m. $175-6^{\circ}$ (decompn.). α -Phenyl- α -benzoyloxy- β -benzoylaminopropane, m. $172.5-3.5^{\circ}$ (cor.).

VI. Halogenethyl ethers and esters and their hexamethylenetetraminium salts. *Ibid* 439-53.—Attempts at combining (a) with chloroethyl ethers and esters were unsuccessful as the substances failed to react. The Br compds. were prep'd. but the reaction is slow and requires boiling in PhMe , with consequent danger of decompn., or standing for several months in CHCl_3 at room temp. The I compds. were not prep'd. as they are generally insol. Phenoxethyl bromide (a) compound, m. $151-2^{\circ}$. *o*-Cresoxethyl bromide (a) compound, m. 185° . *m*-Methylphenoxethyl bromide (*m*-cresoxethyl bromide), from *m*-cresol, $\text{CH}_2\text{BrCH}_2\text{Br}$ and NaOH , b_{14} $136-7^{\circ}$; (a) compound, m. $155-6^{\circ}$. *p*-Cresoxethyl bromide (a) compound, m. 176° . α -Naphthyl bromoethyl ether (α -naphthoxethyl bromide), from α -naphthol, $\text{CH}_2\text{BrCH}_2\text{Br}$ and NaOH , $b_{6.8}$ $154-6^{\circ}$, m. 25° (cor.), sol. in PhH , Et_2O , ligroin, sparingly in EtOH and MeOH ; (a) compound, turns yellow above 170° , m. 175° (decompn.). β -Naphthoxethyl bromide (a) compound, crysts. with CHCl_3 , not removable by boiling with Me_2CO or EtOH , m. 180° (decompn.). 2,4,6-Trichlorophenoxethyl bromide, from the phenol, $\text{CH}_2\text{BrCH}_2\text{Br}$ and NaOH , m. $47-8^{\circ}$ (cor.), sol. in Et_2O , PhH , PhMe and hot EtOH . 2,4,6-Trichlorophenoxethyl dimethylamine hydrochloride, from the above bromide and piperidine as above, m. $188-9^{\circ}$, sol. in H_2O and EtOH . *p*-Bromophenoxethyl bromide, from $\text{PhOCH}_2\text{CH}_2\text{Br}$, m. $56-7^{\circ}$ (cor.), sol. in PhH and Et_2O ; (a) compound, decomp. $185-6^{\circ}$. Tribromo-*p*-methylphenoxethyl bromide (tribromo-*p*-cresoxethyl bromide), from the phenol as above, m. $50-1^{\circ}$, sol. in PhH , Me_2CO and hot HOAc ; (a) compound, m. 181° . Tribromo-*p*-methylphenoxethyl piperidine hydrobromide, m. $223-30^{\circ}$ (decompn.). Tetrabromo-*p*-methylphenoxethyl bromide, from a prep'n. of the tribromocresol containing some tetra-Br comp'd., m. $106-7.5^{\circ}$. *o*-Acetaminophenoxethyl bromide, from the phenol as above, m. $90-0.5^{\circ}$ (cor.), sol. in PhH , CHCl_3 , less so in Et_2O ; (a) compound, m. 160° . *o*-Aminophenoxethyl bromide hydrobromide, from the NHAc comp'd. by hydrolysis with HBr , m. $193-8^{\circ}$ (decompn.). Upon addition of just enough NaOH was obtained *o*-aminophenoxethyl bromide, m. $36-7^{\circ}$ (cor.), very unstable, undergoing internal condensation. *o*-Aminophenoxethyl piperidine hydrochloride, from *o*-acetaminophenoxethyl bromide and piperidine and subsequent hydrolysis with HCl , m. $184-5.5^{\circ}$, sol. in H_2O and hot EtOH . Upon treatment with Na_2CO_3 , this yields the free base, m. $69-70^{\circ}$ (cor.). *p*-Acetaminophenoxethyl bromide (a) compound, m. $196-8^{\circ}$. *o*-Carbomethoxyphenoxethyl bromide (methyl 2-bromoethoxybenzoate), from *Me* salicylate as above, b_{10} $186-8^{\circ}$, m. $37.5-8^{\circ}$ (cor.). 2-Bromoethoxybenzamide, from salicylamide, $\text{CH}_2\text{BrCH}_2\text{Br}$ and EtONa , m. $112-4^{\circ}$. The same mixt.

also yields *salicylamide ethylene ether*, $(o\text{-H}_2\text{NOCC}_6\text{H}_4\text{OCH}_2)_2$, m. 211.5° (cor.). *Acetoxyethyl bromide* (a) compound, m. $172-3^\circ$. *Benzoyloxyethyl bromide* (a) compound, m. $164-5^\circ$. *Bromoethyl p-nitrobenzoate* (*p-nitrobenzoyloxyethyl bromide*), from *p-nitrobenzoic acid* and $\text{CH}_3(\text{OH})\text{CH}_2\text{Br}$, m. $47-50^\circ$, sol. in PhH, CHCl_3 and Et_2O ; (a) compound, m. $190-1^\circ$. *p-Nitrobenzoyloxyethyl iodide* (a) compound, m. $176-8^\circ$. No attempt was made to prep. the (a) compds. of the following esters, which were prepd. from the corresponding acyl chlorides and $\text{CH}_3(\text{OH})\text{CH}_2\text{Br}$. *Bromoethyl o-acetoxybenzoate*, from $\text{CH}_3(\text{OH})\text{CH}_2\text{Br}$ and $\text{AcOC}_6\text{H}_4\text{COCl}$, b.p. $150-60^\circ$, m. $62-2.5^\circ$ (cor.), sol. in Et_2O , CHCl_3 , PhH and hot EtOH. *Bromoethyl acetyl-p-cresolinate*, m. $62.5-3^\circ$, sol. in PhH and PhMe, difficultly in ligroin. *Bromoethyl anisate*, b.p. 140° (cor.). *Bromoethyl m-chloroacetylaminomethylbenzoate*, m. $107-8.5^\circ$. VII. ω -Halogen derivatives of aliphatic-aromatic ketones and their hexamethylenetetraminium salts. *Ibid* 455-65.—Compds. of (a) with ω -chloroacetophenones could not be prepd. owing to the slowness of the reaction and the decompn. accompanying prolonged heating of the reagents. The Br and I ketones reacted smoothly. The compds. of (a) with the Br ketones were preferred owing to their greater solubility. A number of new halogen ketones were prepd. by slightly varying the methods of Kunkell and co-workers (*Ber.* 30, 577, 1713(1897); 31, 169(1898); 33, 2641, 2644(1900)). ω -Bromoacetophenone oxime (a) compound, m. 139° (decompn.). *p-Methylphenacyl bromide* (a) compound, m. $148-9^\circ$. *p-Tolyl iodomethyl ketone* (*p-methylphenacyl iodide*), from the chloride and NaI, m. $42-3^\circ$; (a) compound, m. $157-8^\circ$. *o-Xylyl bromomethyl ketone*, from *o-xylene*, BrCH_2COBr and AlCl_3 , m. $62-2.5^\circ$ (cor.), considered to be identical with the compd. obtained from *o-xylyl Me ketone* and Br (*J. Chem. Soc.* 53, 86(1893)); (a) compound, m. $137-8^\circ$. *m-Xylyl bromomethyl ketone*, as the *o*-compd., m. $42-3^\circ$ (cor.); (a) compound, m. $145-6^\circ$. *p-Ethylphenyl bromomethyl ketone* (*p-ethylphenacyl bromide*), m. $33-4^\circ$ (cor.); (a) compound, m. $146-7^\circ$ (decompn.). *Mesityl bromomethyl ketone* (*2,4,6-trimethylphenacyl bromide*), m. $55-6^\circ$. *m-Nitrophenacyl bromide* (a) compound, m. 157° (decompn.). *p-Acetaminophenyl bromomethyl ketone* (*p-acetaminophenacyl bromide*), m. $190-3^\circ$ (decompn.); (a) compound, m. 194° (decompn.). *p-Aminophenacyl chloride* (a) compound. 3-Acetamino-4-tolyl bromomethyl ketone (*3-acetamino-4-methylphenacyl bromide*), m. $167-70^\circ$; (a) compound, decompn. $150-5^\circ$. 3-Acetamino-4-tolyl ω -iodoethyl ketone (*3-acetamino-4-methyl- ω -iodopropiophenone*), m. $142-3^\circ$ (cor.) (upon oxidation with KMnO_4 is obtained an acid, m. $279-81^\circ$ (cor.), considered to be $4,3\text{-Me}(\text{NHAc})\text{C}_6\text{H}_3\text{CO}_2\text{H}$; *Ber.* 31, 172(1898)); (a) compound, turns yellow 150° , m. $161-2^\circ$ (decompn.). *p-Methoxyphenacyl bromide* (a) compound, m. 172° (decompn.). *p-Ethoxyphenacyl bromide* (a) compound, m. $159-9.5^\circ$ (cor.). Upon treating β -acetylquinaldine with Br in HBr, the hydrobromide of the Br ketone seps. Na_2CO_3 liberates β -[ω -bromoacetyl]quinaldine, m. $102-3^\circ$ (cor.); (a) compound, m. 170° (decompn.). VIII. Miscellaneous substances containing aliphatically bound halogen and the hexamethylenetetraminium salts derived therefrom. *Ibid* 465-75.—*Hydroxyethyl iodide* (a) compound, m. 157° (decompn.). γ -Chloropropyl bromide (a) compound, turns yellow above 140° , m. $180-3^\circ$ (decompn.). γ -Hydroxypropyl iodide (a) compound. *Cetyl iodide* (a) compound, m. 157° (decompn.). *Phenylethyl iodide*, from the chloride and NaI; the fraction b.p. $104.5-30.5^\circ$ was used for the prepn. of the (a) compound, m. 159° (decompn.). *o-Iodobenzyl bromide* (a) compound, decompn. $173-5^\circ$. *Carboethoxyethyl iodide* (a) compound, m. $137-8^\circ$ (decompn.). *sec-Octyl bromoacetate*, from the alc. and CH_3BrCOBr , b.p. 137° (cor.); with (a) is obtained a gelatinous salt. *Bornyl bromoacetate* (a) compound, sinters above 170° , m. $178-81^\circ$. *Menthyl bromoacetate* (a) compound, m. $153-4^\circ$. *Phenyl bromoacetate* (a) compound, m. $149-50^\circ$ (decompn.). *Tribromo-p-cresyl bromoacetate*, softens 60° , m. $60.5-1.5^\circ$ (cor.); (a) compound, not obtained pure. *o-Nitrophenyl bromoacetate*, m. $55.5-6^\circ$ (cor.); (a) compound, m. $149-50^\circ$ (decompn.). *Benzeneazo- β -naphthyl chloroacetate*, m. $127-8^\circ$ (cor.). *Hydroxyethyl anisate* (*p-methoxy*

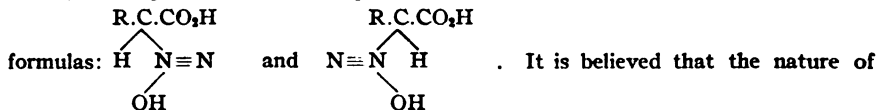
benzoate), from the acyl chloride and $(\text{CH}_2\text{OH})_2$, b_{0.4} 149–50°; the same mixt. also yielded ethylene anisate, m. 117–7.5°, sol. in PhH and CHCl_3 . Chloroacetoxyethyl anisate, from the HOCH_2CH_2 compd. and CH_3ClCOCl , b_{0.4} 170–5°, m. 45.5–6.5° (cor.); (a) compound, very hygroscopic, softens above 70°, completely fluid at 90°. ω -Chloroacetylaminooacetophenone, by acylation with CH_3ClCOCl , m. 124–6.5°, sol. in CHCl_3 ; (a) compound, m. 149–50°. Chloroacetylbis-[*p*-dimethylaminophenyl] methylamine (chloroacetylleucoauramine), $(\text{Me}_2\text{NC}_6\text{H}_4)_2\text{CHNHCOCH}_2\text{Cl}$, by acylation with CH_3ClCOCl , m. 164–4.5°, sol. in CHCl_3 and Me_2CO , insol. in Et_2O ; (a) compound, m. 175°, decomps. 179°. Chloroacetyltriphenylmethylamine (chloroacetyltriphenylmethylamine), by acylation with CH_3ClCOCl , m. 201–2.5° (cor.), sol. in CHCl_3 ; (a) compound, turns yellow 150°, m. 194–5° (decompn.). β -Acetyl- α -chloroacetyl- α -phenylhydrazine (a) compound, m. 192–3°. β -Chloroacetyl- α , α -phenylbenzylhydrazine, by acylation with CH_3ClCOCl , m. 112.5–3.5° (cor.), sol. except in ligroin; (a) compound m. 145–6°.

I. GREENWALD.

Purines. XVII. On a new synthesis of alkylaminopurines. On 2-oxy-8-thiopurine, 2-oxy-8-methylmercaptapurine, 2-oxy-8-methylaminopurine and 2-oxy-6,9-dimethyl-8-thiopurine. CARL O. JOHNS. Yale Univ. *J. Biol. Chem.* 21, 319–23 (1915).— MeNH_2 reacts smoothly with mercaptapurines to form methylaminopurines and MeSH . At high temps. NH_3 appears to react similarly. 2-Oxy-8-thiopurine, from 2-oxy-5,6-diaminopyrimidine and $\text{SC}(\text{NH}_2)_2$, difficultly sol., does not m. 300°; 2-oxy-8-methylmercaptapurine, from the Na salt of the thiopurine and MeI , difficultly sol., decomps. slowly above 260°, does not m. 300°. 2-Oxy-8-methylaminopurine, from the mercaptapurine and MeNH_2 , difficultly sol., does not m. 300°. 2-Oxy-6,9-dimethyl-8-thiopurine, from 2-oxy-4-methyl-5-amino-6-methylaminopyrimidine and $\text{SC}(\text{NH}_2)_2$, slightly sol. in hot H_2O and EtOH . It gives the murexide test. I. G.

The Walden rearrangement in the hexoses. P. A. LEVENE AND F. B. LAFORGE. Rockefeller Inst. *J. Biol. Chem.* 21, 345–50 (1915).—The fact that glucosamine and chondrosamine (cf. *C. A.* 9, 1768) each yield 2 different acids when deaminized and oxidized, depending upon the order in which these processes occur, indicates the occurrence of a Walden rearrangement. L. and LaF. accept the formula $\text{N:N.CRCO}_2\text{H}$ for ali-

phatic diazo acids. In this, the α -C atom is not asym. The fact that glucosaminic and chondrosaminic acids each yield only 1 HO acid, and not 2, upon treatment with HNO_3 , is thought to be due to the possible formation of 2 intermediate compds., of the



the other groups in combination with the α -C atom det. which of these compds. is formed. Ethyl monobenzalglucosaminat hydrochloride, from glucosaminic acid, EtOH , PhCHO and HCl , m. 167–8° (decompn.). From this, with NaNO_2 and HOAc , is obtained ethyl diazobenzalglucosaminat, sol. in org. solvents, insol. in H_2O . I. G.

Xylohexosaminic acid, its derivatives and their bearing on the configuration of isosaccharic and epi-isosaccharic acids. P. A. LEVENE AND F. B. LAFORGE. Rockefeller Inst. *J. Biol. Chem.* 21, 351–9 (1915).—"From xylose, by treatment with NH_3 and subsequently with HCN , a xylohexosaminic acid was obtained. On oxidation following de-amination this acid yields α , α -anhydro-idosaccharic acid. The lactone of the NH_2 acid under the same treatment leads to the α , α -anhydrosaccharic acid. Isosaccharic acid has the configuration of α , α -anhydromannosaccharic acid, while epi-isosaccharic acid is the α , α -anhydrosaccharic acid, and consequently, chitose and chitonic acid have the configuration of α , δ -anhydromannose and of α , δ -anhydro-

mannonic acid, resp.; chitaric acid has that of α,β -anhydrogluconic acid." *Xylohexosaminic acid*, from xylosimine and HCN, with subsequent hydrolysis with HCl, darkens above 190° , decomp. 235° , $[\alpha]_D^{30}$ after 20 min. 11.77° , after 40 hrs. -3.01° . *Xylohexosaminic lactone hydrochloride*, from the acid and alc. HCl, m. 195° (decompn.). *Ethyl dibenzalxylohexosaminatate hydrochloride*, from the NH_2 acid, EtOH, HCl and PhCHO m. 217° . α,α' -*Anhydro-idosaccharic acid*, from xylohexosaminic acid and HNO_3 and subsequent oxidation with HNO_3 , m. 226° (decompn.), $[\alpha]_D^{20} -93.32^\circ$; *acid potassium salt*, very sol. α,α' -*Anhydro-saccharic acid (l-epi-isosaccharic acid)*, from the above lactone hydrochloride and HNO_3 , with subsequent oxidation with HNO_3 , m. 163° , $[\alpha]_D^{20} -38.79^\circ$; *acid potassium salt*, $[\alpha]_D^{20} -38.09^\circ$. Acid K salt of *d*-anhydrosaccharic acid from glucosaminic acid, $[\alpha]_D^{20} 38.53^\circ$.

I. GREENWALD.

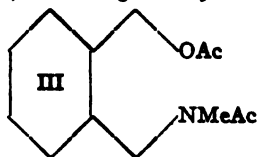
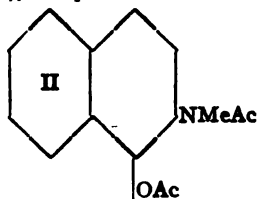
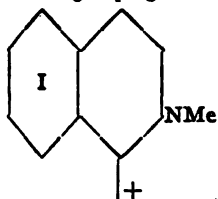
Angostura alkaloids. Isomerism and degradation of cusparine. J. TROGER AND W. MUELLER. Techn. Hochschule Braunschweig. *Arch. Pharm.* 252, 459-96 (1914).—The compd. isomeric with cusparine (a), $\text{C}_{19}\text{H}_{17}\text{O}_2\text{N}$, m. 194° , formed by the action of AgOH or KOH on (a)-MeI, is not simply a demethylated (a), as is shown by a comparison with pyrocusparine (b), which is in fact a demethylated (a) and readily obtained by heating (a) in a current of dry HCl. On treatment with dil. HNO_3 in the heat, (a) and (b) suffer alike diminution of mol. wt. to the extent of $\text{C}_2\text{H}_2\text{O}$, but take on at the same time a NO_2 group. The resulting NO_2 deriv. of (a), which still contains the MeO group, is transformed on heating in a current of HCl into the NO_2 compd. yielded by (b), MeCl being evolved in the operation. On treating the NO_2 deriv. of (a) with MeI vapor, a substance is obtained identical with that formed by the action of dil. HNO_3 on isocusparine (c), the formation of which involves the intramol. change of Me from O to N, in the course of which change a CO group should be apparent. No such group, however, could be detected, and furthermore, no satisfactory explanation is offered touching the loss in mol. wt. of (a), (b) and (c) of the elements of $\text{C}_2\text{H}_2\text{O}$ as the result of treatment with dil. HNO_3 , although it is not improbable that the change may represent the partial degradation of a ring. *Isocusparine*, $\text{C}_{19}\text{H}_{17}\text{O}_2\text{N}$, m. 194° (yielded by (a) on heating with MeI vapor or heating the methiodide, or finally on treating the MeI, EtI or $\text{C}_2\text{H}_5\text{I}$ addition products of (a) with AgOH or KOH in the presence of alc.). The *hydriodide*, $\text{C}_{19}\text{H}_{17}\text{O}_2\text{N} \cdot \text{HI} \cdot \text{H}_2\text{O}$, S-yellow needles anhydrous at 105° , very slightly sol. in hot H_2O . (a)-HI forms yellow anhydrous needles, converted into (b) with loss of MeI on heating in a CO_2 atm. (c)-HI loses under similar treatment but at a higher temp. a small amt. of MeI and is changed into a brownish mass. *Isocusparine hydrobromide*, $\text{C}_{19}\text{H}_{17}\text{O}_2\text{N} \cdot \text{HBr} \cdot \text{H}_2\text{O}$, bright yellow needles; the *hydrochloride*, $\text{C}_{19}\text{H}_{17}\text{O}_2\text{N} \cdot \text{HCl}$, lemon-yellow leaflets; the *chloroaurate*, $(\text{C}_{19}\text{H}_{17}\text{O}_2\text{N})_2\text{HAuCl}_4$, orange-red prisms from alc. HCl; *acid oxalate*, $\text{C}_{19}\text{H}_{17}\text{O}_2\text{N} \cdot \text{C}_2\text{H}_2\text{O}_4$, lemon-yellow cryst. powder stable up to 210° . On treatment with dil. HNO_3 at H_2O bath temp., (c) yields the compound, $\text{C}_{17}\text{H}_{14}\text{O}_2\text{N}_2 \cdot \text{H}_2\text{O}$, S-yellow to yellowish brown prisms from dil. AcOH, m. 239° (darkens $236-7^\circ$), sol. in AcOH, very slightly so in other solvents, only slightly basic, contains the NH group of (c). The same compd. is formed on heating the NO_2 compd. of (a), $\text{C}_{17}\text{H}_{14}\text{O}_2\text{N}_2 \cdot \text{H}_2\text{O}$ (m. 145°), in MeI vapor. The *hydriodide*, yellow anhydrous crystals, m. 239° . The *hydriodide* of the isomeric NO_2 compd., m. 145° , yellow cryst. powder contains 1 mol. H_2O . A new method for prep. (b), $\text{C}_{19}\text{H}_{17}\text{O}_2\text{N}$, consists in heating (a) at 210° in dry HCl, whereby MeCl is evolved. It is also formed on heating (a) in PhCH_2Cl vapor. (c) carbonizes on heating in HCl above 225° . (c) yields with dil. HNO_3 at H_2O bath temp. and with the evolution of gaseous products the compound, $\text{C}_{19}\text{H}_{19}\text{O}_4\text{N}_2$, bright yellow needles from AcOH, m. 283° (decompn.). The same compd. is likewise obtained by demethylating (heating with HCl) the NO_2 compd., $\text{C}_{17}\text{H}_{14}\text{O}_2\text{N}_2 \cdot \text{H}_2\text{O}$, m. 145° .

W. O. E.

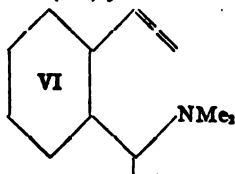
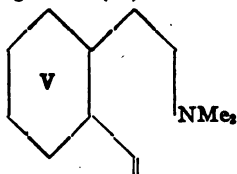
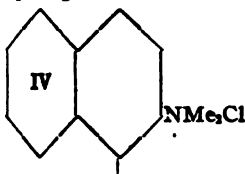
Alkaloids of pareira root. M. SCHOLTZ AND O. KOCH. Univ. Greiswald. *Arch.*

Pharm. 252, 513-36(1914).—As the result of a renewed extn. of a large quantity of radix pareirae, only minute traces of bebeerine (a) (crystg. from MeOH) were obtained, the main product being amorphous β -bebeerine, thus showing the effect of seasonal influences on the character of the drug. The observation was made that crystd. (a) in time passes into the amorphous form, apparently identical with the product obtained by protracted heating of a H_2SO_4 soln. of crystd. (a). Owing to the difficulty of obtaining crystd. (a), S. and K. have confined their attention to an investigation of isobebeerine (b). On heating this substance in a tube at 160° with 5 parts Bz_2O , 2 Bz groups are introduced, one entering the phenol OH, the other uniting with the N atom, thus yielding the compd., $\text{C}_{18}\text{H}_{11}\text{Bz}_2\text{O}_2\text{N}$, as bright yellow granular crystals from alc., m. 225° ; insol. in acids, alkalis and Et_2O , sol. in concd. H_2SO_4 with a deep red color. The splitting of the N-ring is comparable to that of apomorphine and bulbocapnine, thus disposing of the erstwhile assumption to the effect that the difference in behavior of apomorphine and bulbocapnine on the one hand and of (a) and (b) on the other toward Ac_2O was due to an inability of the C atom (marked +) to yield H with the formation of a double bond, for the reason that it is already thus involved. Nascent CH_3N_2 converts (b) into *methylisobebeerine*, $\text{C}_{18}\text{H}_{12}\text{O}_2\text{N}$, pale yellow amorphous ppt. from C_6H_6 + petr. ether, m. 225° (decompn.), insol. in alkalis. On treating (b) with alk. MeI, however, *methylisobebeerine methiodide*, $\text{C}_{18}\text{H}_{14}\text{O}(\text{OMe})_2\text{NMe}_2\text{I}$, results as needles, m. 294° (decomp. somewhat above the m. p.). The same product is obtained on treatment of methylisobebeerine with MeI. Me_2SO_4 converts an alk. soln. of (b) into *methylisobebeerine dimethosulfate*, $\text{C}_{18}\text{H}_{14}\text{O}(\text{OMe})_2\text{NMe}_2\text{SO}_4\text{Me}$, which with KI yields the aforesaid methiodide. *Isobebeerine ethiodide*, $\text{C}_{18}\text{H}_{12}\text{O}_2\text{NI}$, needles from hot H_2O , m. $264-5^\circ$ (decompn.). *Ethylisobebeerine ethiodide*, $\text{C}_{22}\text{H}_{18}\text{O}_2\text{NI}$, yellow cryst. powder, m. 240° . Methylisobebeerine methiodide (the methochloride much more readily) yields on boiling with caustic NaOH a mixt. of α - and β -methylisobebeerinemethine, while treatment with Na-Hg after Emde leads to the formation of the α -form solely. In view of the fact that the same methine base (containing 2 Me groups in combination with N) is formed by both the amalgam treatment and the degradation procedure after Hofmann, the conclusion is drawn that (b) belongs to the isoquinoline group. α -*Methylisobebeerinemethine*, $\text{C}_{18}\text{H}_{12}\text{O}_2\text{N}$, rods from alc., m. 211° , $\alpha = 0^\circ$, sol. in cold concd. H_2SO_4 without color, while on heating the soln. becomes cherry-red. *Hydrochloride*, $\text{C}_{18}\text{H}_{12}\text{O}_2\text{N} \cdot \text{HCl}$, large needles, decomp. 282° . *Sulfate*, $(\text{C}_{18}\text{H}_{12}\text{O}_2\text{N})_2 \cdot \text{H}_2\text{SO}_4$, needles becoming brown at 295° and decomp. above 305° . *Perchlorate*, $\text{C}_{18}\text{H}_{12}\text{O}_2\text{N} \cdot \text{HClO}_4$, rods darkening and decomp. about 285° . *Picrate*, $\text{C}_{18}\text{H}_{12}\text{O}_2\text{N} \cdot \text{C}_6\text{H}_5\text{O}_7\text{N}_3$, yellow cryst. ppt. m. $202-4^\circ$. β -*Methylisobebeerinemethine*, $\text{C}_{20}\text{H}_{16}\text{O}_2\text{N}$, needles from $\text{C}_6\text{H}_6\text{N} + \text{H}_2\text{O}$, m. 185° , more sol. in alc. than the α -form, $[\alpha]_D^{20} 171.4^\circ$ (0.14 g. in 10 cc. $\text{C}_6\text{H}_6\text{N}$), sol. in concd. H_2SO_4 with yellowish green color rapidly changing to cherry-red and then suddenly to a pure blue. *Hydrochloride*, $\text{C}_{20}\text{H}_{16}\text{O}_2\text{N} \cdot \text{HCl}$, rhombic plates. *Sulfate*, $\text{C}_{20}\text{H}_{16}\text{O}_2\text{N} \cdot \text{H}_2\text{SO}_4$, needles. *Perchlorate*, $\text{C}_{20}\text{H}_{16}\text{O}_2\text{N} \cdot \text{HClO}_4$, needles. α -*Methylisobebeerinemethine* unites readily with MeI to form the *methiodide*, $\text{C}_{18}\text{H}_{12}\text{O}_2\text{N} \cdot \text{MeI}$, rhombic plates darkening above 300° and still solid at 325° , slightly sol. in hot H_2O . On boiling with NaOH, the methiodide (more readily the methochloride, $\text{C}_{18}\text{H}_{12}\text{O}_2\text{N} \cdot \text{MeCl}$, rods m. above 310°) yields Me_2N , HI (or HCl) and the compound, $\text{C}_{18}\text{H}_{12}\text{O}_3$. On treating the methochloride with Na-Hg, the compound, $\text{C}_{18}\text{H}_{12}\text{O}_3$, results, which yields with Br a *dibromide*, thus indicating the presence of a double bond. No tetrabromide could be prepd. from the compd. $\text{C}_{18}\text{H}_{12}\text{O}_3\text{N}$. The methiodide yields no NH_4 base with Ag_2O but rather suffers oxidation. The compound, $\text{C}_{18}\text{H}_{12}\text{O}_2\text{N}$, was obtained in the form of needles, m. 256° , insol. in but reddened by concd. H_2SO_4 . The compound, $\text{C}_{18}\text{H}_{12}\text{O}_3\text{N}$ forms rhombic leaves from alc. or AcOH, and needles from aq. $\text{C}_6\text{H}_5\text{N}$, m. 325° . The *dibromide*, $\text{C}_{18}\text{H}_{12}\text{O}_3\text{NBr}_2$, yellow granular ppt., m. $228-30^\circ$. KMnO_4 converts the compd. $\text{C}_{18}\text{H}_{12}\text{O}_3\text{N}$ into an acid and a glycol. The various reactions de-

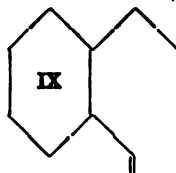
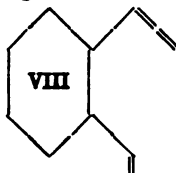
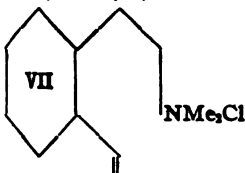
scribed for (b) can be satisfactorily explained only on the assumption that it contains the at. grouping shown in (I), the position marked with a + indicating the asym. C



atom. Formulas (II) and (III) indicate the manner in which an opening of the mol. is effected by means of Ac_2O . While asymmetry persists in both cases, the asym. C atom itself is involved in the formation of (II), since it takes on the substituent and thus becomes racemic. (V) and (VI) represent the α - and β -forms, resp., and result from opening the methochloride as given in (IV). The methochloride (VII) yields the forms



(VIII) and (IX). Pharmacological tests carried out by Gabbe show that (b) in the



form of its cryst. sulfate and some other combinations is not an antipyretic but rather a narcotic, that it cannot be regarded as the carrier of the therapeutic action of pareira root. The following color reactions were noted in connection with (b): In the cold, concd. H_2SO_4 yields a colorless soln., while in the heat a cherry-red color is produced. On adding a drop of FeCl_3 to the concd. soln., a rose coloration gradually develops, while with a drop of concd. HNO_3 the liquid first turns brownish yellow, then rose and on warming colorless. (b) dissolves in cold concd. HNO_3 with a light brown color, the soln. becoming colorless on warming. Erdmann's reagent first produces a brownish yellow color, followed by rose and finally on warming by dark red. Millon reagent: brownish in the cold gradually changing to cherry-red. Froehde reagent: blue-violet in the cold, changing through red to brown in the heat. A drop of 1% SeO_2 develops a dark red color in a cold concd. H_2SO_4 soln. of (b), becoming brown on warming. Marquis reagent: feeble blue color in the cold, becoming reddish brown on warming. H_2SO_4 containing As_2O_3 yields a colorless soln. in the cold, changing to reddish brown in the heat. A trituration of (b) with sugar is reddened by concd. H_2SO_4 . Dissolved in $\text{K}_3\text{Fe}(\text{CN})_6$ + FeCl_3 (b) develops Berlin blue. A soln. of KIO_3 acidified with H_2SO_4 is made to yield free I by (b).
W. O. E.

The resin of *Picea vulg. L. var. Montana* Schur. HANS BINDER. Univ. Bern. Arch. Pharm. 252, 547-89(1914); cf. Tschirch and Koch, *Ibid* 240, 272.—Among the problems involved in this investigation was an attempt to demonstrate whether, on melting the resin, the cryst. constituents are changed into amorphous forms or *vice versa*. It became necessary to show in this connection also to what extent if any such

constituents are modified by the various methods of isolation. The crude resin, in which vanillin and a bitter principle were detected, is dissolved by the more common solvents, very slightly by 70% alc., acid no. (direct) 121.58, (indirect) 115.97; sapon. no. hot 119.34, cold after 24 hrs. 123.55, 48 hrs. 131.96, 72 hrs. 109.51. The product insol. in 70% alc. yielded on recrystn. from 90% alc. cryst. aggregates (A) and a cryst. meal (B). On treating (A) with Pb acetate, a sepn. was further effected into (a) pptd. by the Pb salt and (b) not pptd. thereby. (a) gave with HCl the monobasic *l*-piceapimarinic acid, $C_{20}H_{30}O_2$, light- and air-stable needles, m. $140-1^\circ$, $[\alpha]_D -21^\circ 2'$ (in alc., $c = 1.363$), I no. 86.17, without sapon. no. Silver salt, $C_{20}H_{28}O_2Ag$, very sol. in Et_2O , difficultly so in alc., insol. in H_2O . Pb salt, $(C_{20}H_{27}O_2)_2Pb$, only sol. in alc. and Et_2O in traces. (b) yielded with HCl the isomeric *d*-piceapimarinic acid, $C_{20}H_{30}O_2$, small cryst. aggregates m. $140-2^\circ$, $[\alpha]_D 5^\circ 13'$ (in alc., $c = 1.149$), otherwise very like the *l*-acid. (B) m. 138° , $[\alpha]_D -16^\circ$ (in alc., $c = 5.836$), could not be sepd. by Pb acetate into stable crystals. Steam-molten resin, which also contained vanillin, dissolved in 90% alc., acid no. (direct) 115.97, (indirect) 123.55; sapon. no. hot 133.90, cold after 24 hrs. 126.07, 48 hrs. 131.69, 72 hrs. 125.09. Exhaustion with 75% alc. yielded 4-5% mono- or triclinal crystals, m. $138-43^\circ$, $[\alpha]_D -54^\circ 28'$ (in alc., $c = 6.549$). On subjecting the crude resin to Tschirch's method of analysis (exhaustion of the Et_2O soln. in rotation with 1% solns. of $(NH_4)_2CO_3$, Na_2CO_3 and KOH), with $(NH_4)_2CO_3$, 30% of an amorphous optically active acid was extd., which on sepn. by means of Pb acetate gave 2 amorphous acids, αI and βI , the latter having the comp. $C_{21}H_{31}O_2$, m. $116-20-26^\circ$, monobasic, easily sol. in alc. and Et_2O , $[\alpha]_D -7^\circ 54'$ (in alc., $c = 2.1141$), and yielding a Pb salt sol. in Et_2O and alc., I no. 45.14, without sapon. no. A 1% Na_2CO_3 soln. dissolved 45% of the resin, the resulting crude acid yielding with Pb acetate 3 products, one pptd. as the Pb salt insol. in Et_2O (x), a second not pptd. by Pb acetate and insol. in Et_2O (y), while the third (z) is not pptd. by Pb acetate but is sol. in Et_2O . (x)- β -piceapimarinic acid, $C_{20}H_{30}O_2$, monobasic, light- and air-stable monoclinic leaflets, m. $157-62.5^\circ$, $[\alpha]_D -11^\circ 30' \pm 0.3$ (in alc., $c = 5.790$), I no. 76.42, without sapon. no. Ag salt $C_{20}H_{29}O_2Ag$; Pb salt, $(C_{20}H_{29}O_2)_2Pb$, insol. in Et_2O and only slightly sol. in alc. The mother liquor of this acid contained an amorphous optically active acid, γI . (y), monobasic γ -piceapimarinic acid, $C_{20}H_{30}O_2$, monoclinic leaflets, m. $168-9^\circ$, $[\alpha]_D -12^\circ 46'$ (in alc., $c = 3.131$), I no. 82.36, without sapon. no. Ag salt, $C_{20}H_{29}O_2Ag$; Pb salt, $(C_{20}H_{29}O_2)_2Pb$, insol. in Et_2O , moderately sol. in alc. The mother liquor contained the amorphous resin acid δI . (z), a mixt. of the resin acid ϵI , m. $90-110^\circ$, $[\alpha]_D -7^\circ 40' \pm 0.3$ (in alc., $c = 2.391$), slightly sol. in cold NaOH. 1% KOH extd. a very small quantity of an amorphous substance. The residual resene (amounting to 12%) freed from essential oil was quite sol. in alc. and Et_2O . The oil had an aromatic odor and cooling taste, b. $158-76^\circ$, $[\alpha]_D -16^\circ 42' \pm 0.3$, sol. in $CHCl_3$ and Et_2O , very slightly in alc. In applying T.'s method to the molten resin, $(NH_4)_2CO_3$ soln. gave 32% of an amorphous slightly *l*-rotatory resin acid, only a small portion of which was pptd. by Pb acetate. The non-pptd. portion was sepd. by Et_2O into 2 parts. The Et_2O -insol. part, monobasic α -piceapimarinic acid, $C_{20}H_{30}O_2$, was obtained only with great difficulty as light- and air-stable monoclinic plates, m. $164-6^\circ$, $[\alpha]_D -22^\circ 36'$ (in alc., $c = 4.656$), without sapon. no. The Ag salt, $C_{20}H_{29}O_2Ag$; Pb salt, $(C_{20}H_{29}O_2)_2Pb$. The mother liquor contained an amorphous *l*-rotatory acid, αII . The Et_2O -sol. part behaved like the substance obtained from the crude resin and was provisionally designated βII , amorphous monobasic acid, slightly colored powder, $C_{21}H_{31}O_2$, m. $80-6^\circ$, $[\alpha]_D -14^\circ 53'$ (in alc., $c = 1.9047$), I no. 56.32, without sapon. no. The resin acids extd. by Na_2CO_3 soln. were sepd. into 3 products, one pptd. by Pb acetate and insol. in Et_2O (d), another not pptd. by Pb-acetate and insol. in Et_2O (e), and a third not pptd. by Pb acetate but sol. in Et_2O (f). (d), monobasic β -piceapimarinic acid, $C_{20}H_{30}O_2$, light- and air-stable leaflets, $[\alpha]_D -24^\circ 44'$ (in alc., $c = 5.681$), I no. 76.92, without sapon. no.

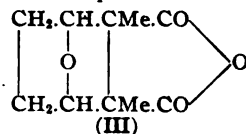
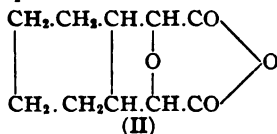
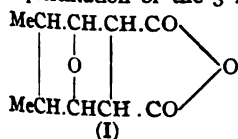
Ag salt, $C_{20}H_{32}O_2Ag$; Pb salt, $(C_{20}H_{32}O_2)_2Pb$. The mother liquor contained the amorphous acid γ II. (e), γ -piceapimaric acid, $C_{20}H_{30}O_2$, light- and air-stable leaflets, m. $151-3.5^\circ$, $[\alpha]_D -4^\circ 17'$ (in alc., $c = 4.66$), very like the corresponding acid from the crude resin. (f), monobasic δ -piceapimaric acid, $C_{20}H_{30}O_3$, light- and air-stable monoclinic leaflets, m. $160-2^\circ$, $[\alpha]_D -17^\circ 8'$ (in alc., $c = 2.043$), I no. 87.15, without sapon. no. Ag salt, $C_{20}H_{32}O_2Ag$; Pb salt, $(C_{20}H_{32}O_2)_2Pb$. The amorphous acid, ϵ II, was isolated from the mother liquor. Resene was obtained in a yield of 10.6%, essential oil 0.4%. From the foregoing it appears that the resin under exam. contains chiefly *l*-piceapimaric acids, those of the crude material as isolated by T.'s method being less *l*-rotatory than the corresponding ones from the molten product. The acids obtained by the use of 70% alc. possess the same rotatory properties. The sum of $[\alpha]_D$ values obtained for the crystals isolated with 70% alc. is approx. equal to that of $[\alpha]_D$ yielded by the substances sepd. by T.'s method from the molten resin. Not only is the yield of cryst. acids greater but pure crystals are more easily and rapidly obtained from the molten than from the crude product. The piceapimaric acid formerly isolated by T. and Koch and by T. and Bruening was optically inactive. This was also true in the case of cryst. acids obtained from the crude resin on treatment with Na_2CO_3 soln. prior to sepn. with Pb acetate. On treating galipot with 70% alc., a crude acid, sensitive to light, was obtained, $[\alpha]_D 32^\circ 18'$, which could be sepd. into 2 portions by means of Pb acetate, each forming light- and air-stable crystals, the one from the pptd. Pb salt yielding $[\alpha]_D 65^\circ 18'$, the other from the sol. Pb salt, $[\alpha]_D 36^\circ 19'$. The pimaric acid from galipot gives, in distinction to the piceapimaric acids, Vesterberg's NH_3 reaction; furthermore, the latter acids contain only one double bond as indicated by the I nos.

W. O. E.

Iron compounds of phenols. VII. Compounds of eugenol and vanillin with iron. R. F. WEINLAND AND HERMANN NEFF. Univ. Tuebingen. *Arch. Pharm.* 252, 600-8 (1914); cf. Weinland and Binder, *C. A.* 8, 1785.—Sodium tetravanillinferate, $[Fe(C_8H_7O_2)_4]Na \cdot 0.5H_2O$, nearly black powder consisting of microscopic red-violet needles, was prepd. by treating 0.55 g. Fe'' acetate in 10 cc. abs. alc. with 3.8 g. vanillin in 15-20 cc. abs. alc. and 2.5 g. of 10% alc. NaOH. In a similar manner were obtained: potassium pentavanillinferate, $[Fe(C_8H_7O_2)_5]K \cdot H_2O$, black powder consisting of microscopic granular aggregates. Sodium tetraeugenolferate, $[Fe(C_{10}H_{11}O_2)_4]Na \cdot 0.5H_2O$, black powder consisting of microscopic violet right-angled leaflets. Potassium tetraeugenolferate + eugenol, $[Fe(C_{10}H_{11}O_2)_4]K \cdot C_{10}H_{11}O_2$, black powder consisting of microscopic violet right-angled plates. Acid potassium eugenolate, $C_{10}H_{11}O_2K \cdot 2C_{10}H_{11}O_2$, needles.

W. O. E.

The constitution of cantharidin. J. GADAMER. Univ. Breslau. *Arch. Pharm.* 252, 609-32 (1914).—A critical discussion of previous papers relating to this subject and a presentation of the 3 most prominent formulas: Prior to the completion of work



inaugurated by Danckwortt (cf. following abstr.) and that continued by G., no final decision with respect to the constitution can be made.

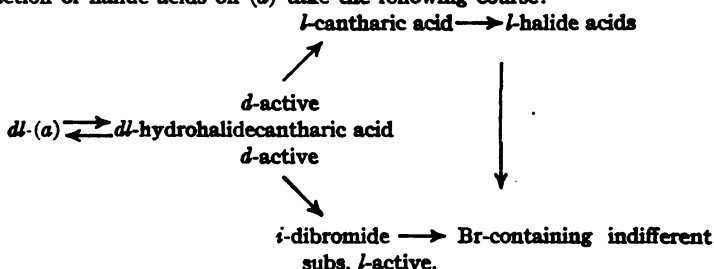
W. O. E.

The chemical nature of cantharidin. P. W. DANCKWORTT. Univ. Breslau. *Arch. Pharm.* 252, 632-6 (1914).—According to Spiegel (cf. *Ber.* 26, 142) cantharidin (a) is the anhydride of a di- CO_2H acid, while Meyer (cf. *Monatsh.* 18, 396) inclines to the belief that a free CO_2H exists in the compd. D. finds, however, that titration of (a) in neutral soln. develops a permanent red color only after an amt. of alkali corre-

sponding to 1.5 CO_2H has been added. Analysis of the K salt resulting therefrom shows that 2 CO_2H are satd. (a) behaves therefore in harmony with the observations of Spiegel like an acid anhydride, the hydrated form being unstable. The neutral K salt of the dibasic cantharidinic acid, $\text{C}_{11}\text{H}_{14}\text{O}_6$, is stable only in the absence of H_2O ; in aq soln. it becomes hydrolyzed until a point of equilibrium obtains between the neutral salt and the acid anhydride. With brucine a fairly stable salt is obtained; it could not be used, however, with success in an attempt to prep. optical isomers of (a).

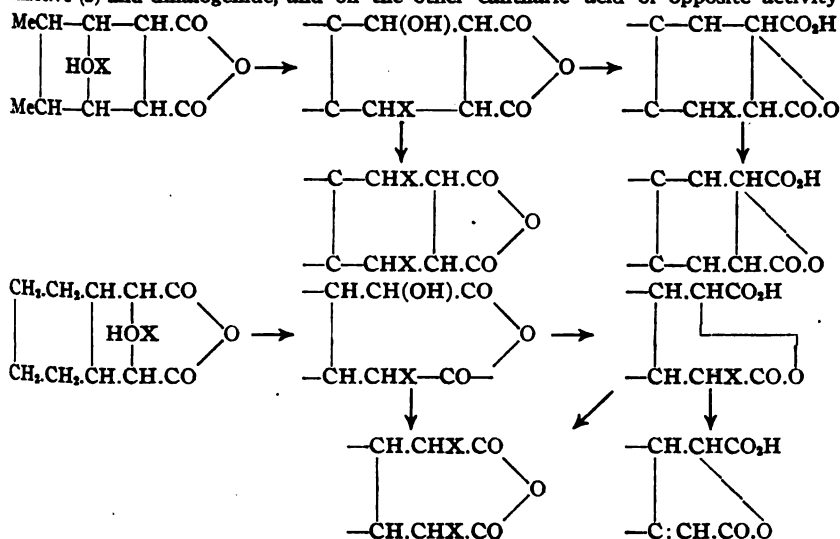
W. O. E.

The action of hydrochloric acid on cantharidin. J. GADAMER. Univ. Breslau. *Arch. Pharm.* 252, 636-63 (1914).—On heating cantharidin (a) with iodized HI (d. 2.0) and under conditions excluding reduction, Piccard's diiodide, $\text{C}_{10}\text{H}_{12}\text{O}_3\text{I}_2$, is formed and in addition secondary products in form of I acids difficult of sepn., together with an indifferent substance of low I content. These acids are obtained in a yield of 20% when (a) is heated with HI (d. 1.7), while one of them resulted in a very pure state and to the amt. of 50% on allowing (a) to stand 6 months at the ordinary temp. with HI (d. 2.0). The acid in question, *dl*-hydriodocantharic acid, $\text{C}_{10}\text{H}_{12}\text{O}_4\text{I}$, is separable, by the aid of the brucine salts, into the optical congeners, $[\alpha]_D = 79-80^\circ$, while I acids obtained in other ways are not uniform and owe their formation, in part at least, to the addition of HI to cantharic acid, which always appears in greater or less amt. with the other products. At a somewhat higher temp. ($150-5^\circ$) HBr also reacts with (a) in an exactly analogous manner, yielding thereby the dibromide, $\text{C}_{10}\text{H}_{12}\text{O}_3\text{Br}_2$, together with a secondary oily, indifferent product containing apparently only 1 atom of Br. Mixts. of various acids are likewise formed, among which cantharic and hydrobromocantharic acids are the most important. The latter acid is separable into 2 optical components, $[\alpha]_D = 85.5^\circ$. When these optically active acids are heated with HBr in AcOH under the same conditions as (a), an inactive dibromide, an indifferent viscous product containing but 1 Br atom and possessing an opposite activity to that of the original acid, active hydrobromocantharic acid and cantharic acid of opposite activity result. On treating the dibromide in the same way, the substance is scarcely affected, while active cantharic acid yields an indifferent non-cryst. product together with Br acids (not identical with hydrobromocantharic acid) and active cantharic acid. Reactions involving the action of halide acids on (a) take the following course:



The reaction: $\text{HX} + (\text{a}) = \text{hydrohalidecantharic acid}$ is likewise reversible, a fact easily shown in another way. On heating active hydrobromocantharic acid for some time, a few degrees under the m. p. (220°), HBr is quant. evolved and at the same time about half the substance (inactive (a)) sublimes while the other half remains in the solid state as cantharic acid of opposite activity. The HCl addition products of (a) possess so little stability that it is impossible to isolate them. The hydrochlorocantharic acid at the high temp. of formation is apparently immediately changed into cantharic acid with corresponding loss of HCl. In view of the fact that the union of hydrogen halide with (a) consists of the mol. union of an ether

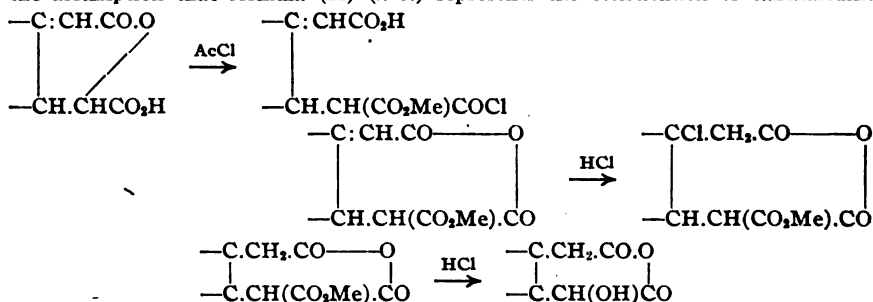
with a non-ionized hydrogenhalide, the principal reactions involved for (a), on the assumption of either Formula I or II (cf. preceding abstr.), may be represented by the following schemes, which show that active hydrohalidecantharic acid yields on the one hand inactive (a) and dihalogenide, and on the other cantharic acid of opposite activity.



Piccard's diiodide, $\text{C}_{10}\text{H}_{12}\text{O}_4\text{I}_2$ (cf. Ber. 10, 1505), cryst. crusts from alc., gradually becoming yellow, m. $117-24^\circ$ or $133-7^\circ$, acts like an acid anhydride, is converted in part into the liquid Et ester on recrystg. from alc., converted in part into (a) with corresponding loss of HI and CO_2 . *d*-Hydriodocantharic acid, $\text{C}_{10}\text{H}_{12}\text{O}_4\text{I}$, crystals from dil. alc., becoming yellow at 160° , m. $178-80^\circ$ (evolution of HI), easily sol. in alc. *l*-Hydriodocantharic acid, $\text{C}_{10}\text{H}_{12}\text{O}_4\text{I.H}_2\text{O}$, needles turning yellow 160° , m. $179-81^\circ$, $[\alpha]_D -80^\circ$ (in abs. alc., $c = 2$). Brucine salt, m. 207° (decomps. $193-4^\circ$). *d*-Hydriodocantharic acid, $\text{C}_{10}\text{H}_{12}\text{O}_4\text{I.H}_2\text{O}$, $[\alpha]_D 79-80^\circ$ (in abs. alc. $c = 1.867$), m. as the *l*-acid. Brucine forms a neutral salt with hydrated hydriodocantharic acid, $\text{C}_{10}\text{H}_{12}\text{O}_4\text{I}.2\text{C}_{22}\text{H}_{28}\text{O}_4\text{N}_2.7\text{H}_2\text{O}$, fine needles, shrinks 100° , decomps. $100-2^\circ$ into the anhydrous form (decomps. 157°), and a normal salt of monobasic *d*-hydriodocantharic acid, thick plates containing apparently 3 mols. H_2O , decomps. 111° into the anhydrous form, m. $160-5^\circ$. Dibromide, $\text{C}_{10}\text{H}_{12}\text{O}_4\text{Br}_2$, m. $133-4^\circ$, boils in vacuum without decompn., acts like an acid anhydride, somewhat more stable than the diiodide toward alkalies, loses HBr and CO_2 on titration. *d*-Hydrobromocantharic acid, $\text{C}_{10}\text{H}_{12}\text{O}_4\text{Br}$, needles, m. $218-20^\circ$ (evolution of HBr), monobasic and separable by means of brucine into its 2 optical components. *l*- and *d*-acids, $[\alpha]_D \pm 84.4-85.5^\circ$ (in abs. alc., $c = 2.28$), vary only slightly from the *dl*-form. Brucine salt of the *l*-acid, anhydrous, bright, hard and thick crystals, m. $222-3^\circ$ (decomps. $216-7^\circ$). Brucine salt of the *d*-acid contains apparently 4 mols. H_2O , very thin opaque leaflets, m. $183-5^\circ$ (decompn.) W. O. E.

Cantharic acid, isocantharidin and isocantharidinic acid. P. W. DANCKWORT. Arch. Pharm. 252, 663-82 (1914).—According to Gadamer (cf. preceding abstr.), the formation of cantharic acid (a) from cantharidin under the influence of hydrogen halide is due to the slight stability of the hydrohalidecantharic acid first formed, which at the high temp. involved immediately passes into (a) with corresponding loss of hydrogen halide. It was fair to assume therefore that ClSO_3H would react in a similar manner. From the fact that H_2SO_4 shows little tendency to react with cantharidin, it did not seem

probable that its Cl deriv. would show any greater tendency to yield a mol. compd. with that substance. There is formed a compd. which may be regarded as hydrochlorocantharic acid whose OH is combined in ester form with H_2SO_4 , with the result that both CO_2H groups are available for anhydride formation. In contact with H_2O , hydrolysis of the complex ester takes place leading to the formation of hydrochlorocantharic acid which immediately decomps. into (a) and HCl. The accompanying Cl-acids of indifferent and acid character are apparently the result of secondary action of HCl on (a). The latter contains a double bond and an asym. C atom and may be sepd. by brucine into its 2 physical isomers. The transition of (a) to isocantharidin under the influence of AcCl possibly takes place in accordance with the following mol. changes, on the assumption that formula (II) (*l. c.*) represents the constitution of cantharidin:



That the above formulation of isocantharidin is open to question has already been pointed out by Gadamer (*l. c.*), although it harmonizes well with the optical relations existing between the original and end product. Cantharic acid, $\text{C}_{10}\text{H}_{12}\text{O}_6$, from cantharidin by the aid of ClSO_3H according to Anderlini and Ghio, or by the action of $\text{HCl} + \text{AcOH}$ in a tube at 200° , feather-like crystals from hot H_2O , m. about 273° . On indirect titration the acid shows a decided color change, while a similar treatment of phthalidecarboxylic acid, m. $151-2^\circ$, gives no such result, the latter acid reacting like a monobasic lactone acid, being converted by an excess of alkali into a dibasic triat. acid. Such behavior on the part of (a) is additional evidence that it cannot have the constitution assigned to it by Meyer. Attempts to prepare a hydrogenated phthalidecarboxylic acid were unsuccessful. On boiling cantharidin for an extended period under a reflux condenser with $\text{H}_2\text{SO}_4 + \text{AcOH}$, the substance remains for the most part unaffected, although a very minute quantity of (a) could be detected. *d*-Cantharic acid (the difficultly sol. brucine salt has 4 mols. H_2O), needles, $[\alpha]_D^{20} 90.2^\circ$ (0.4366 g. in 25 cc. abs. alc.). *l*-Cantharic acid (the easily sol. brucine salt has 5 mols. H_2O) could not be prepd. in absolutely pure condition; $[\alpha]_D^{20} -72.6^\circ$ in abs. alc. Attempts to prep. Meyer's " α -hemellithylic acid," $\text{C}_8\text{H}_5\text{CO}_2\text{H}$, in accordance with Piccard's procedure by heating the Ba salt of (a) resulted in the formation of a minute quantity of an acid m. 134° and having a mol. wt. 156.7. (a) is converted into isocantharidin on treatment with AcCl in partially filled tubes at 135° . In this manner *l*-(a) yielded *l*-isocantharidin, $[\alpha]_D^{20} -106.4^\circ$ (0.4112 g. in 25 cc. acetone), which in contact with H_2O passes in a few hrs. into *d*-isocantharidin, and to some extent perhaps into *d*-(a) until equil. is established. Continued boiling of an aq. soln. of isocantharidin, as also heating in the dry state with a few drops HCl to about 200° , yields for the most part *d*-(a), in less degree an isomeric (a) of opposite rotation, which could not be isolated in a pure condition, however, by means of brucine. The suggestion is made that the *d*-(a) may possibly be converted into the desired structural isomer on treatment with ultraviolet light. *d*-Isocantharidinic acid, crystals from Et_2O , m. about 160° (decompn.), $[\alpha]_D^{20} 48.7^\circ$ or 46.5° (0.3900 g. in 25 cc. abs. alc.). W. O. E.

Conversion of choline into neurine. ERNST SCHMIDT. Univ. Marburg. *Arch. Pharm.* 252, 708-11 (1914).—Attempts to convert choline into neurine by the direct elimination of H_2O were unsuccessful. On heating choline chloride on the H_2O bath with pure H_2SO_4 , the main portion was unaffected, a minor portion yielding a betaine-like compd., $NMe_2.CH_2.CH_2.O.SO_2.O$. Other dehydrating agents, such as $POCl_3$,

P_2O_5 and $ZnCl_2$, failed to have the desired effect. Similarly, choline chloroplatinate heated for a long time on the H_2O bath or 1 hr. at $125-30^\circ$ with 5 parts of concd. H_2SO_4 yielded no neurine. The same substance heated to the molten state is for the most part converted into $NMe_2.HPtCl_4$. W. O. E.

Arecolidine. HERMANN EMDE. *Apoth. Ztg.* 30, 240-1 (1915).—This alkaloid occurs in minute quantities in the mother liquors resulting from the prepn. of arecoline-HBr and can be sepd. therefrom by systematic recrystn. of the HCl salts. The free base is obtained from its salts by means of caustic alkalies or alk. carbonates, even with $MgCO_3$. It is easily sol. in H_2O , alc., Et_2O and acetone. On evapn. of its solns. the alkaloid remains as a viscous oil, having a characteristic amine-like odor somewhat resembling locust (acacia). From anhydrous Et_2O the base is obtained in the form of brilliant needles, m. 105° . Sublimation raises the m. p. to 110° . On account of its hygroscopic properties the base does not lend itself well to analysis. *Arecolidine hydrochloride*, $C_8H_{11}O_2N.HCl.H_2O$, very hygroscopic, hard brilliant prisms from 99.5% alc., m. $95-8^\circ$, losing its H_2O at 100° . Heated to 250° it decomps. with evolution of gas. The *hydrobromide*, $C_8H_{11}O_2N.HBr$, thick brilliant prisms, sinters 235° , darkens 242° , decomps. $268-71^\circ$ (gas evolution). The *chloroaurate*, $C_8H_{11}O_2N.HAuCl_4$, light golden-yellow leaflets or needle-like aggregates from H_2O , m. $219-20^\circ$ (decompn.). The *chloroplatinate*, $(C_8H_{11}O_2N.HCl)_2PtCl_4$, thick, deep orange needles, sinters 214° , decomps. $222-3^\circ$. *Methiodide*, $C_8H_{11}O_2NI$, thick, yellow needles or brilliant prisms from MeOH, decomps. 264° ; *chloroaurate*, $C_8H_{11}O_2N.HAuCl_4$, golden-yellow, fern-like crystals, m. 252° (decompn.). In view of the fact that the alkaloid is unaffected by treatment similar to that which saponifies arecoline to arecaine, it is believed that the O atoms are not present as CO_2H as in the case of arecoline. The following constitutional formula is suggested: $CH:CH.C(OMe):C(OMe).CH_2.NMe$.

W. O. E

Synthesis of thiohydantoin. III. The formation of the substituted thiohydantoins. SHIGERU KOMATSU. *Mem. Coll. Sci., Kyoto Imp. Univ.* 1, 69-79 (1914); cf. C. A. 5, 2819.—The condensation of NH_2 acids with HSCN in the presence of Ac_2O has been further applied to the prepn. of several new 4-substituted hydantoins. 2-Thio-3-acetyl-4-isobutylhydantoin, formed when mol. proportions of leucine and KSCN are heated at 100° with Ac_2O for 15 min., plates from hot H_2O , m. $112-3^\circ$, converted by heating with concd. HCl into 2-thio-4-isobutylhydantoin, scales from hot H_2O , m. $169-70^\circ$. 2-Thio-4,4-dimethylhydantoin formed in like manner from $Me_2C(NH_2)CO_2H$; needles, m. $163-4^\circ$. The yield was poor (about 4%). $Me_2CHCH(NH_2)CO_2H$ gave 2-thio-3-acetyl-4-isopropylhydantoin, an oil which sepd. from hot H_2O in fine needles, m. $98-9^\circ$, giving with hot concd. HCl 2-thio-4-isopropylhydantoin; plates from hot H_2O , m. $129-30^\circ$. 2-Thio-3-acetyl-4-phenylhydantoin, needles from hot H_2O , m. $185-6^\circ$, is formed from $PhCH(NH_2)CO_2H$ and is de-acetylated by strong HCl, forming 2-thio-4-phenylhydantoin, needles from H_2O or alc., m. $211-2^\circ$ (decompn.). Aspartic acid under the same conditions did not lead to the formation of a hydantoin deriv.; cf. glutamic acid, C. A. 6, 1276-7. Most of the NH_2 acid was recovered unaltered, while NH_4Cl was isolated in amt. proportional to the quantity of KSCN used. 2-Thio-3-methylhydantoin, which cannot be prepd. by the Ac_2O method from $MeNHCH_2CO_2H$, was formed on heating $MeNHCH_2CO_2Et.HCl$ with KSCN in alc. 5 hrs.; yellow leaves from hot H_2O , m. $214-5^\circ$. 1-Phenyl-2-thio-3-methylhydantoin was formed by Aschen's

method from PhNCS and $\text{MeNHCH}_2\text{CO}_2\text{H}$; light yellow plates, m. $150-1^\circ$. In like manner *1,4-diphenyl-2-thiohydantoin* (a), needles from H_2O , m. $223-4^\circ$, was formed from PhNSC and $\text{PhCH}(\text{NH}_2)\text{CO}_2\text{H}$. A by-product, difficultly sol. in hot H_2O , sepg. in red-brown needles from alc., m. $155-6^\circ$, is to be further investigated. (a) is desulfurized by $\text{ClCH}_2\text{CO}_2\text{H}$.

NORMAN A. SHEPARD.

The ethereal oil of *elsholtzia cristata* willdenow (labiatae). II. Elsholtzic acid. YASUHIKO ASAHINA AND YOSHIATSU MURAYAMA. Univ. Tokio. *J. Pharm. Soc. Japan* 1915 (398), 361-4; cf. *C. A.* 9, 1048.—Elsholtzic acid, $\text{C}_8\text{H}_8\text{O}_3$, previously obtained by A. and M. from elsholtzia ketone in small yield, may now be prepd. in quantity from the crude Elsholtzia oil as follows: To 3.0 g. oil in 40 cc. abs. Et_2O with 1.0 g. finely cut Na 6.0 g. AmNO_2 is added slowly with cooling and the mixt. allowed to stand at room temp. 24 hrs. H_2O is then added, the soln. satd. with CO_2 , extd. with Et_2O , the H_2O soln. acidified with HCl and again extd. with Et_2O . After removal of the Et_2O , elsholtzic acid remains as an oily mass, which soon solidifies; yield 0.5-0.7 g. It is purified by heating in H_2O with small amt. of NH_4Cl and Zn dust, filtering when decolorized, acidifying with HCl and extg. with Et_2O . Recrystd. from H_2O , it m. 134° . Sodium salt, $\text{C}_8\text{H}_7\text{O}_3\text{Na}\cdot\text{H}_2\text{O}$, plates. Potassium salt, cryst. powder from H_2O . The calcium and barium salts both sep. without H_2O of crystn. Lead salt, $(\text{C}_8\text{H}_7\text{O}_3)_2\text{Pb}\cdot\text{H}_2\text{O}$, clusters of leaves; silver salt, white powder; copper salt, $(\text{C}_8\text{H}_7\text{O}_3)_2\text{Cu}\cdot 6.5\text{H}_2\text{O}$, green leaves; ferric salt, $\text{Fe}(\text{C}_8\text{H}_7\text{O}_3)_2\cdot\text{OH}\cdot 4\text{H}_2\text{O}$, yellow needles. Methyl ester, from the Ag salt and MeI , leaves, m. $3-8^\circ$. Ethyl ester, leaves, m. $47-8^\circ$. Acid chloride, by the action of SOCl_2 on the free acid, m. $21-2^\circ$, b. 175° . Amide, leaves, m. $85-6^\circ$. Anilide, m. 91° .

NORMAN A. SHEPARD.

Crystallographic study of some nitro derivatives of benzene. H. STEINMETZ. Munich. *Z. Kryst. Min.* 54, 467-97(1915).—Complete crystallographic descriptions are given of $\text{C}_6\text{H}_4(\text{NO}_2)_2$, the *o*-, *m*- and *p*-forms of chloro-, bromo- and iodonitrobenzenes, 3,5- $\text{Cl}_2\text{C}_6\text{H}_3\text{NO}_2$, 3,5- $\text{ClBrC}_6\text{H}_2\text{NO}_2$, $\text{C}_6\text{H}_2(\text{NO}_2)_3\text{I}$, *o*- and *m*-nitrophenol, 2,6-, 3,4-, 2,3- and 3,5-dinitrophenol, also, supplementary to previous papers (S. and Gossner, *C. A.* 8, 1766), a new or entation of $\text{O}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$ and measurements on *o*- $\text{H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$ *m*- $\text{O}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$, 2,4-, 3,5- and 2,6-(O_2N) $_2\text{C}_6\text{H}_2\text{CO}_2\text{H}$.

E. T. WHERRY.

Tormentol, the extract of *Potentilla tormentilla* Neck. A. GORIS AND C. VISCHNIAC. *Compt. rend.* 160, 77-80(1915).—Tormentol is obtained from the roots of *Potentilla tormentilla* Neck. by extn. with hot Me_2CO of the fraction pptd. from the macerated roots by basic Pb acetate. The ext. is pptd. with H_2O and the ppt. recrystd. from dil. EtOH . It m. $227-8^\circ$; $[\alpha]_D$ in 90% EtOH 10.78° . Cryoscopic and analytical data give the formula $\text{C}_{22}\text{H}_{30}\text{O}_{10}$. It seems to polymerize on heating to 100° and appears to be an ester since it yields an alc. (m. 310°) and an acid (m. 280°) on sapon. With acid anhydrides it gives esters, indicating the presence of an OH group. E. M. F.

Action of sunlight on cinnamic acid. A. W. K. DE JONG. Buitenzorg, Java. *Verslag. Akad. Wetenschappen Amsterdam* 23, 1255-9(1915); *Proc. Acad. Wetenschappen* 17, 1274-7(1915).—Further expts. on the formation of α - and β -truxillic acid from normal and allocinnamic acids (cf. *C. A.* 6, 2746). Allocinnamic acid, cinnamic acid, and mixts. with α - and β -truxillic acids were exposed to sunlight and the nature of the effect detd. for various conditions. The results indicated that, contrary to previous conclusions, β -truxillic acid is not formed by combination of a mol. each of the allo- and the normal cinnamic acids. Normal cinnamic acid can give both α - and β -truxillic acid, while the formation of the β -acid from allocinnamic acid is a secondary process. The effect of the sunlight is affected by the fineness of the substances exposed, and by the interposition of glass. Samples of com. cinnamic acid were found to contain up to 3% of β -truxillic acid, and allocinnamic acid was obtained in quantity by exposing a soln. of Na cinnamate to sunlight.

GEORGE W. MORRIS.

The introduction of the guanidine nucleus into the polypeptide molecule. Synthesis of guanidoglycylglycine. ANTONINO CLEMENTI. Univ. Heidelberg. *Atti accad. Lincei* 24, I, 55-7(1915); see *C. A.* 9, 1473. E. J. WITZEMANN.

The chemical action of light. XXX. G. CIAMICIAN AND P. SILBER. *Atti accad. Lincei* 24, I, 17-21. XXXI. Autooxidation. *Idem* 96-8(1915); see *C. A.* 9, 1178. E. J. WITZEMANN.

Some aromatic nitro derivatives. Solubility of some nitro derivatives of toluene in the solid state. I. M. GIUA. Milan. *Gazz. chim. ital.* 45, I, 339-45(1915); see *C. A.* 8, 2731. E. J. WITZEMANN.

Aromatic nitro derivatives. II. Trinitrobenzoic acid and dinitrotoluidines corresponding to β - and γ -trinitrotoluenes. MICHELE GIUA. Milan. *Gazz. chim. ital.* 45, I, 345-52(1915); see *C. A.* 9, 1479. E. J. WITZEMANN.

The oxime of phenyl α -naphthyl ketone. MARIO BETTI AND PASQUALE POCCHIANTI. Univ. Siena. *Gazz. chim. ital.* 45, I, 372-9(1915); see *C. A.* 8, 3021. E. J. W.

Reactions of sodium malonic ester. C. LORING JACKSON AND F. C. WHITMORE. *J. Am. Chem. Soc.* 37, 1522-37(1915).—The present paper gives exptl. proof of the theory that the 1st step in the reaction of sodiomalonic ester (a) and org. halogen compds. consists in addition of the halogen compd. to the enol form of (a), the more negative part of the halogen compd. (usually the halogen atom, but in some cases the org. radical) adding to the C atom carrying the ONa (*C. A.* 6, 615). The following facts furnish evidence of the formation of such an addition product: when the pale yellow bromotriiododinitrobenzene (b) is treated with colorless (a) in the cold the mixt. becomes blood-red and is decolorized by acids (owing to the formation of $\text{BrI}_2\text{C}_6\text{H}(\text{NO}_2)_2$ and $[\text{CH}(\text{CO}_2\text{Et})_2]_2$ or $\text{CHI}(\text{CO}_2\text{Et})_2$). Similar color changes have been observed in 83 analogous reactions. Moreover, 10 cc. of abs. alc. dissolves 10 g. of the red product but only 1.5 g. of (a) and 0.043 g. of (b). When (a) is treated with an excess of *sald.* alc. (b), filtered, evapd. *in vacuo*, the Na in the residue detd. and there is deducted from the wt. of this residue the amt. of (b) sol. in a vol. of alc. equal to that of the soln. taken, the % of Na found agrees within 0.2% with that calcd. for the addition product (c), $\text{BrI}_2(\text{O}_2\text{N})_2\text{C}_6\text{H}(\text{ONa})(\text{OEt})\text{CO}_2\text{Et}$, irrespective of the concn. of (a) in the soln. In similar expts. in $\text{C}_6\text{H}_5\text{-EtOH}$ with an excess of (a), the % of halogen in the residue differed from the calcd. by 1.25% at most. A large amt. of the product of the reaction between (a) and (b) was then fractionated into 29 fractions and it was found that the excess of (a) and (b) accumulated in the 1st and last fractions, while the 4 middle fractions all contained the amt. of halogen calcd. for (c). A method is also described whereby triiodoaniline can be prepd. pure with tolerable certainty, and the prepn. of (b) has also been improved. The cold solns. of (c) in C_6H_6 and alc. are quite stable if protected from acids and H_2O , but heating decomps. them and all evapns. must be carried out at room temp. Attempts to prep. insol. compds. by replacing the Na by other metals (Ag, Ca, Fe'' , Hg'') were unsuccessful. The residue left by evapg. solns. of (c) *in vacuo* over KOH is a red oil or tar changing to an amorphous dark red solid; in only 1 case were obtained a few red plates which may have been (c) in cryst. form.

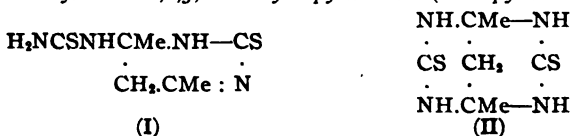
CHAS. A. ROULLIER.

Azulene, a blue hydrocarbon. II. ALFRED E. SHERNDAL. *J. Am. Chem. Soc.* 37, 1537-44(1915); cf. *C. A.* 9, 596.—Azulene (a) combines in alc. with 1 mol. picric acid, the *picrate* sepg. out almost at once in jet-black needles, m. about 120° , regenerates (a) with dil. alkalis or H_2O , sol. in alc., acetone and Et_2O with green, in C_6H_6 and AcOEt with blue color; CCl_4 and benzine dissolve out the (a), leaving the picric acid behind. The color intensity of (a) is such that 0.64 g. in 1 l. benzine matches 0.24 g. CuSO_4 in 1 l. NH_4 . Using the method described in the 1st paper, 0.03% (a) was iso-

lated from a dark bluish green fraction of oil of cubebs. By the action of $\text{Ac}_2\text{O} \cdot \text{H}_2\text{SO}_4$ blue oils were obtained from oils of amyris, guaiac wood and gurgun, and from the latter (a) was isolated as the picrate. The sesquiterpene fraction of the oil of eucalyptus also gave a greenish blue oil while oil of cedar wood and caryophyllene of clove oil did not. With H and colloidal Pd in 50% alc. (a) is quant. reduced in 12 hrs. to a tricyclic *dihydrosesquiterpene*, $\text{C}_{15}\text{H}_{28}$, $d_{20} 0.8935$, $n_D^{20} 1.490$, $[\alpha] = 0^\circ$, insol. in 63% H_2SO_4 , gives an intense color with Ac_2O and a trace of H_2SO_4 and with Br in AcOH . It is probably identical with dihydro- α -gurjunene, the approx. consts. of which, derived from Semmler's data (C. A. 8, 2376), are: $d_{20} 0.900$, $n_D 1.492$. Sherndal concludes that (a) is closely related to the sesquiterpenes in structure, is tricyclic and therefore has 4 ethylene bonds, has an aromatic nucleus, has no aromatic conjugate double bond and has a peculiar arrangement of the double bonds which accounts for the intense color, such a color intensity being exhibited by no other known hydrocarbon.

C. A. R.

Constitution of the so-called dithiourimidoacetylacetone. WILLIAM J. HALE. *J. Am. Chem. Soc.* 37, 1544-52 (1915); cf. C. A. 9, 1065.—With concd. H_2SO_4 , CH_3Ac , and $\text{CS}(\text{NH}_2)_2$ in alc. yield acetylacetoneithiourea (2-thiopyrimidine) (a) whereas with a few drops of concd. HCl in abs. alc. there is obtained after 3 days, together with varying amts. of (a)-HCl, the *hydrochloride*, m. 219° , of Evans' dithiourimidoacetylacetone (b) (*J. prakt. Chem.* 48, 489 (1893)). As it is very difficult to sep. the 2 HCl salts the $\text{CS}(\text{NH}_2)_2$ and CH_3Ac were brought together, without acids, in alc. or H_2O , and in both cases small yellow crystals of the free (b) appeared in several days. The slight solubility of $\text{CS}(\text{NH}_2)_2$ in alc. renders H_2O a better medium for the prepn. of (b) which is obtained in 91% yield from 3 g. $\text{CS}(\text{NH}_2)_2$ and 2.5 g. CH_3Ac in 5 cc. H_2O heated 10-2 hrs. in a sealed tube at 98° . (b) can also be obtained in much lighter yellow form by slow condensation (several weeks) of the components in H_2O in the dark. It seps. from alc. or H_2O in monoclinic prisms, m. 192° , readily blackens HgO or basic Pb acetate in H_2O ; CHCl_3 exts. none of the intermediate (a) from the reaction product. (b) is also obtained when the components are boiled without solvents 5-6 hrs. or, with less decompn., when they are heated in a sealed tube 24 hrs. at 98° ; CHCl_3 exts. some (a) from the residue left by evap. the mother liquors. Again, (b) is obtained from 1 mol. each of concd. aq. $\text{CS}(\text{NH}_2)_2$ and (a) at room temp. (b) is therefore clearly (6-thioureido-4,6-dimethyl-2-thio-1,2,5,6-tetrahydropyrimidine (2-thiopyrimidinethiourea) (I).



When 1 g. is boiled 5 hrs. with 1.5 g. $\text{ClCH}_2\text{CO}_2\text{H}$ in 15 cc. H_2O , it is completely desulfurized to 2-ketopyrimidine-urea. In 3 or 4 cases where $\text{CS}(\text{NH}_2)_2$ and CH_3Ac had been allowed to stand in alc. in stoppered tubes over the summer months, more or less exposed to sunlight, and the dark yellow cryst. product was extd. with boiling alc., there remained undissolved 2,4-dithioureinopentane (II), insol. in practically all solvents, sol. in acids and in CH_3Ac , does not blacken HgO but with boiling $\text{ClCH}_2\text{CO}_2\text{H}$ yields de Haan's diureinopentane (C. A. 2, 2559). $\text{CS}(\text{NH}_2)_2$ with CH_3Ac therefore yields 3 S products analogous to the 3 O compds. obtained with urea.

CHAS. A. ROUVILLER.

Inosite and pinite and some of their derivatives. EDWARD G. GRIFFIN AND J. M. NELSON. *J. Am. Chem. Soc.* 37, 1552-71 (1915).—Attempts to synthesize inositol (a) or compds. closely related by (1) aldolization between the C : O and CH_2OH groups of glucose, (2) removal of HBr from bromotetraacetylglucose, (3) C_6Cl_6 and AgOAc

and (4) hydrolysis of benzenetrichlorohydrin failed. (a) was then prepd. from "steep water," a by-product in the manuf. of corn products (368 g. pure (a), rhombic prisms with 2 H₂O from H₂O or dil. AcOH, m. 225°, from 42 l. steep water). Gently heated 10 min. with 18 g. AcBr, 3 g. (a) gives 7 g. of the hexaacetate. When 25 g. (dried at 110°) was heated 6 hrs. in sealed tubes with 100 g. AcBr at 120°, however, the following products were obtained: C₆H₅Br(OAc)₃ (Müller, C. A. 7, 1357), indistinct crystals from alc., m. 240°; α-C₆H₄Br₂(OAc)₄, scaly crystals from alc., long, flat prisms from C₆H₆, m. 225° (M. gives 235°); β-C₆H₄Br₂(OAc)₄ (b), rhombic prisms from alc., m. 130° (M., 140°); *dibromotriacetylcyclohexanetetrol*, slender prisms from alc., m. 124°, yields (b) on acetylation; *dibromodiacetylcyclohexanetetrol*, needles from alc., m. 240° (decompn.), gives (b) on acetylation; *tribromotriacetylcyclohexanetriol*, microscopic plates from C₆H₆, m. 180°; C₆H₄Br₂(OH)₄, massive prisms from H₂O, m. 216° (decompn.) (M., 210°), small prisms from AcOEt, tufted crystals from alc., gives (b) on acetylation. Repetition of M.'s work gave compds. of the same m. p. as those reported above. These halogen esters are not affected by AlCl₃ and C₆H₆ or Na and EtBr in Et₂O, only slightly by Ag₂CO₃ in boiling MeOH; PhMgBr in Et₂O gives dark resins; liquid NH₃ (which, however, was later found to contain large amts. of impurities, such as H₂O, Fe, C₆H₅N, etc.) with (b) gave only C₆H₄Br₂(OH)₄. With AcCl 6 hrs. at 140° (a) gave the following derivs., none of which seems to be identical with M.'s compds.: *Chloropentaacetylcyclohexanepentol*, indistinct crystals from alc., m. 250°; α-*dichlorotetraacetylcyclohexanetetrol*, scales from alc., m. 186°; β-*isomer* (c), rhombic prisms from alc., m. 118°; *dichlorotriacetylcyclohexanetetrol*, b. 216–7°, brittle gum, gives (c) on acetylation and with alc. HCl yields *dichlorocyclohexanetetrol*, prisms from alc., m. 221°, gives (c) on acetylation; *dichlorodiacetylcyclohexanetetrol* (?), needles, m. 107°. The following hexa-, penta- and tetraacyl derivs. of (a) were prepd. by dissolving (a) and the acid chloride at 120° in slightly more quinoline than the amt. necessary to react with the chloride, dissolving the resulting syrup in CHCl₃, washing 2–3 times with dil. H₂SO₄, concg. and adding warm alc. to incipient crystn.: *Hexabenzozoate* (cf. Maquenne, *Compt. rend.* 104, 297(1887)), microscopic crystals from alc., m. 258°; *pentabenzozoate*, prisms from C₆H₆, m. 269°; *tetrabenzozoate*, amorphous powder from CHCl₃-EtOH, m. 231°. *Hexaanisate*, prisms from CHCl₃-EtOH, m. 225°; *pentaanisate*, microscopic needles, m. 251°. *Hexacinnamale*, needles from CHCl₃-EtOH, m. 199°; α-*pentacinnamale*, microscopic prisms from CHCl₃ and alc., m. 271°; β-*isomer*, amorphous powder, m. 125°. *Hexa-m-nitrabenzozoate*, needles from AcOEt, m. 217°; *penta-m-nitrobenzozoate*, powder from AmOH, m. 226°. ClCO₂Et under the same conditions gives a hygroscopic syrup pptd. from Ac₂O and 2 drops of H₂SO₄ by H₂O as an oil, gradually solidifying to an amorphous mass sol. in alc. but with simultaneous formation of (a) (possibly due to alcoholysis); on acetylation the syrup gives 2 *hexaacetylcyclohexanehexols* different from the hexaacetate (d) obtained by direct acetylation of (a); α-*form* flat prisms from alc., m. 212°; β-*isomer*, microscopic prisms from alc., m. 200°. In 1 case the α- changed into the β-form but the transformation could never be repeated, nor could (d) be converted into the above hexaacetates by warming with ClCH₂CO₂Et and quinoline or with Ac₂O satd. with HCl. Repetition of Fick's work (*Chem. Zentr.* 1887, 452) gave (d) as the only cryst. deriv.; it seps. from PhMe in monoclinic prisms, m. 216°, sublimes 200°; b. 234°; liquid NH₃ gives only (a). (a) is unchanged by heating with CH₃N₃, 15% KOH and MeI in alc., Ag₂O and MeI in MeOH, MeOH and HCl in a sealed tube, Me₂SO₄ in quinoline or C₆H₅N. With Me₂SO₄ in 25% NaOH boiled 24 hrs., however, and subsequent acetylation of the product, (a) yielded *mono-methylcyclohexanehexol*, microscopic prisms from alc., m. 204°; *pentaacetylmethylcyclohexanehexol*, needles from Et₂O, m. 141°, takes up 1.5 H₂O on standing in the air and then m. 96°; *tetraacetyldimethylcyclohexanehexol*, prisms from alc., m. 223°, sublimes above 300°; *triacetyldimethylcyclohexanehexol*, syrup, b. 212–3°. With

Et_2SO_4 are obtained: *pentaacetylcyclohexanehexol*, needles, from Et_2O , m. 128° ; *tetraacetyldiethylcyclohexanehexol*, prisms from alc., m. 212° , sublimes unchanged above 300° , yields with alc. $\text{Ba}(\text{OH})_2$ *diethylcyclohexanehexol*, prisms from alc., m. 212° . Pinite (monomethylcyclohexanehexol) (e), obtained from the roots of *Pinus lambertina*, prisms from MeOH, m. 186° , sublimes above 200° , gives the Scherer test, $[\alpha]_D^{25} 65.3^\circ$ (0.6950 g. in 100 cc. H_2O); gently warmed with AcBr for 0.5 hr. it gives the *pentaacetate*, prisms from 80% MeOH, m. 98° , $[\alpha]_D^{20} -9.67^\circ$, while 15 min. boiling with BzCl yields the *pentabenzoate*, amorphous powder from 80% MeOH, m. 97° , $[\alpha]_D^{20} 32.3^\circ$. *Pentaanisate*, obtained with the chloride in quinoline at 120° , needles from alc., m. 101° , $[\alpha]_D^{20} = 0^\circ$. *Pentacinnamate*, amorphous powder from alc., m. 105° , $[\alpha]_D^{20} 41.2^\circ$. *Nitrate*, from (e) in a mixt. of 1 vol. fuming HNO_3 and 2 vols. H_2SO_4 , syrup with a bitter taste, easily decomps. on heating, explodes when struck. With AcBr at room temp. 72 hrs. in sealed tubes, (e) gives α - and β - $\text{C}_6\text{H}_4\text{Br}_2(\text{OAc})_4$.

CHAS. A. ROUILLER.

Temperature coefficients and the effects of acids, bases and salts in reaction velocities of triphenylmethane dyes. H. C. BIDDLE and C. W. PORTER. *J. Am. Chem. Soc.* 37, 1571-89 (1915); cf. *C. A.* 8, 665.—The influence of changes in temp. and in the concns. of acid and base and the effect of neutral salts upon the velocity of the development of color and of fading of Ph_3CH dyes was studied by following the change of color of crystal violet (a) in a Stammer colorimeter. It was found that the temp. coeff. of the change carbinol $\rightarrow$ quinoid in the presence of HCl is independent of the concn. of the acid (0.0026-0.0234 *N*) and, between 25 - 40° , of the temp., the increase in velocity of the change being 66% for every 5° . The same is true for the reverse change in the presence of KOH (0.0033-0.0083 *N*) but the temp. coeff. is smaller (43% for 5°). The rate of fading in the presence of alkalies is proportional to the HO ion concn. (in the case of acid dyes, like phenolph., the increase in the velocity of fading is slightly greater than the increase in the HO ion concn.). Expts. on mono-, di- and triaminotriphenylmethane dyes showed that the rate at which these basic dyes acquire color in the presence of acids varies with the concn. of the acid in such a way that it passes through a minimum at a definite acid concn. (different for each dye); for (a) the concn. of acid corresponding to this minimum is approx. 0.0234 *N* HCl; for malachite green, 0.007 *N*. The rate of developing color of (a) in the presence of HCl (0.004 *N*) and NaCl becomes slower as the concn. of NaCl increases, and equimol. amts. of NaCl and KCl have the same effect. The reverse change in the presence of KOH is similarly retarded, the rate of fading being almost a linear function of the sq. root of the equiv. concn. of the salt. All univalent neutral salts (NaCl, KCl, NaNO_3 , NaBr, NaI, KNO_3) in equiv. concns. are equally effective in modifying the catalytic influence of the acid or base; they behave like acids in their effect upon basic dyes and like bases in their influence on acid dyes, the fading of phenolph. being accelerated by neutral salts. In the conversion of a basic dye from the carbinol to the colored form in the presence of an acid, the salt effect depends on the concn. of the acid, being indifferent at that particular concn. of acid at which the rate of development of color is minimum, accelerating at higher and retarding at lower concns. of acid. The equil. is also displaced by neutral salts; in acid solns. addition of salts produces variations in color in the same direction as increase in the concn. of acid. Alc. and acetone have an effect on basic dyes just the opposite of that of salts, the change in rate, however, being relatively greater as the concn. of alc. or acetone increases. Sugar reduces the rate of fading, probably owing to a diminution of HO ions by formation of glucosates between the base and the sugar.

CHAS. A. ROUILLER.

Conversion of galactose pentaacetate to an isomeric form. C. S. HUDSON and H. O. PARKER. *J. Am. Chem. Soc.* 37, 1589-91 (1915).—From 50 g. galactose penta-

acetate, m. 142° , $[\alpha]_D^{25}$ in CHCl_3 , prepd. by the method of Erwig and Koenigs (*Ber.* 22, 2207(1889)), heated on the H_2O bath with 150 cc. Ac_2O and 10 g. ZnCl_2 until the rotation becomes const. (about 15 min.), is obtained about 70% of an isomeric *pentaacetate*, easily cryst. from alc., m. 95.5° , $[\alpha]_D^{20}$ in 100 cc. soln., 106.7° (3.2500 g. in CHCl_3), 94.8° (1.6816 g. in C_6H_6), 113.6° (3.9480 g. in MeOH), 114.0° (3.3732 g. in AcOH).

CHAS. A. ROUILLER.

The existence of a third crystalline pentaacetate of galactose. C. S. HUDSON. *J. Am. Chem. Soc.* 37, 1591-3(1915); cf. preceding abstr.—When 175 g. galactose is acetylated with Ac_2O and NaOAc and poured into cold H_2O , recrystn. from 95% alc. of the ppt. gives the pentaacetate (a), m. 142° ; if the filtrate is neutralized with NaHCO_3 , extd. with CHCl_3 , the ext. mixed with the mother liquors from (a) and the CHCl_3 allowed to evap. slowly at room temp., more (a) seps. in a few days (total yield, 163 g.); from these final mother liquors there is obtained, after crystn. from alc., 20 g. of a 3rd *pentaacetate*, m. 98° , $[\alpha]_D^{20} -41.6^{\circ}$ in CHCl_3 . Only 2 pentaacetates can be accounted for on the basis of the usual stereoisomeric structures; the existence of a 3rd form may be due to the O-ring linkage being on some other than the γ -C atom (cf. Fischer, *C. A.* 8, 3036).

CHAS. A. ROUILLER.

Catalytic reduction of γ -pyrones. W. BORSCHKE. Univ. Göttingen. *Ber.* 48, 682-6(1915).—Contrary to what happens with yangonin (*C. A.* 9, 312) the pyrone ring in γ -pyrone and some of its simplest derivs. can be reduced with comparative ease. Thus, 15 g. γ -pyrone in 20 cc. H_2O , 4 cc. of 1% gum arabic and 2 cc. of 2% PdCl_2 satd. with H under atm. pressure give *tetrahydro- γ -pyrone*, b. $163-6^{\circ}$, miscible with H_2O within wide limits. *Semicarbazone*, very sol. *Phenylcarbamimic hydrazone*, $\text{O}(\text{CH}_2-\text{CH}_2)_2\text{C}:\text{NHCONHPh}$, needles, m. 169° . β,β' -*Dibenzal derivative*, from the ketone in alc. with BzH and NaOH , light yellow rhombic leaves from $\text{EtOH}-\text{CHCl}_3$, m. 158° . β,β' -*Dianisal derivative*, yellow needles from $\text{EtOH}-\text{CHCl}_3$, m. $179-80^{\circ}$ to a turbid, $222-3^{\circ}$ to a clear liquid. β,β' -*Dicinnamal derivative*, yellow leaflets from $\text{CHCl}_3-\text{EtOH}$, m. $213-4^{\circ}$, sol. in H_2SO_4 with deep blue color. α,α' -*Dimethyltetrahydro- γ -pyrone*, b_m 170° ; *semicarbazone*, prisms from about 10 parts H_2O , m. 192° ; *phenylcarbamimic hydrazone*, needles from alc., m. $211-2^{\circ}$. The pyrone does not condense with aromatic aldehydes. *Diethyl tetrahydro- γ -pyrone- α,α' -dicarboxylate* (*diethyl tetrahydrochelidonate*), b₁ $200-15^{\circ}$, m. $80-2^{\circ}$; *phenylcarbamimic hydrazone*, needles from dil. alc., m. 164° .

CHAS. A. ROUILLER.

4-Hydroxypiperidine and 4-aminopiperidine. BRUNO EMMERT and WILHELM DORN. Univ. Würzburg. *Ber.* 48, 687-92(1915).—To 30 g. 4-hydroxypiperidine in 300 cc. alc. in a 5 l. flask provided with a Dimroth reflux condenser is added 100 g. Na at such a rate that the vapors are just condensed, 1 l. alc. added in 100 cc. portions to the mixt. on the H_2O bath, then 1 l. H_2O and excess of concd. HCl and the soln. is evapd. to dryness. Repeated extn. with alc., diln. with H_2O , evapn. to dryness and 2 more treatments with alc. and evapns. yield 30 g. of the crude HCl salt of 4-hydroxypiperidine; the free base, obtained by dissolving the salt in 40% KOH and extg. 30-40 times with Et_2O , b₇₄ $211-2^{\circ}$ (cor.), m. 86° , quickly absorbs CO_2 and H_2O from the air, gives in 10% soln. with phosphomolybdic acid a yellow ppt., with phosphotungstic acid in the presence of HCl a white gelatinous ppt. sol. on heating and sepg. in tables on cooling; $\text{BiCl}_3\text{-KI}$ ppts. a cinnabar-red powder; Nessler reagent gives a white ppt. *Hydrochloride*, slender prisms from alc., quickly deliquesces in the air. *Chloroaurate*, long prisms from H_2O . *Benzoate*, from the HCl salt and BzCl heated 5 hrs. at 120° , b₁₁ $169-70^{\circ}$, sol. in about 100 parts H_2O at room temp.; *hydrochloride*, m. about 230° when heated rapidly; *chloroaurate*, needles from H_2O ; *chloroplatinate*, prisms from H_2O ; *1-nitroso derivative*, $\text{BzOCH}(\text{CH}_2\text{CH}_2)_2\text{NNO}$, from the HCl salt in H_2O and concd.

KNO_3 treated 5 min. with steam, m. $77-9^\circ$ when heated rapidly from 70° . 12 g. 4-aminopyridine, obtained from 4- $\text{C}_5\text{H}_4\text{NCl}$ heated 4-5 hrs. at $220-30^\circ$ with 5-6 parts $\text{ZnCl}_2 \cdot \text{NH}_3$, gives with Na in alc. 8.5 g. of 4-aminopiperidine hydrochloride, m. $332-5^\circ$ (decompn.) when heated rapidly; chloroplatinate, prisms from H_2O .

CHAS. A. ROUILLER.

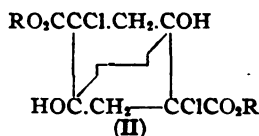
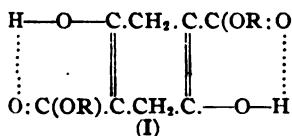
Naphthalenemonosulfonic acids. ORRO N. WITT. Berlin. *Ber.* 48, 743-72 (1915).—Having need of a large amt. of pure β - $\text{C}_{10}\text{H}_7\text{SO}_3\text{H}$, W. made a thorough study of it and the α -isomer and found that a number of errors concerning these substances have crept into the literature and have been accepted as true for a long time. A method was devised for prepg. the β -acid whereby the 1st stage in the usual process (*i. e.*, formation of the α -acid), was avoided and the free acid was obtained pure directly, without passing through the Pb or Ca salt, by taking advantage of the fact that acids "salt out" a new trihydrate (*a*), which is capable of existence only below 70° . Into 250 g. C_{10}H_8 kept at 160° is poured 400 g. of 93.7% H_2SO_4 at such a rate that the temp. remains const. at 160° (about 15 min. are required); the heating is continued 5 min. at most and the clear, light reddish brown liquid poured into 2 l. cold H_2O . About 2 g. of $(\text{C}_{10}\text{H}_7)_2\text{SO}_2$ (chiefly β, β) is formed in the reaction but this almost completely seps. out in cryst. form in the course of 24 hrs. The small amt. remaining in soln. may be extd. with C_6H_6 if desired. The amt. of α -acid formed is such that if the filtered soln. is vigorously boiled in a porcelain dish until the temp. of the boiling liquid is 115° (the liquid then weighs 925 g.) and the dish is covered and cooled, the α -acid salts out (*a*). If it is not desired to sep. the sulfones (which is the case when the acids are eventually to be converted into salts), the evapn. may be avoided by pouring the sulfonation mixt. into only 300 cc. H_2O . Under the above conditions the crude product contains 15% of the α - and 85% of the β -acid and of the latter 85% fully 80 seps. as the trihydrate on cooling and even more if the temp. is brought down to $8-10^\circ$. The cryst. magma is mashed to a thick paste, centrifuged in a Ni basket or filtered through a Pukall filter and pressed out in an acid-proof press through coarse unbleached muslin. 600 g. of the press cake in 300 cc. H_2O at 70° are then treated with 100 cc. of HCl (d. 1.19); on slow cooling and allowing to stand in the ice chest, (*a*) again seps. practically quant. and is treated as above and finally kept over concd. aq. NaOH *in vacuo*. So obtained, it forms snow-white, gleaming crystals, m. 83° , free from every trace of the α -acid, perfectly stable in the air, even in the hottest summer weather; if kept over H_2SO_4 or CaCl_2 12-24 hrs. *in vacuo* or a longer time under atm. pressure, it goes over into the monohydrate, m. 124° , which in the air again goes over into (*a*). Again, if (*a*) is covered with a little Et_2O , it slowly melts, without dissolving, to a strongly refractive liquid, the Et_2O apparently splitting off 2 mols. H_2O which then dissolves the resulting monohydrate; on standing in the air, the Et_2O very slowly evaps. and (*a*) is reformed. Towards many other solvents (PhOH liquefied with H_2O , 80% HCO_2H , almost all alkyl aliphatic esters), however, (*a*) is very stable, sepg. unchanged even from solns. which have been prepd. hot. The 3rd mol. of H_2O can be removed in a current of dry air at the temp. of boiling PhMe , the resulting anhydrous acid being an extremely hygroscopic but *not* deliquescent substance; in the air it swells and powders up like CaO and finally forms a cryst. powder of (*a*); the absorption of H_2O is so rapid that the m. p. cannot be detd. in the usual way; the (*a*) must be dehydrated in a tiny bulb attached to a capillary which is then at once sealed; the anhydrous acid then m. $90.5-1.0^\circ$ and is very sol. in C_6H_6 , PhMe and other solvents in which the hydrates are insol., but these solns. always deposit mixts. of the hydrates. If the anhydrous acid is heated in dry air at the temp. of boiling PhNH_3 , it again loses 1 mol. of H_2O , the product being a glassy mass which becomes porcelain-like when covered with H_2O and finally dissolves to a milky liquid containing innumerable microscopic spheres and sepg. from alc. in

transparent spheres. By representing the monohydrate and (a) by the formulas $C_{10}H_8S[:O^{IV}(OH)H]_2$ and $C_{10}H_7S[:O^{IV}(OH)H]_2O^{IV}(OH)H$, a picture is obtained of the different ways in which the H_2O mols. may be combined in them. From the pure β -acid obtained as above a number of its salts were prepd. from the corresponding metallic hydroxides or carbonates in H_2O ; almost all are normal and apparently often isomorphous; at least, almost all sep. in quadrangular tablets. *Ammonium salts*, anhydrous, becomes milky 150° , dissolves in 7 parts H_2O at 25° and 1 part boiling H_2O , seps. from H_2O in monoclinic prismatic tables, $\infty P\infty, \infty P, \neq P, + P$ being usually absent, however. *Na salt*, glass-like leaves, sol. in 17 parts H_2O at 25° ; only when it is contaminated with the α -isomer does it sep. in the form of the shimmering leaflets in which it is generally known. *K salt*, non-hygroscopic crystals with 0.5 H_2O . *Pb salt*, snow-white, non-hygroscopic, 6-sided leaflets with 1 H_2O , which it loses at 180° . *Zinc salt*, seps. with 6 H_2O , all of which it gradually loses from $100-80^\circ$, sol. in 221 parts H_2O at 25° . *Cobalt salt*, flesh-red 6-sided leaves with 6 H_2O which it quickly loses at a high temp., becoming red-violet. *Nickel salt*, light green crystals with 6 H_2O , yellow when anhydrous. *Cadmium salt*, soft pearly leaves with 6 H_2O which it loses at 80° . *Copper salt*, light turquoise-blue crystals with 6 H_2O , depositing a small amt. of a basic salt on long boiling of its solns., sol. in MeOH and EtOH, loses 4 H_2O at $75-80^\circ$, becoming white, and the other 2 H_2O at 125° , becoming lemon-yellow. *Silver salt*, crystals gleaming like polished Ag, somewhat sensitive to light, melts at a high temp.

CHAS. A. ROULLER.

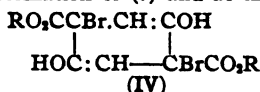
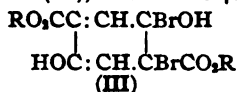
Constitution of succinylosuccinic ester and its halogen derivatives. A. HANTZSCH. *Ber.* 48, 772-85 (1915).—It has now been established by chem. and optical methods that the ester (a) is a "fixed" dienol, $CH_2.C(OH) : C(CO_2R) CH_2.C(OH) : CCO_2R$,

which under no conditions yields a ketone or keto-enol equil. in detectable amts. This extraordinary stability of the enol is related with its cyclic structure as a *cis*-enol and can be more readily perceived from the formula (I) with secondary valences, only



cyclic *cis*-enols forming directly a 6-membered ring by conjunction and thus being able to stabilize themselves, while open enols, like $MeC(OH) : CHCO_2R$, can escape the *cis*-configuration and ring formation by going over into *trans*-enols. Finely divided solid (a) or its alc. soln. at 0° or room temp. instantly and sharply absorb 4 atoms Br, forming a colorless soln.; in other media the reaction is slower but that the (a) is present only in the enol form is shown by the fact that its solns. in various solvents (EtO, EtOH, MeOH), show practically the same absorption and while in AcOH it is somewhat more transparent, addition of a little concd. H_2SO_4 produces no further change, and moreover this slight change is not in the direction of keto forms of succinylosuccinic esters, as shown by comparison with the spectrum of the ketonic *C*-dimethylsuccinylosuccinic ester, insol. in alkalies (v. Baeyer, *Ber.* 25, 2123 (1892)). The difference in behavior of (a) towards Br in various solvents is probably due to the formation of addition products of different stability and reactivity. The *tetrabromide*, which is relatively stable only in its colorless alc. soln., is decompd. into its components by much H_2O ; the same is true of the fresh AcOH soln. poured upon ice and of the alc. and AcOH solns. evapd. *in vacuo* even below 0° , but the alc. soln. shaken with AgCl in the dark gives an alc. soln. of the *tetrachloride*, in which the halogen, as in the case of the bromide, can be quant. titrated with KI. Both tetrahalides give with $FeCl_3$ a red-brown color. No evidence

could be obtained of the existence of intermediate labile α -dihalides; when (a) is shaken with 2 atoms alc. Br at 0° , 0.5 of it is recovered unchanged; similarly an alc. solution of the tetrabromide treated with 2 mols. concd. aq. KI at once deposits 0.5 of the substance as (a). On the other hand, if (a) is pptd. in finely divided form by adding H_2O to its boiling satd. alc. soln. and cooling quickly, filtered, dried, covered with a little Et_2O and treated at -15° with Cl till a permanently yellow soln. is obtained, the apparently unchanged (a) is really almost pure β -dichloride, probably (II), sepg. from org. solvents on cautious crystn. in needles, decomp. 106° , gives no color with $FeCl_3$, no I with KI and no $AgCl$ with Ag_2O , forms no tetrachloride with Cl in any solvent; only with Zn dust and $AcOH$ does it instantly regenerate (a). On warming with alc., long heating or standing several weeks in a KOH desiccator, it quant. forms dihydroxy-*p*-phthalic ester (b). The β -dibromide could not be obtained; only dibromoquinone-dicarboxylic ester (c) could be isolated from the reaction mixt. While the α -tetrahalides show selective absorption similar to that of (a), the β -dichloride shows only general and much weaker absorption. That the change of an enol into a true enol dibromide changes the absorption but little is also shown by ethoxycrotonic and acetoacetic esters and their dibromides in alc. and hexane, resp. A 3rd series of halide derivs. is obtained (the tetrahalides probably being intermediate products) when (a) is pptd. from a warm satd. soln. with 0.25 vol. H_2O and treated with Br vapor at -10° until the soln. has become dark yellow. The apparently unchanged (a) is filtered, washed with Et_2O at -10° and very quickly dried; it is the labile *diethyl dihydroxytetraphthalate* α -dibromide (III), loses Br at $40-50^\circ$ with formation of (b) and at the same time



quickly rearranges into the stable β -dibromide (IV) which undergoes the above decompn. only at 88° ; it is obtained directly instead of (III) when the operations are carried out at a higher temp. and more slowly; when dry it is stable for a short time but always smells faintly of Br and cannot be recrystd. Its spectrum lacks entirely the very deep band of (b). It is probably identical with product obtained by Herrmann from solid (a) and Br vapor (*Ann.* 211, 327(1882)). The dibromides quant. liberate I from KI and in alc. at once absorb Br; the expected hexabromide could not be isolated, the product being (c). The by-product obtained by Zeckendorf in the oxidation of (a) with Br, which he thought was a hydrate of (b), really contains 23% Br and is probably a mixt. of (b) with its dibromide.

CHAS. A. ROULLIER.

Phenylacetylglutamine and its formation in the human body (THIERFELDER) 11H. Activity of the undissociated molecule in ester catalysis (RAMSTEDT) 2. Rapid organic combustions (REIMER) 7. Application of Thomson's theory of atoms and molecules to structural chemistry (SZYSZKOWSKI) 2.

II. BIOLOGICAL CHEMISTRY.

WILLIAM J. GIES, EDGAR G. MILLER, JR., PAUL E. HOWE.

A. GENERAL.

FRANK P. UNDERHILL.

Action of hydrogen ions on phagocytosis in *Carchesium lachmani*. N. K. KOLTZOV. Moscow. *Intern. Z. physik. Chem. Biol.* 1, 82-107(1914).—Increase of the H-ion concn. (also of the OH-ion concn., though to a lesser extent) inhibits the phagocytosis of *Carchesium lachmani*. The reaction is quite delicate between certain limits and might be available as a method of measuring H-ion concn. E. M. FRANKEL.

Changes in the colloidal state of starch. M. SAMEC. Vienna. *Intern. Z. physik. Chem. Biol.* 1, 173-88(1914).—Review of the author's previous papers (cf. C. A. 6, 1913; 7, 3767; 8, 837; 9, 468).
E. M. FRANKEL.

Physico-chemical reactions of enzymes in the stomach after administration per os. A contribution to the nature of zymogens. E. PRIBRAM AND A. PERUTZ. Vienna. *Intern. Z. physik. Chem. Biol.* 1, 269-74(1914).—Zymogens may be explained on the basis of simple adsorption phenomena. The living rabbit stomach readily adsorbs pepsin and rennin, also trypsin, and in alk. medium. The enzymes can be obtained from the mucosa by the usual methods of obtaining zymogens. To activate the enzyme the reaction of the medium must be opposite to that used in extg. the zymogen. Addition of 10% sugar soln. prevents adsorption of the enzyme by the gastric mucosa without affecting the ferment.
E. M. FRANKEL.

Influence of certain capillary-active substances on enzyme activity. G. H. CHAPMAN. Prag. *Intern. Z. physik. Chem. Biol.* 1, 293-337(1914).—Invertin, pepsin, trypsin and catalase are inhibited by various alcohols, esters and ketones. The effects of surface tension do not follow any isocapillary law nor the law of Traube. The effect of univalent alcs., etc., unless influenced by specific toxic action decreases with increase in lipid nature of the substance. There is evidence that enzymes are hydrophile in nature. The action of alcs., etc., is apparently due to a coagulation of the enzyme. Protective colloids retard the inhibition. Lipase acts differently from other enzymes studied, being inhibited by CHCl_3 and accelerated by alcs. below certain concns. It may be a hydrophilic colloid or a lipid.
E. M. FRANKEL.

Antagonism and balanced solutions. R. H. TRUE. Washington. *Science* 41, 653-6(1915).—A review of the conceptions of antagonism and synergism. T. regards balanced and nutrient solns. as cases of antagonism, the salts tending to remove the ill effects of pure H_2O and of certain components.
E. M. FRANKEL.

Balanced solutions and nutritive solutions. J. LOEB. New York. *Science* 41, 757-8(1915).—L. objects to True's view (cf. preceding abst.) that balanced and nutrient solns. are of the same nature, since the lack of a given nutrient deprives the organism of a necessary building stone and this may produce malnutrition or a deficiency disease.
E. M. FRANKEL.

The biochemistry of lipoids. Studies on the adrenals. III. N. C. BORBERG. Copenhagen. *Skand. Arch. Physiol.* 32, 287-354(1915).—The adrenal cortex contains cholesterol esters of the fatty acids, free fatty acids, and phosphatides, but no triglycerides of fatty acids. The fatty acids consist in large part of the higher unsatd. acids. The zona glomerulosa contains phosphatides, the zona fasciculata the cholesterol esters, and the zona reticularis the fatty acids and pigment. In pathological alterations, the most typical change is in the cholesterol-containing zona fasciculata. In pregnancy and chronic kidney disease, there is an increased amt. of cholesterol esters; in most intoxications and infections, a decreased cholesterol content and increased fatty acid content with simultaneous infiltration of the organ with blood phosphatides. The pathological changes in the adrenals are not qual., but rather quant. and are changes of localization. The cholesterol lipoids from adrenals pass to the liver, then to other organs after fatty infiltration of the liver.
H. B. LEWIS.

The influence of poisons on enzymic processes. III. Arsenic compounds and phosphorus. C. G. SANTESSON. Stockholm. *Skand. Arch. Physiol.* 32, 405-28(1915).—Relatively strong solutions of H_2AsO_3 (N/154) and H_2AsO_4 (N/180), and of Na_2AsO_3 and neosalvarsan depressed the activity of the catalytic enzyme of frog muscle. The action of neosalvarsan is coincident with its decompn. Na_2AsO_4 , Na cacodylate and atoxyl had little or no influence. In very weak soln. (e. g., H_2AsO_3 0.042%,

H_2AsO_4 , 0.016%, etc.), the substances studied showed an optimum concn. at which there was a tendency to stimulation of the normal catalytic activity. A soln. made by allowing P to stand in water overnight lowered catalytic activity. H. B. LEWIS.

Enzyme inhibition. II. L. LICHTWITZ. Göttingen. *Z. physiol. Chem.* **94**, 73-8(1915); cf. *C. A.* **6**, 2437.—The earlier studies on the result of enzyme inhibition in a medium containing invert sugar are confirmed. The negative results of Euler and Cramer (*C. A.* **8**, 1129, 1593) were due to the use of too large a number of cells (18×10^{10} per 100 cc. soln. instead of 8 million). G. M. MEYER.

Hardness of water in relation to perfection of the teeth. ROSE. *Giorn. farm. chim.* **62**, 406(1913).—R. has shown that, while H_2O with a high content of salts (especially Ca salts) is rather injurious to health, the soundness of the teeth is in direct proportion to the degree of hardness of the H_2O used as a beverage in the locality in question. The finest dentition was found, on the whole, in localities where the H_2O contained Mg salts (which harden the enamel) in addition to Ca salts. H. S. PAINE.

The organic phosphorus compound of wheat bran and the hydrolysis of phytin. R. J. ANDERSON. New York Agr. Expt. Sta., *Tech. Bull.* **40**, 3-31(1915); see *C. A.* **9**, 1622. R. C. ROARK.

Combination of protein with halogen acids. J. H. LONG AND MARY HULL. *J. Am. Chem. Soc.* **37**, 1593-606(1915); cf. *C. A.* **9**, 1624.—When mixts. of proteins and varying amts. of 0.2 N HCl are slowly evapd. and heated to practically const. wt. at 105° , the increase in wt. (av., 0.0655 g. for 0.677 g. dry fibrin) shows that HCl is added alone, without H_2O (i. e., without hydrolysis), the av. amt. of added HCl, as calcd. from the amt. of Cl in the residue, being 0.0646 g. Expt. having shown that high temp. causes some increase in the amt. of HCl added (750 mg. dry casein adding an av. of 70.9 mg. when evapd. on live steam and 67.8 mg. when evapd. slowly on a H_2O bath), in subsequent expts. the solns. were allowed to stand several weeks over H_2SO_4 , then over powdered NaOH and finally dried to const. wt. not above 75° . In this way were obtained very const. results, agreeing closely (in the case of HCl and HBr) with those obtained on the H_2O bath and final drying at 105° . Using the equiv. of 750 mg. anhydrous protein in each case, it was found that casein adds 71.5, 269.6 and 420 mg. HCl, HBr and HI, resp.; fibrin, 62.6, 278, 415 mg.; egg albumen, 71.3, 329, 413 mg. In the case of HI, the constancy in combining ratios found with HCl and HBr is lacking, the increase in wt. not being always equal to the amt. of I taken up, calcd. as HI; the increase in wt. is sometimes even less than the HI added, showing that substitution as well as addition has taken place. In the course of evapn. and drying the residues become dark but CS_2 and CHCl_3 do not ext. free I. When the solns. are evapd. on the H_2O bath, the protein may combine with as much as 75% of its wt. of HI, the resulting compd. having a brownish ocher-yellow color and no longer giving the protein reactions. Detn. by the usual titration method of the acid held by the proteins gives much lower results, probably owing to the lack of delicacy of the indicator in the presence of unaltered protein but especially on account of the dissociation of the protein-acid complex; if, instead of titrating the mixt. directly, it is filtered and the insol. portion is washed with successive portions of H_2O , titration of the wash waters shows that 7-8 washings remove about 0.2 of the HCl or HBr held by the egg albumen, 0.1 from the fibrin and 0.25 from the casein and about 0.66 of the HI from the egg albumen and more than 0.5 from the fibrin. When a fine uniform coagulum of egg albumen is vigorously stirred or shaken with HCl, titration of the mixt. shows that the max. of HCl addition is not reached even after long standing; if, however, the coagulum is ground in a mortar with the acid, this max. is quickly reached. C. A. R.

Origin of the humin formed by the acid hydrolysis of proteins. ROSS A. GORTNER AND MORRIS J. BLISH. *J. Am. Chem. Soc.* **37**, 1630-6(1915).—Van Slyke's conclusion

that the N of tryptophan (*a*) is not transformed into humin N when boiled with HCl (C. A. 5, 1938, 3295), holds only when the (*a*) is boiled alone; when it is added to a protein a considerable portion of its N passes over into the humin fraction (approx. 0.0070 g. when added to 1 g. zein), the remainder being distributed between the bases and the filtrate from the bases. There is no increase in the ammonia N. The formation of humin reaches a max. with 0.125 g. (*a*) per g. zein, showing that it involves not only (*a*) but also some product of hydrolysis. When (*a*) is boiled with dextrose, practically 90% of its N remains in the humin fraction, while the hydrolysis of zein in the presence of the sugar gives rise to a slight increase in humin N, possibly owing to the presence of (*a*) in zein in such a small amt. that it is difficult to detect by the color tests; certainly, the loss in ammonia N in zein and gliadin hydrolyzed in the presence of dextrose, as compared with the amt. found when the proteins are hydrolyzed alone, is not much greater than the exptl. error. Histidine plays no part in the humin formation, as shown by the hydrolysis of zein in its presence. The reaction involved in the humin formation is probably a condensation of an aldehyde with the NH group of (*a*). The product of the hydrolysis of zein + dextrose is a jet-black suspension of solid non-nitrogenous humin, so that absorption of NH_3 by non-nitrogenous humins plays no important part in the formation of humin N. CHAS. A. ROULLIER.

Oxidizing enzymes. VII. Action of carbon dioxide upon tyrosinase. R. CHODAT AND K. SCHWEIZER. *Arch. sci. phys. nat.* 39, 327-31 (1915).—Tyrosinase extd. from toad-stools frequently contained both laccase and peroxidase. By using the ext. in acid medium, the action of tyrosinase is inhibited. It was found that H_2CO_3 had a remarkable effect when used. Pure washed CO_2 when passed through a mixt. of 9 cc. glyccoll (0.75 g./250), 3 cc. *p*-cresol (1 g./250), and 2 cc. tyrosinase (0.05 g./20) shows no color reaction even at the end of 30 min. When CO_2 was passed into separate solns. of glyccoll, of *p*-cresol and of tyrosinase (all of the strengths indicated above), in the last case only was a color change observed. It was found that CO_2 had no effect upon a tyrosinase soln., through which had previously been passed H for an hour but that instead a deep blue color developed with *p*-cresol naturally and immediately. Some preparatory action, possibly a combination of enzyme with fermentable substance, was shown in the following way: the mixture of tyrosinase, *p*-cresol and glyccoll was treated by bubbling H through it; for 1 hr.; no rose color resulted, evidently because the H prevented any oxidation but if this mixt. were then exposed to the air, the coloration was produced in 5 min. **VIII. The production of benzaldehyde by tyrosinase.** *Ibid* 331-4.—Phenylglyccoll when treated with tyrosinase for 12 hrs. is found to decompose to produce NH_3 , CO_2 , and benzaldehyde. Peptone added to the mixt. seemed to hinder the action. To show that aldehyde is produced in plants, a leaf of the poppy, a plant containing considerable tyrosinase, was wrapped in dark paper and allowed to remain undisturbed for 20 hrs. This darkened leaf, as well as one exposed to the light, was ground with water, distd. and Schryver's aldehyde test carried out with the filtrates. The distillate from the darkened leaf did not give any color reaction, while the other gave a faint test for an aldehyde. The most plausible conclusion is that the aldehyde formed prevented the photolysis of CO_2 and of water. The addition of chlorophyll ext. to glyccoll in absence of CO_2 does not hasten the decompn. into aldehyde but if tyrosinase be added and light shut out as much as possible, the action is very greatly accelerated. Testing with Schryver's reaction gave a red fuchsine color, showing the presence of much aldehyde. In the same way a strong positive test for benzaldehyde was obtained when phenylglyccoll was treated with tyrosinase in a mixt. protected from the air by a layer of toluene. These tests probably explain the production of benzaldehyde by hydrolysis of protein mols. and show that chlorophyll is of importance because of its reducing action. **IX. Peroxidase as a rea-**

gent for the photolysis by chlorophyll. *Ibid* 334-8.—An ext. of chlorophyll was made in the winter from green leaves using alc. and benzene according to the method of Hoppe-Seyler; the operation was carried out in the dark. The soln. was allowed to evap. spontaneously on lumps of marble to spread the powder over a large surface. About 0.5 g. of this paste was then placed in test-tubes which were filled $\frac{2}{3}$ full of water charged with CO_2 and allowed to stand for 3 days, one in the light, the other in the dark. The first when examd. showed the presence of HCHO . To show that H_2O_2 is produced in molecular quantities with aldehyde, peroxidase was added to a 2% pyrogallol soln. and this with the carbonated chlorophyll soln. gave a strong reaction. In the leaf, H_2O_2 is constantly decomposed by catalase and atomic O produced. The distribution of catalase in light and dark parts of several plants was studied and it was found that the darker parts contained less of the catalase, for exts. of them liberated less O_2 from a given vol. of H_2O_2 than did the ext. from the lighter portion.

R. L. SIBLEY.

Acceleration of fermentation (MOUFANG) 16. Enzymes in malt that produce polypeptides and amino acids (ADLER) 16.

B. METHODS AND APPARATUS.

STANLEY R. BENEDICT.

Method for determining inorganic phosphorus in the tissues and fluids of the organism. A. COSTANTINO. Univ. Pisa. *Arch. farm. sper.* 19, 307-16(1915).—The method consists essentially in agitating the sample with a soln. containing 2% HgCl_2 and 1% HCl , removing Hg from the filtrate by H_2S and the latter by an air current, pptg. the phosphoric acid with $\text{Ba}(\text{NO}_3)_2$ and NH_3 , dissolving in HNO_3 , pptg. again with molybdic acid, and detg. the P either volumetrically or gravimetrically. Minute details for the various steps are given.

A. W. DOX.

The estimation of acetone in urine. N. O. ENGFELDT. Stockholm. *Skand. Arch. Physiol.* 32, 253-86(1915).—A critical study of the sources of error in the detn. of acetone in urine by the Messinger-Huppert method. The use of $\text{H}_3\text{C}_2\text{O}_4$, AcOH , or H_3PO_4 is recommended for the acidification of the urine before distn.

H. B. LEWIS.

Nature of the Abderhalden reaction. J. BRONFENBRENNER. West Penn Hosp., Pittsburgh. *Biochem. Bull.* 4, 87-9(1915); cf. *C. A.* 9, 920.—"The Abderhalden reaction is specific, but depends not as Abderhalden believes, on the presence of specific enzymes, but on the presence in the blood of pregnant women of the specific antibody that combines with placenta antigen, and thus sets free the only proteolytic enzyme which is always present in the serum of every animal. The Abderhalden test should be positive wherever the complement-deviation test is positive." In many instances a positive reaction has been obtained with the sera of syphilitics, using pure lipid antigen, in which the only source of protein cleavage products was the serum of the patient, proving that the serum itself and not the substrate is digested in the Abderhalden test.

A. P. LOTHEROP.

Further note on Landau's color test for serodiagnosis of syphilis. J. A. KLOMER. Phila. *J. Am. Med. Assoc.* 64, 1966-8(1915); cf. *C. A.* 9, 1795 and following abstr.—K. finds this test unreliable.

L. W. RIGGS.

Landau's iodine serum test for syphilis. A. W. STILLANS. Chicago. *J. Am. Med. Assoc.* 64, 1964-6(1915); cf. preceding abstr.—S. concludes that this test is wholly unreliable.

L. W. RIGGS.

Quartz mercury vapor lamp (BOVIR) 1. Morphine in a cadaver (GRUTTERINK) 7.

C. BACTERIOLOGY.

ERNEST D. CLARK.

Adaptation of the organisms of lactic fermentation to the medium. C. RICHT. Paris. *Ann. inst. Pasteur* 29, 22-54(1915).—The degree of acidity in lactic fermentation furnishes a remarkably accurate and easily obtained measure of the adaptation of organisms to the media on which they are grown. The following salts in various concns. were added to milk and the effects on lactic fermentation noted: K_2SeO_4 , K_2PO_4 , KNO_3 , $CuSO_4$, $NaCl$, KBr , K_2AsO_4 , $Te(NO_3)_2$. Adaptation was found to be the rule and there was also a diminution of the activity of the ferment when returned to act upon normal milk. In each case, except with $NaCl$, the activity was less than that of normal ferment. Coincident with this diminution of activity, the enzyme showed a greater activity (as compared with the normal) when it was allowed to grow on the solns. to which it had become adapted.

GEO. T. CALDWELL.

Germicidal value of iodine. T. MAHON AND J. S. WHITE. *Chem. and Druggist* 1915, 144.—By the Rideal-Walker method it was shown that a soln. of 0.5-0.25% I in C_2H_5OH or H_2O was about 4 times as powerful a germicide as C_2H_5OH . J. GAUB.

Enzymes in the mycelia of *Penicillium glaucum* grown on a nitrogen-free medium. DONATO FRANCESCHELLI. Univ. Neapel. *Centr. Bakt. Parasitenk., II Abt.* 43, 305-22(1915).—The ext. of the mycelia of *Penicillium glaucum* grown on a fat- and protein-free medium, contains a proteolytic enzyme which can act in an alk., neutral or slightly acid reaction. It digests protein as completely as does trypsin. This enzyme dialyzes very slowly. The ext. does not affect raw starch but digests cooked starch and inverts cane sugar. Dialysis inactivates the diastase but a small amt. of acid activates it. The ext. does not produce alc. from grape sugar. It does not contain lipase and rennin.

JULIAN H. LEWIS.

The germicidal effect of lactic acid in milk. P. G. HEINEMANN. Univ. Chicago. J. *Infect. Dis.* 16, 479-86(1915).—Some acid-tolerant cells of *B. coli* may survive the presence of 0.6% lactic acid in milk. *B. dysenteriae*, *B. typhosus*, *B. paratyphosus B*, and *Spirillum cholerae* were destroyed by the presence of 0.45% lactic acid. It is probable that other strains of these bacteria exist which are able to resist a greater amt. of lactic acid. Acid-tolerant strains of *B. coli*, *B. dysenteriae*, *B. typhosus*, and *B. paratyphosus B* may multiply in the presence of quantities of lactic acid that are destructive to the majority of cells. The smaller the initial amt. of lactic acid, the more likely is the growth of acid-tolerant strains. Consequently, the slower milk sours, the greater is the danger of pathogenic bacteria surviving. The growth of test bacteria is influenced to a marked degree by the amt. of acid present. Up to a fairly definite proportion of acid there is an increase in numbers, followed by a decrease, which becomes more pronounced as the proportion of acid increases. The amt. of acid may increase after the number of bacteria has commenced to decrease, owing to the liberation of enzymes. Acids other than lactic acid are frequently present in buttermilk. Buttermilk therefore should be looked upon with suspicion, especially if heavily polluted, unless prepared from pasteurized milk. Still, the chances of buttermilk becoming a carrier of infection are much smaller than in the case of raw, sweet milk. The presence of saprophytic bacteria in buttermilk may have some influence on pathogenic bacteria. Whether this influence is favorable or otherwise is difficult to det. by present bacteriological methods.

JULIAN H. LEWIS.

D. BOTANY.

CARL L. ALSBERG.

Experiments on the antioxidase of the tomato. LUBIMENKO. *Compt. rend.* 160, 479-81(1915).—During the ripening of tomatoes there is a decrease in the amt. of

Dec. 16/95

peroxidase present as measured by the guaiacol reaction. This is only apparent and is due to the formation in the process of ripening of an antioxidase which may be destroyed by treatment with toluene, Et_2O or CHCl_3 .

E. M. FRANKEL.

Chemical intoxication and mutation of maize. A. JUNGELSON. *Compt. rend.* 160, 481-3(1915).—Exposure of the seeds of maize to 1-2% solns. of CuSO_4 for 1-24 hrs. resulted in the production of 14-35% of abnormal ears including 9 diff. mutations; the controls gave none.

E. M. FRANKEL.

Studies on the physiology of metabolism of living plant cells. I. Absorption of lipocolloids in the plasma membrane. F. CZAPEK. *Prag. Intern. Z. physik. Chem. Biol.* 1, 108-23(1914).—A critical review of the theories of the relation of diosmotic metabolic exchange between the living protoplasm and the surrounding medium.

E. M. FRANKEL.

Studies on the physiology of metabolism of living plant cells. II. Changes in the permeability of the plasma membrane by potassium cyanide. MAX KREHAN. *Prag. Intern. Z. physik. Chem. Biol.* 1, 189-259(1914).—Dil. solns. of KCN act on the colloid of the plasma membrane, causing an increase in its permeability to certain substances. The increase in permeability to salts is dependent on the ions; for a given anion it increases in the order Na, K, NH_4 , Ca, and Mg, while for a given cation the order is NO_3 , Cl, acetate, citrate, and SO_4 . For polyatomic alcs. the order is glycerol, lactose, glucose, saccharose. There is no alteration for urea. The change in permeability is due to the CN ion and not to the alkalinity of the dissociated salt. The relation of permeability to concn. and time of action of KCN gave the typical adsorption-phenomena reaction-isotherms. The season of the year has some influence on the phenomenon, the reaction in the spring and winter being less marked and of shorter duration than in the summer. This cannot be explained as due to variations in light intensity. Temp. affects the reaction velocity but not the permeability. Dil. EtOH and CHCl_3 intensify the action of KCN while concd. solns. of narcotics antagonize it, diminishing the toxicity of the KCN and the narcotic as well. The latter findings would indicate that KCN and the narcotics have the same point of attack in the plasma membrane.

E. M. F.

The osmotic pressure of the juices of desert plants. J. A. HARRIS, J. V. LAWRENCE AND R. A. GORTNER. Cold Spring Harbor. *Science* 41, 656-8(1915).—The osmotic pressure of the juices of desert plants is much higher than that of plants in a more moist habitat. Of the former type 50% had an osmotic pressure of over 15.7 atms., while of the latter 50% had o. p. of 10.5 atms., or lower. Of the desert plants, 30% were over 20 atms., while in the other series only 3% reached this value. There is a higher max. and a higher minimum osmotic pressure in the desert plants.

E. M. F.

The toxicity of insecticides. C. W. WOODWORTH. Berkley. *Science* 41, 367-9(1915).—Five different species of tree scale were exposed to HCN vapor of various concns. for different lengths of time. Long-continued action at a strength below the lethal seems to have a benign influence on the scale. This may be explained by the increased production of antibodies or increased cell permeability or even utilization of the HCN by the insect, the latter suggestion being supported by some expts. showing an acceleration of the sprouting of seeds by dil. HCN solns.

E. M. FRANKEL.

Study of plant enzymes, particularly with relation to oxidation. A. D. HALL, E. F. ARMSTRONG, *et al.* *Rpt. Brit. Assoc. Adv. Sci.* 1913, 143-5.—Various studies on the relation of plant enzymes to pigmentation are reported. Sol. sap pigments appear to result from oxidation of a colorless chromogen by aid of an oxidase. With a minimum of water present the colored cell may be stimulated by a hormone with the result that the sap pigment is reduced to the colorless chromogen.

WM. P. GARRETY.

Some relations of plants to distilled water and certain dilute toxic solutions. M. C. MERRILL. *Science* 41, 176(1915).—Several factors cause the harmfulness of distd. H₂O to pea seedlings. Bacteria and fungi played an important part. The length of time the plants could grow in a culture soln. without change was detd.

J. J. SKINNER.

Electrolytic determination of exosmosis from the roots of anesthetized plants. M. C. MERRILL. *Science* 41, 176(1915).—Exosmosis was more rapid in the roots of *Pisum sativum*, when exposed directly to anesthetics, than where the roots were kept in H₂O during the exposure. There was a greater resistance to anesthetics by older plants.

J. J. SKINNER.

Direct assimilation of atmospheric nitrogen by plants. E. MAMELI AND G. POLLACCI. *Atti ist. botan. Univ. di Pavia* 14, 156-257(1914); *Ann. chim. applicata* 3, 67-9.—Extensive expts. have shown that the property of assimilating atmospheric N is not restricted to a particular class of plants, but is exhibited generally by all kinds of plants containing chlorophyll. The plants were grown in sterilized nutrient media free from N and the amt. of N combined was detd. by analysis of the plant and, in some cases, of the residual air. *Azolla caroliniana* and *Salvinia natans* were especially active in assimilating free N. It is suggested that the N combines directly with H in the cells containing chlorophyll, under the influence of an enzyme or a catalyst. M. X. S.

Smoke and gas poisoning of plants. L. J. KNIGHT AND W. CROCKER. *Botan. Gaz.; J. Roy. Hort. Soc.* 40, 184(1914); *Pharm. J.* 94, 699(1915).—Tobacco smoke is very injurious to seedlings of Leguminosae and Cucurbitaceae, producing chemotactic movements in the leaves of some species, and diseased growths in others. The leaves of *Mimosa pudica* and other leguminous plants fall off when exposed to tobacco smoke for 24-48 hrs. It also injures ferns and liverworts. CO is very toxic to plant life, and C₂H₄ especially so. 1 : 10,000,000 stops the growth of the epicotyl of the pea, 4 : 10,000,000 is markedly toxic, and 5 : 10,000,000 in 12 hrs. causes the open flower of the carnation to close. Thus, in smoke and illuminating gas, the heavy hydrocarbons are the plant poisons.

S. WALDBOTT.

Tormentol, the extract of *Potentilla tormentilla* Neck (GORIS) 10. Dissolving action of roots (CHIRIKOV) 15.

E. NUTRITION.

PHILIP B. HAWK.

ABNORMAL.

The utilization of glucose after rectal and intravenous administration. G. BERGMARK. *Upsala. Skand. Arch. Physiol.* 32, 355-404(1915).—That rectally administered glucose was absorbed in large quantity from the human intestine was shown by a rise in the CO₂ output. Intravenously administered glucose is utilized less in glycogen deficiency than under normal conditions. Glucose administered *per rectum* was as effective in reducing the acidosis produced by a carbohydrate-free diet, as was glucose administered *per os*. Forty g. of glucose administered intravenously caused hyperglycemia, while 65 g. glucose absorbed *per rectum* did not affect the concn. of blood sugar.

H. B. LEWIS.

F. PHYSIOLOGY.

ANDREW HUNTER.

Degree of acidity of muscle under diverse mechanical conditions of contraction. F. PORCELLI-TITONE. Naples. *Intern. Z. physik. Chem. Biol.* 1, 338-53(1914).—The acid production in muscle is greatest in effective work. Lower values for H-ion concn. are obtained in isometric contraction, tetanus and isotonic contraction in the order named.

E. M. FRANKEL.

Capillary measurements on human serum and cerebrospinal fluid. B. KISCH AND O. REMERTZ. Cologne. *Intern. Z. physik. Chem. Biol.* 1, 354-88(1914).—Surface tension of normal human serum free from hemoglobin and chyle is constant. Heating the serum to 56-60° to inactivate it diminishes the surface tension. Age and sex have no effect on the surface tension of the serum or cerebrospinal fluid. Normal values are obtained in functional psychoses, alcoholism, dementia praecox, paralysis, tabes, epilepsy and pregnancy. Fetal serum gives lower values. Low values were also obtained from epileptics during a fit, a case of uremia and one of icterus. The surface tension of the cerebrospinal fluid is generally constant, being diminished in cases of icterus, uremia and apoplexy. E. M. FRANKEL.

Osmotic properties of different kinds of muscle. E. B. MÆIGS. Philadelphia. *Science* 41, 689-91(1915).—M. takes exception to some of the conclusions of the expts. of v. Kőrösy (*C. A.* 9, 634) and maintains that striated and non-striated muscle have different osmotic properties and that these are not due to injury in the process of prepn. (cf. *C. A.* 8, 1170). E. M. FRANKEL.

Effect of repeated injections of pituitrin on milk secretion. S. SIMPSON AND R. L. HILL. *Am. J. Physiol.* 36, 347-51(1915).—Injection of pituitary exts. causes in goats a marked increase in the amt. of milk secreted and also in its fat content. Injections repeated over a period of several months lead to the establishment of an immunity against this action. (Cf. following abstr.) J. F. LYMAN.

Mode of action of pituitary extract on the mammary gland. S. SIMPSON AND R. L. HILL. Ithaca. *Quart. J. Exp. Physiol.* 8, 377-8(1915).—The flow of milk, which follows the injection of pituitary ext., is apparently due to the action of the ext. on the secretory mechanism of the gland and not on its muscular tissue, since BaCl₂, which is a specific stimulant for muscle, produces no increase in milk flow. Cf. preceding abstr. V. C. M.

Note on paper by Simpson and Hill: "The mode of action of pituitary extract on the mammary gland." E. A. SCHÄFER. Edinburgh. *Quart. J. Exp. Physiol.* 8, 379-81(1915); cf. preceding abstr.—It seems probable to Schäfer that pituitary acts by promoting contraction of plain muscle in the alveolar walls. V. C. M.

The metabolism of the amino acids in the organism. I. Action of muscular tissue on the amino acids added through the circulating blood. UGO LOMBROSO. *Atti accad. Lincei* 24, I, 57-62(1915).—It is concluded that when blood containing a large amt. of amino acids (about 1%) is circulated through the muscles of a dog there is always a diminution of amino acids after the circulation. Of these amino acids the greater part is found deposited unchanged in the tissues. Of the remainder a part is burned (as was shown by an increase of NH₃) and a part is utilized to form compds. not titratable with formol. The significance of these observations will be discussed in a subsequent paper. **II. Action of muscular tissue on amino acids circulating in Ringer solution.** *Ibid* 148-53.—Causing amino acids dissolved in Ringer soln. to circulate in muscular tissue always induces a more or less notable diminution (up to 12%) in the amino acid content of the nutrient liquid. Besides the percentage diminution of the amino acids in the liquid circulated through the muscular tissue there is a diminution in the amt. of the liquid recovered, which causes a conspicuous edema. Thus the total amt. of amino acids lost both by the percentage diminution of amino acids in the soln. and by the diminution of liquid recovered amts. to about 50% of that used. The amino acid content of the muscles was detd. before and after the circulation and it was found that nearly all of the above 50% was deposited in the tissues and remained unchanged. The amt. of amino acids not recovered amounted to 1-2% but it could not be detd. whether this was all due to exptl. error or not. E. J. W.

Function of the suprarenals. I. General considerations and biochemical investigations. C. CIACCIO. Univ. Palermo. *Arch. exp. Path. Pharm.* 78, 347-69 (1915).—The suprarenal is the seat of an active lipoid metabolism. Besides a review of the other work C. offers the following evidence.: the suprarenal contains free choline and related compds., simple compds. contg. P and a phosphatase. C. J. WEST.

Condition of phosphorus and of calcium in milk (LINDET) 12.

G. PATHOLOGY.

H. GIDEON WELLS.

Adsorption of toxins by animal charcoal. R. KRAUS AND B. BARBARA. *Deut. med. Wochschr.* 41, 393-4(1915).—Diphtheria toxin (dild. 1 : 10) was shaken with animal charcoal (Merck) and after standing 1 hr. at 37° was injected subcutaneously into a guinea pig of 250 g. The animal survived without even showing a local edema. A control succumbed to $\frac{1}{100}$ of the dose in 48 hrs. Similar results were obtained with tetanus and dysentery toxin. S. AMBERG.

Experimental data concerning the action of benzene. W. NEUMANN. *Deut. med. Wochschr.* 41, 394-6(1915).—Rabbits were treated with pure benzene. Benzene is a leucotoxin of powerful action, but its action is not uniform. There are great individual variations. S. AMBERG.

Clinical studies with the Abderhalden dialysis method. H. STEINER. *Deut. med. Wochschr.* 41, 489-92, 526-8(1915).—The Abderhalden dialysis method is of importance clinically to differentiate diseases here and there. A final judgment concerning its applicability cannot be given as yet. S. AMBERG.

Further experimental investigations concerning the specificity of the protective enzymes by means of the optical method. H. JAFFÉ AND E. PRIBRAM. *Münch. med. Wochschr.* 62, 614(1915); cf. C. A. 9, 930.—The serum of a rabbit treated with cancer emulsion changed the rotation of a mixt. of serum and cancer peptone but not of serum and placenta peptone. Inactivation of this serum by heating it to 58° for $\frac{3}{4}$ hr. suppressed its action on cancer peptone. Addition of 0.2 cc. guinea-pig serum to the inactivated serum made it behave as before inactivation. Guinea-pig serum (0.2 cc.) had no effect on the cancer peptone. In former expts. it was shown that treatment with placenta peptone yielded a serum decomposing placenta and silk but not cancer-peptone. Inactivation of such serum with addition of 0.2 cc. fresh guinea-pig serum gave the same results. The reactivation does not injure the specificity of the reaction. S. AMBERG.

Butyric acid and sclerosis. G. E. COLEMAN. Paris. *Ann. inst. Pasteur* 29, 139-56(1915).—In a study of the relation of the butyric acid absorbed from the alimentary tract to sclerosis of the arteries, guinea pigs were used because of the more frequent arterial lesions in the herbivora. Since very small quantities of the free acid had to be given to the animals, it was decided to use Ca butyrate, which was tolerated much better. The excess of Ca thus introduced was thought also to favor the production of lesions. The butyrate was introduced subcutaneously, intraperitoneally and also by mouth. In view of the small quantities of acid endured by the animals and the limited number of animals studied, and keeping in mind the fact that spontaneous sclerosis occurs in a large proportion of normal guinea pigs, no definite conclusion is drawn concerning the action of free butyric acid. The author believes that the ingestion of Ca butyrate in the doses used produces in the aorta and the other organs of guinea pigs a generalized sclerosis, but not atheroma. G. T. C.

Attempt to discover the composition of tissue fluid in normal and nephritic animals. A. E. BOYCOTT AND J. S. C. DOUGLAS. Univ. Manchester. *J. Path. Bact.* 19, 528-48(1915).—The normal blood of rabbits contains about 0.55% NaCl, the plasma 0.65%

and the corpuscles 0.3%. Blood was removed from one carotid, and into the other was immediately injected 4 cc. of 60% aq. dextrose soln. per kg. body wt. Ten sec. after injection the animal was bled freely. The liquid brought into the blood from the tissues by this intravascular injection contains some protein and 0.5% NaCl. The liquid similarly obtained by the use of Na_2SO_4 contains about 0.35% NaCl, and the liquid which comes in to replace blood lost by hemorrhage, from 0.4 to 0.7% or more. The liquid thus obtained can be regarded as representing tissue fluid. Some differential filtration by the capillary wall must be assumed. In rabbits with U-nephritis the liquids obtained in parallel expts. contained more protein and more chlorides than in normal animals. The difference probably signifies a difference in the compn. of the tissue fluid.

JOHN T. MYERS.

Use of a suprarenal antigen in the Wassermann reaction. A. SÉZARY AND P. BORRL. *Compt. rend. soc. biol.* 76, 334-5 (1914).—The use of a suprarenal antigen was suggested by reason of the high content of cholesterol and lecithin in suprarenal ext. The suprarenals from freshly killed cattle were freed from surrounding fat, cut in thin strips, washed rapidly with sterile, physiol. serum and pounded in a mortar to a homogeneous pulp; the latter was distributed in Petri dishes and dried *in vacuo* over H_2SO_4 . After 24-48 hrs. the product was finely pulverized in a mortar and the resulting powder was passed through a sieve. Two exts. were prepd. by digesting 5 g. suprarenal powder in 100 g. abs. alc. and 100 g. alc.- Et_2O , resp., for 8 days. The supernatant liquid was decanted, preserved in an ice box and dild. 1 : 20 with physiol. serum when desired for use. The 2 exts. gave comparable results, so only the pure alc. ext. was prepd. thereafter. This antigen exhibited properties which were very frequently identical with those shown by a tested syphilitic liver ext.; the degree of hemolysis (measured by means of the Vernes scale) was quite often analogous in the 2 cases. It is concluded that this suprarenal antigen may be substituted for the usual antigens in the Wassermann reaction. Inasmuch as the chem. comp. of the suprarenals appears to be practically const. in animals killed in abattoirs, it appears probable that there may be readily prepd. therefrom an antigen which will be of const. sensitiveness and which will yield comparable results in the hands of different observers. It will be shown in a succeeding note that fixation of complement in the presence of this antigen is not influenced by the functional or anatomical condition of the suprarenals (especially by a condition of suprarenal insufficiency) of the subject whose humoral fluids constitute the object of study.

H. S. PAINE.

Significance of the Abderhalden method. N. KOCHNEV AND A. CHINGAREVA. Petrograd. *Compt. rend. soc. biol.* 76, 354-7 (1914); cf. *C. A.* 8, 3590.—The specificity of the Abderhalden reaction was tested in a series of more than 50 cases of various diseases (nephritis, acromegaly, Basedow's disease, cancer, pernicious anemia, hepatic cirrhosis, etc.). The reactions with kidney, heart, placenta, liver, lungs, brain, suprarenals, etc., are tabulated for some of the various diseases. For instance, the serum of cancerous patients always gave a positive reaction with carcinoma and a negative reaction with placenta. The serum of Basedow patients always gave a positive reaction with the thyroid, while the sera of acromegaly patients and cirrhotics reacted with the hypophysis and liver, resp. In the case of nephritics the reaction was positive not only with the kidney, but also with the heart and placenta (often most intense with the 2 latter). The placenta gave a negative reaction with the serum in the case of all the other affections. The above connection between nephritis and the reaction with placenta may possibly have some bearing on the occurrence of nephritis during pregnancy. With helminths the reaction was positive in the case of subjects infected with these parasites and negative with non-infected subjects; this was evidently a group reaction, however, for the sera of patients suffering from helminthiasis (*Taenia saginata* and

Botriocephalus latus) gave a positive reaction not only with the parasites with which they were infected, but also with other species of *Taenia*, and even with horse ascarides. Regarding the specificity of the Abderhalden reaction it is concluded that the latter is, at least in certain cases, merely a group reaction (comparable to the phenomenon of agglutination, for instance).
H. S. PAINE.

Gastrointestinal studies. V. The protein curve of gastric digestion in normal and pathologic cases. J. A. CLARKE AND M. E. REHFUSS. Jeff. Med. Coll., Phila. *J. Am. Med. Assoc.* 64, 1737-41(1915); cf. *C. A.* 9, 932.—“The gastric juice in health shows definitely a protein content of very low degree. This content is increased in disease by the addition of an exudation of protein materials from inflammatory, ulcerous, or carcinomatous mucous membranes, or by the addition of partially digested and retained food residues, or the swallowing of protein material such as certain forms of sputum. Bread and tea alone, following the comp. of the Ewald meal, will show in the absence of any pathologic factor a definite amt. of protein corresponding to the curve or the digestive power of the juice secreted. A mixt. or maceration of bread in tea will show a protein content on 1 : 20-1 : 40; if the mixt. is acted on by an artificial gastric juice *in vitro* the protein content of the juice rises steadily within the next 2 hrs. and may reach 1 : 320 in 75 min. The pathologic significance arises when a curve shows any marked deviation from this recognized standard, that is when there is an undue conc. of protein out of all proportion to that normally found at that particular phase in digestion. If therefore a marked increase in protein does not conform in a general way to the acid curve it can be definitely stated that the protein is coming from other sources than the proteins of the bread. Normally this protein is of the nature of a proteose, but in inflammatory or ulcerative conditions it is probably serum protein removed to a large extent by satn. with $(\text{NH}_4)_2\text{SO}_4$. In the differentiation of achylia and carcinoma, the test is of value in direct proportion as the case approaches a true achylia and the added factors such as swallowed pus, bleeding and protein residues can be ruled out.
L. W. RIGGS.

Form of diabetic coma not due to “acetone bodies.” J. ROSENBLUM. Pitts-burgh. *Penn. Med. J.* 18, No. 17(1915); *J. Am. Med. Assoc.* 64, 1879.—The 3 cases studied by R., which differed so completely from the modern idea of acidosis as the cause of coma, were all of the severe type, with no tolerance for carbohydrates; and with a restricted protein intake there was no lessening of the glucose output. The urine contained a normal amt. of ammonia N and showed no trace of acetone, diacetic acid or β -hydroxybutyric acid. There was no evidence of any kidney pathology. The urine contained excessive amts. of colloidal N, neutral S, and amino acids. Death occurred in typical diabetic coma. R. suggests that more attention be paid to the study of the excretion of amino acids, polypeptides and certain unknown substances in this disease.
L. W. RIGGS.

Oxygen and carbon dioxide in the blood in uricacidemia. L. PRETI. *Riforma medica* 31, No. 16(1915); *J. Am. Med. Assoc.* 64, 1884.—P. shows that by artificial circulation of oxygenated blood through a liver containing uric acid, the latter is destroyed, but may be reformed by circulating blood containing CO_2 . Both phenomena are the work of enzymes in the blood. Animals breathing air with much CO_2 eliminate larger amts. of uric acid through the kidneys, and the uric acid content of the blood is higher. A study of 12 persons with attacks of gout, tophi, and high uric acid content of the blood showed their blood to contain on the av. about $1\frac{1}{2}$ the O of blood of healthy controls, while CO_2 in the blood of gouty persons averaged 50% higher than in that of controls. These findings throw light on the familiar experience that gout affects persons with defective oxidations owing to a sedentary life, muscular inanition, depression of heart action, etc.
L. W. RIGGS.

H. PHARMACOLOGY.

ALFRED N. RICHARDS.

The local action of lead. F. A. McJUNKIN. *J. Med. Res.* 32, 271-81(1915).—Within endothelial leucocytes and endothelial cells inorganic lead is changed to a compd. that is sol. in albuminous fluids, in which form it passes into the blood, producing a "stippling" of the corpuscles, and into liver cells, producing in them a basophilic granulation. The basophilic hyaline change in these cells is due to the immediate presence of lead as shown by subjecting the preps. to prolonged treatment with an alkali sulfide. Lesions other than those at the site of application and the basophilic granulation of the liver cells and red blood corpuscles were not produced in animals even in cases of administration of lead for periods of some months. GEO. T. CALDWELL.

The effect of phosphorus poisoning upon the peroxidase reaction of rabbit liver. C. H. BUNTING AND P. K. RAND. *Univ. Wisc. J. Med. Res.* 32, 283-6(1915).—To test the effect of P-poisoning upon the peroxidase of the liver, rabbits were poisoned by the subcutaneous injection of various amts. of a 1% soln. of P in olive oil. Aq. exts. of the livers of the poisoned and also of normal animals were tested quantitatively for peroxidase by means of the phenolphthalein reagent of Kastle and Shedd. In the poisoned animals the peroxidase seemed to be reduced or its action inhibited or destroyed, even to the point of complete disappearance, depending upon the dose of the poison administered. This reduction occurs prior to the accumulation of fat in the organ and may possibly be the cause of such accumulation in later stages.

GEO. T. CALDWELL.

The pharmacological properties of diallylmalonylurea (dial). LUIGI CASTALDI. Florence. *Arch. farm. sper.* 19, 289-306(1915).—Diallylmalonylurea, when injected into frogs and rabbits or administered orally to man, produces sleep without any noteworthy post-hypnotic phenomena. The effect is produced with smaller doses than with the other hypnotic derivs. of barbituric acid, on account of the greater mol. wt. of the allyl group. It acts by exciting the inhibitory centers of the heart. No advantages are claimed for this drug over the other hypnotics of the *ureid* series. A. W. DOX.

Levorotatory sodium glycerophosphate. L. MAESTRO AND L. CASTALDI. Florence. *Arch. farm. sper.* 19, 352-66(1915).—Sodium *l*-glycerophosphate, administered subcutaneously, is completely absorbed and produces a diminution in P excretion.

A. W. DOX.

Colloidal state of alkaloids. The relation between surface tension and size of particles and toxicity. I. TRAUBE AND N. ONODERA. Charlottenburg. *Intern. Z. physik. Chem. Biol.* 1, 35-59(1914).—Aq. solns. of free alkaloids whose mol. wts. exceed a certain limit are colloidal. The surface tension of such a soln. is lower than that of pure H₂O and the lowering of the surface tension is proportional to the toxicity to tadpoles and fish, so that the toxicity may be measured with a stalagmometer. Some alkaloidal solns. are not stable and the size of the particles and the surface tension increase with a corresponding decrease in the toxicity. The surface tension is altered by change in temp. or addition of antagonistic substances or acids. The authors regard the decrease of surface tension and the size of the particles as a method of increasing the reaction velocity and in this case the toxicity. Local action of alkaloids is a result of an increased alkalinity at a given place with the liberation of free alkaloid in the colloidal state, etc.

E. M. FRANKEL.

Studies on narcosis. I. Effect of ethylurethan and chloral hydrate on the carbon dioxide production in the nerve fiber. SHIRO' TASHIRO AND H. S. ADAMS. Chicago. *Intern. Z. physik. Chem. Biol.* 1, 450-62(1914).—CO₂ production is greatly diminished when a nerve is narcotized with chloral hydrate or ethylurethan in concs. which pro-

duce a reversible loss of excitability. With weak concs. of these narcotics the CO_2 output is increased, probably due to the increased irritability of the nerve. Certain nerves were found to be unexcitable and in these cases the metabolism was abnormally low. The metabolism of the nerve is interfered with by narcotics and there is a parallelism between the CO_2 output and the state of excitability. Narcotics may primarily affect protoplasm by lowering its metabolism with a corresponding loss of irritability.

E. M. FRANKEL.

Effect of arsenic compounds on the Rous chicken sarcoma. CASIMIR FUNK. *J. Exp. Med.* 21, 574-5(1914); cf. *C. A.* 9, 1936.—Arsenic and arsenious acids, cacodylic acid, atoxyl and neosalvarsan fail to influence markedly the growth of the Rous chicken sarcoma.

G. M. MEYER.

Influence of digitalis on the T wave of the human electrocardiogram. ALFRED E. COHN, FRANCIS R. FRASER AND ROSS A. JAMIESON. Rockefeller Inst. *J. Exp. Med.* 21, 593-604(1915).

G. M. MEYER.

Further experiments on the effects of long-continued intraperitoneal injections of proteins. PAUL G. WOOLLEY, AMIE DEMAR AND DAISY CLARK. Univ. Cincinnati. *J. Exp. Med.* 22, 114-21(1915); cf. *C. A.* 9, 932.—An attempt was made to discover whether or not certain protein materials, such as albumose, casein and albumin, when introduced parenterally (peritoneally) into exptl. animals, are able to produce organic lesions. These proteins were used alone or in combination with CHCl_3 which was administered in oil and as an anesthetic. The results were negative.

G. M. MEYER.

Late poisoning with chloroform and other alkyl halides in relationship to the halogen acids formed by their chemical dissociation. EVARTS A. GRAHAM. Rush Medical College, Chicago. *J. Exp. Med.* 22, 48-75(1915); cf. *C. A.* 9, 934.—The central lobular necrosis in the liver, which has been regarded as characteristic of late CHCl_3 poisoning, has been produced experimentally by a number of other drugs. It is, therefore, in no sense peculiar to CHCl_3 poisoning. The drugs used were: CH_2Cl_2 , CCl_4 , CHBr_3 , CHI_3 , $\text{C}_2\text{H}_5\text{Cl}$, $\text{C}_2\text{H}_5\text{Br}$, $\text{C}_2\text{H}_5\text{I}$, $\text{C}_2\text{H}_5\text{Br}$, or in general, the halogen substituted aliphatic hydrocarbons with 1 or 2 C atoms. The mechanism by which CHCl_3 produces its characteristic tissue changes must accordingly be considered as a group reaction. The view is developed that the changes characteristic of late poisonings with the above substances, namely, edema, multiple hemorrhages, fat infiltration and necrosis are ascribable (1) to acids and (2) to the fact that the amt. of acid formed parallels the chem. dissociability of the drug outside of the body. All the characteristic features of late CHCl_3 poisoning have been produced merely by administration of HCl , except for a different distribution of the liver necrosis. The areas of central necrosis produced in the liver by various substances under discussion give an acid reaction to neutral red. Na_2CO_3 in a hypertonic NaCl soln. markedly inhibits the production of lesions. After the administration of some of these drugs there has been an increase of the neutral salts of the halogen acids in the urine. The necrosis-producing powers of CH_2Cl_2 , CHCl_3 and CCl_4 parallel the amts. of HCl which these substances theoretically can yield in their breakdown outside of the body. Ether and chloral hydrate which do not yield halogen acid likewise do not produce necrosis. They only induce edema and fat infiltration to a less marked degree. The halogen acid, directly liberated in the process of dissociation, may be the important factor which makes the tissue changes seen in poisoning with CHCl_3 and other alkyl halides so different from those following the administration of narcotic drugs of a different type.

G. M. MEYER.

Phenylacetylglutamine and its formation in the human body after feeding phenyl-

acetic acid. H. THIERFELDER AND C. P. SHERWIN. Univ. Tübingen. *Z. physiol. Chem.* 94, 1-9(1915); cf. *C. A.* 9, 86.—Phenylacetylglutamine (A) shows $[\alpha]_D^{17}$ —18.1, $[\alpha]_D^{18}$ —18.4 in H_2O , $[\alpha]_D^{18}$ —19.6 in HCl . The synthetic product, obtained in a yield of 34-60%, shows $[\alpha]_D^{17}$ —17.9°. Phenylacetylglutamine-urea, $[\alpha]_D^{16}$ —13.97°, $[\alpha]_D^{17}$ —14.28°. Phenylacetylglutaminic acid, needles from H_2O , m. 123°, $[\alpha]_D^{18}$ —19.16°. *Polassium salt*. *Brucine salt*, cryst. Phenylacetylglutaminic acid is excreted as such from the human body. No trace of (A) was found. G. M. MEYER.

Analytical investigation of combined magnesium-neuronal hypnosis. P. GENSLER. Univ. Zürich. *Arch. exp. Path. Pharm.* 78, 317-30(1915).—In Mg narcosis there is no increase over the normal Mg content of the brain in either the rabbit or dog. In the combined Mg-neuronal hypnosis the brain contains nearly the same percentage of neuronal as in neuronal sleep. Thus the penetrability of the cell-membrane is not changed by the injection of Mg. The Mg does not seem to produce a more rapid action of the neuronal or an essential deepening of the sleep. The paralysis of the muscles and the narcotic action are more noticeable and the recovery is slower after the combination narcosis. Thus, analytically and functionally, it seems to be a pure addition reaction. The content of neuronal in the intestinal canal is increased after the combined effect, being 22.3% as against 6.5% in the normal neuronal sleep.

C. J. WEST.

The action of several heart drugs (strophanthin, caffeine, diuretin) upon the coronary vessels. S. SAKAI AND S. SAN'EYOSHI. Freiburg. *Arch. exp. Path. Pharm.* 78, 331-46(1915).

C. J. WEST.

Action of quinine upon the striated muscles of the frog. KNUD J. A. SECHER. Univ. Copenhagen. *Arch. exp. Path. Pharm.* 78, 445-54(1915); cf. *C. A.* 8, 3472.—Quinine salts (1 : 250) destroy the striated muscles of frogs. Weaker solns. do not cause a histological change. The compd. formed between quinine and the muscle substance is reversible. Quinine accelerates the production of fatigue in these muscles, and decreases the amt. of work performed. The action of quinine is unlike that of caffeine.

C. J. WEST.

I. ZOÖLOGY.

R. A. GORTNER.

Researches on hemolysis. I. Hemolysis by capillary-active substances in cold-blooded animals. B. KISCH. Naples. *Intern. Z. physik. Chem. Biol.* 1, 60-81(1914).—Hemolysis of the erythrocytes of *Sipunculus midus*, *Seyllium calulus*, *Torpedo marmorata*, *Scorpena scropa*, *Lophius piscatorius*, *Labrus tardus* and *Labrus festiosus* by means of solns. of $MeOH$, $EtOH$, $PrOH$, $iso-BuOH$, $iso-C_4H_{11}OH$, Et_2O and Me_2CO of definite concn. and surface tension showed no relationship between the hemolysis and the capillary activity of the liquids. The hemolyzing concns. are lowest with *Sipunculus* and highest with the teleosts. No const. difference in the surface tension of the blood serum of males and pregnant females of the same species could be demonstrated. It appears that the lipid solubility of the substances is of importance in hemolysis.

E. M. FRANKEL.

12. FOODS.

W. D. BIGELOW AND F. F. FITZGERALD.

The new formulation of the food law (German). A. BRYTHIEN. *Z. Nahr.-Genussm.* 28, 575-84(1914).—Two parties have been formed in Germany upon this issue. One of these, comprizing the officials and majority of associations of interested manufacturers and dealers, favor the appointment of the Kaiserliche Gesundheitsamt

as an institution empowered legally to prescribe methods of prepn. and to adopt definitions, methods of analysis, and standards for all kinds of food products, the regulations so established to be enforced uniformly throughout the Empire and to replace the often contradictory requirements now prevailing in the different administrative divisions of the country. The second party, comprizing a minority of interested industrial bodies, seeks to attain the same end by means of an elective board or central bureau, the members of which are to be elected by associations of manufacturers and dealers, each class of food products to be represented by a fixed number of delegates, these delegates to act as an executive council to a limited number of official scientific experts by whom regulations similar to those provided in the first plan are to be promulgated and by whom all questions arising under the law are to be decided.

A. F. SEEKER.

Sensitive and rapid method for detecting the presence of sodium hydrogen sulfite in meat. FOLCK AND FARRERAS. *Boll. chim. farm.* 53, 106(1914).—Iodate starch paper is prepd. as follows: *Soln. (I)*: Add 95 g. distd. H_2O to 2.5 g. starch and heat gradually with const. stirring so that the starch is thoroughly fluid by the time the liquid begins to boil. *Soln. (II)*: 1 g. $NaIO_3$, 2.5 g. citric acid and 5 g. distd. H_2O . Mix *Solns. (I)* and *(II)* thoroughly in the cold and absorb with strips of filter paper. When dried under conditions that preclude the direct action of sunlight and gases and vapors of the laboratory, this reagent paper remains perfectly white. $NaHSO_3$ may be detected in meat by means of the action of liberated SO_2 on $NaIO_3$ in the presence of moisture. Macerate 5–15 g. meat for 5 min. in sufficient H_2O to cover the mass, remove the meat and test the liquid with the iodate starch and paper. A blue coloration is produced in case $NaHSO_3$ was present in appreciable amt. This method is compared with the Rosell procedure which consists in testing the liquid obtained by macerating meat in H_2O with a 1% $KMnO_4$ soln.; the latter is decolorized if sufficient $NaHSO_3$ was present.

H. S. PAINE.

Detection of antiseptics (benzoic acid and its derivatives) in preserved meats. F. MARRE. *Ann. fals.* 8, 16–27(1915); *J. Soc. Chem. Ind.* 34, 298(1915).—Two samples of a German preservative, "Cordin" consisted of: (1) *m*-dinitrobenzoic acid, cinnamic acid, and $NaCl$; (2) $NaCl$ 20, KNO_3 35, and an amino deriv. of $BzOH$ 45%. Samples of canned meats imported into France from Germany and America were all free from $BzOH$, salicylic acid, $HCHO$, Na_2CO_3 , and fluorides, but derivs. of $BzOH$ were found in 2 cans of corned beef, 2 of lunch tongue, and in various sausages. The following method is recommended: Dry 20 g. mixed with sand and ext. with benzene or CCl_4 to remove the fat. Drive off solvent, ext. with hot H_2O and shake out the H_2O soln. with Et_2O . Evap. off Et_2O and dissolve in a small quantity of aniline faintly colored with magenta, adding enough H_2O and HCl to dissolve the aniline. Filter and wash the filter with H_2O . If $BzOH$ derivs. are present, the filter paper will be blue. $BzOH$ may be detected in the presence of nitrates by extg. the meat with H_2O , evapg. the ext. to a small vol., then transferring to a test tube and carrying the evapn. to dryness. Heat the residue to incineration, with the production of bitter almond odor if $BzOH$ derivs. be present.

H. S. BAILEY.

Effervescing beverages. L. GAUCHER AND F. GEORS. *Ann. fals.* 8, 94–8(1915).—G. and G. studied the bacteriol. flora ordinarily found in these liquids, and also those pathogenic organisms which are accidental. Total counts were taken and the saprophytes detd. *B. subtilis* is most common. *B. mesentericus*, *B. aerophilus*, *B. translucidus*, *Dip. roseus*, and *M. cinnabareus* are also found. *B. coli* and *B. typhosus* have never been found in the raw water. However, *B. coli* and *B. typhosus*, if inoculated into lemonade, will increase rapidly for the first 15 days, then die off. The flora were found to differ from winter to summer.

C. S. MUDGE.

Apple sirup and concentrated cider. H. C. GORR. *Yearbook of Dept. Agr.* 1914, 227-44.—G. describes the following processes for the utilization of surplus and cull apples: (1) *The production of apple sirup.* The apple juice is almost neutralized with CaCO_3 or $\text{Ca}(\text{OH})_2$, and after the addition of infusorial earth is filtered through a plate and frame filter press. The filtered juice is then concd. to the desired consistency and cooled quickly to 71° . After the deposition of the Ca malate crystals the sirup is drawn off into containers and sterilized. (2) *Concentration of sweet cider by freezing.* The fresh cider is frozen in tin-lined ice cans in the brine tanks of an ice-making plant. The frozen cider is thawed at the sides and bottom and crushed with a power ice crusher. The sirupy part is then sepd. by means of a standard sugar centrifugal machine. The sirup obtained is again frozen and the process repeated. The concd. product in sealed containers will keep for weeks in a refrigerator or at cold room temp. It gradually ferments if allowed to become warm, but will spoil much more slowly than ordinary cider. One gal. of this sirup represents 5 gals. of the original cider. P. J. DONK.

Detection of potatoes and potato products. D. SCHENK AND H. BURMEISTER. *Apoth. Ztg.* 30, 234(1915).—As a result of recent Ger. regulations respecting the use of potato flour in bakers' products, preliminary expts. were undertaken to det. whether or not potato albumin is capable of reacting as a precipitin and of producing such bodies or an antiserum, by means of which the detection of potato albumin as such and of potatoes in bakers' products may be possible. It was found by expt. that potato albumin, as also that of other plants, when introduced into the blood of the rabbit brings about the formation of precipitins capable of effecting pptn. in fresh potato juice. Tests were likewise made on denatured potato albumin (after conversion into its alkali albuminate) and showed that a soln. of the latter was indifferent toward the antiserum previously used. The work is being continued. W. O. E.

Drying of potatoes. G. FISCHER. *Z. Ver. deut. Ing.* 59, 353-62(1915).—The technical problems involved in the use of potato driers, adapted for the particular method used, are indicated. The important drying app. and accessory machines used for the drying of sliced or mashed potatoes are described and numerous illustrations shown. The methods of prep. of the potatoes and the drying are given in a detailed description. Experimental data shows that the heat efficiency for drying ovens adapted for sliced potatoes and those for the mashed potatoes is approx. the same.

H. R. GUNDLACH.

Microscopic detection of the addition of potato to bread. W. HERTER. *Mikrokosmos* 1914-15, 237-9.—A small piece of bread crumb is moistened with H_2O , placed on a microscopical slide and worked into a paste with the cover glass. The starch originating from raw ground potatoes is distinguished from the starch obtained from boiled and crushed potatoes and potato flakes by the fact that the starch granules in the former case are egg shaped, ellipsoidal, highly refractive bodies, three or four cornered, smooth surface and with deep furrows running lengthwise and resembling brain formation. Their size varies from a few μ to μ 150 with an average at 100μ . Where boiled potatoes have been employed in some form the characteristic starch granules are absent, having been gelatinized, and these "gelatinized cells" are present in the baked loaf. Their general contour is round or elliptic. They are only slightly refractive and as a rule yellowish in color and transversed by numerous delicate veins. Their size varies between 100 and 300μ . The identification of potato constituents is facilitated by staining with a weak soln. of methylene blue or gentian violet: Rye starch = colorless, p. starch slightly colored, "gelatinized cells" strongly colored. Alk. soln. of Congo-red: Rye starch = pink, p. starch = colorless, "gel. cells" = deep purple-red. Albumen particles, peelings, etc., the former being colored brick-red by Congo-red, can be differentiated from the "gelatinized cells" by their torn appearance and irregular size and

shape. Whenever it is necessary to make a quant. exam. 10 different fields should be examd., counts carefully made and an average arrived at. It is permissible to express the results in terms of parts by wt. Microscopical pictures are given.

C. A. NOWAK.

Protein charts. A. SILVERMAN. Univ. Pittsburgh. *J. Ind. Eng. Chem.* 7, 533-4(1915).—In the detn. of protein in feeds, NH_4 is distd. into 25 cc. 0.2 N acid and the excess acid titrated with 0.2 N alkali. S. has prepd. for different moisture contents curves in which % of crude protein is plotted against cc. of 0.2 N alkali. From these charts the protein content can be read directly. Three of the curves in use are shown.

ISADOR MILLER.

The chemical examination of ghee. K. H. VAKIL. *J. Soc. Chem. Ind.* 34, 320 (1915).—Indian ghee is obtained from either cow or buffalo butter. Analyses made by others are summarized and a table given showing butyro-refractometer reading, sapon. no., R.-M. no., and acid no. (not oleic) of 10 authentic ghees. The greatest variation is in the R.-M. no., that of Menon (18.24) being probably too low, due to overheating in drying the sample. V.'s limits are 25.51 to 20.46. High acid values indicate that the sample is old. The figs. for free acid given by V. are lower than usually reported.

H. S. BAILEY.

Report of work in the field of milk chemistry and dairying during 1913. W. GRIMMER. *Milchwirtsch. Zentr.* 43, 530-35, 551-6, 569-72(1914); 44, 3-8, 17-23, 33-4(1915); cf. C. A. 9, 1809.

G. A. MENGE.

The condition of phosphorus and of calcium in milk. LINDER. *Ann. de l'inst. national agron.* 1912; through *Milchwirtsch. Zentr.* 44, 86-7(1915).—(1) The sol. caseins of milk can be detd. by pptn. with a satd. soln. of phenol or with a mixt. of phenol and HgSO_4 . (2) The total amt. of sol. caseins is very uniform, but their relative amts., detd. by means of the polariscope, vary in different milks within wide limits. (3) The presence of sol. caseins in serum is caused by the solvent action of phosphates, citrates, alkali chlorides, lactose, etc., in milk. (4) The sol. caseins adhere to the solid particles of casein that are present in suspension, the more strongly when the latter contain water; these solid casein particles enclose a concd. soln. of the sol. caseins when they are held in the serum itself; when through coagulation they are brought together, the enclosed caseins are released. The cheese-curd furnishes, according to the degree of drainage, larger or smaller amts. of sol. caseins for the nutrition of different micro-organisms. Cheeses undergo fermentation more quickly and vigorously, the greater the water content. (5) With an acid soln. containing 1.25% of phenol, one can ascertain by pptn. which casein is the more abundant in the mixt. (6) Careful coagulation of serum by heat furnishes a coagulum in which both caseins are present in the same proportions as in the serum from which they were obtained. (7) CaCl_2 , added to milk before coagulation, changes the phosphates and citrates of the alkalies into Ca salts; the sol. caseins lose a part of their solvent and increase the N content of the coagulum. (8) The di-Ca phosphate formed is decomposed by water and forms CaHPO_4 , which by continuous transposition takes the Ca from the casein, and the casein is in consequence pptd.; Ca phosphate, corresponding to the amt. of Ca contained in the casein, is formed. (9) The addition of CaCl_2 will on this account appreciably increase the yield of cheese. (10) By their solubility or insolubility in the presence of CaCl_2 , by their capillary attraction for insol. casein, by their pptn. with phenol, by their slight coagulation with heat, these two caseins are shown to behave similarly, and milk albumin may be regarded as a casein. (11) The condition shown by the milk proteins is simple: the β casein (pseudo-albumin) is present in so small an amt. that it is completely dis-

solved in the serum, while only one-tenth of the other or α casein is in soln. and the remaining protein is in colloidal soln.

I. L. VAN SLYKE.

The freezing point of milk considered in its relation to the detection of added water. G. W. MONTER-WILLIAMS. *Rept. of Local (Brit.) Gov. Bd., Food Rept. No. 22, 1-32* (1914); *J. Soc. Chem. Ind.* 34, 444 (1915).—A study of the factors, e. g., supercooling, rate of stirring, etc., influencing the correct detn. of the f. p. of a soln., followed by a detailed description of W.'s f. p. app. This app. is essentially an Et_2O bath contained in a large Dewar tube. The temp. of the bath is controlled by exhausting the air space above the Et_2O , or drawing in fresh Et_2O when the bath gets too cold. The f. p. of milk samples may be compared with that of a soln. of 9.495 g. of pure sucrose in 100 g. of H_2O , which has a f. p. of -0.5345° , the av. f. p. of normal milk. In practice an ice-salt bath may be used, with the temp. as low as -5° without materially affecting the results. The removal of fat does not appreciably affect the f. p. of milk, but any considerable amt. of acid does. The increase in acidity is normally slow, and if a sample does not taste sweet the f. p. method is applicable for the detn. of added H_2O . The av. f. p. of 141 samples of genuine milk was -0.5345 , max. -0.558 , min. -0.514 . These values are accurate to 0.002° . Pasteurization for 20 min. at 60° raises the f. p. about 0.002. Sepd. milk added to whole milk does not affect the f. p., but, of course, H_2O raises it. The method may in some cases be applied to advantage in the detection of added H_2O and the approx. detn. of the amt. present, but is hardly suitable for general milk control work.

H. S. BAILEY.

The examination of adulterated milk. R. EICHLÖFF AND H. BLECKMANN. *Milch-wirtsch. Zentr.* 43, 561-9 (1914).—The authors conducted a series of comparative examns. of milk, skimmed milk, watered milk, and of milk that was both skimmed and watered, to det. the degree to which results obtained in such examns. are affected by the use of $\text{K}_2\text{Cr}_2\text{O}_7$ as a preservative. Their investigations also included a study of the relative merits of gravimetric analysis vs. application of the Fleischmann formula as methods for detg. total solids of milk. The detailed results obtained are given in 7 tables. E. and B. conclude, from their few expts., that the presence of 0.1% $\text{K}_2\text{Cr}_2\text{O}_7$ does affect the analytical results, whether detd. by gravimetric analysis or by application of the Fleischmann formula. The errors involved in the gravimetric method are slight but with the Fleischmann formula they may be so great as to lead to bad judgments regarding the degree of adulteration. For the detn. of total solids the authors recommend the use of the "Kosmos" balance (described) as a rapid and accurate method which requires no more time than the application of the Fleischmann formula. Teichert has compared the "Kosmos" balance with the gravimetric method and found that in 12 series of results the av. values obtained by the 2 methods varied only about 0.1%.

G. A. MENGE.

Analysis of milk. Determination of total solids and total nitrogen. G. MEILLÈRE. *J. pharm. chim.* 11, 167-70 (1915).—For total solids, evap. 5-10 cc. of milk in cylindrical dishes (7 cm. diameter, 2.5 cm. high) in a bacteriolog. oven at 37° for 3-4 days. For total N, evap. 10-20 cc. milk in Kjeldahl flask, add 10-15 cc. H_2SO_4 , 5-7 g. K_2SO_4 and proceed as usual. Clearing up will occur in at most 2 hrs. Before distn. with NaOH , the slightly acid liquid is boiled to expel CO_2 so as to obtain a final sharp end reaction with the indicator (alizarin red, hematoxylin or litmus). In distg. the alk. liquid a Delattre reflux tube should be used so as to have a minimum vol. of distillate. Additional precautions are mentioned.

S. WALDBOTT.

Milk fat determination with the alpha butyrometer kolibri. I. O. VON SOBBE. *Milchwirtsch. Zentr.* 44, 23-27 (1915).—Description of special form of apparatus. Results compared with those of Gerber method are about 0.2% high.

I. L. VAN SLYKE.

The effects of certain condensing and drying processes used in the preservation of milk upon its bacterial contents. S. DELEPINE. *Rept. to Local (Brit.) Gov. Bd., Food Rept. No. 21, 1-49(1914); J. Soc. Chem. Ind. 34, 297(1915).*—A study of 3 methods: (A) manuf. of sweetened condensed milk; (B) of dry milk by revolving heated cylinders, and (C) of dry milk made by spraying into a current of hot air. There were fewest bacteria in the milk made by (A) and most in (C). There was a point in each of the methods where the total bacteria were less than in the finished product, due to contamination during the final stages of the processes. The decrease was due largely to the destruction of *Streptococci*, *Staphylococci*, *Sarcinae*, *B. coli*, *Streptothrichae* and yeasts. In none of the methods was the heat sufficient to kill several saprophytic and some pathogenic bacteria. The milk was never found quite sterile. Apparently the most hardy were the spore-forming bacilli, *B. mesentericus*; some *Streptothrichae* may have survived, but the evidence is not conclusive. Living t. b. of bovine origin survive all treatments. The t. b. in the milks from methods (A) and (B) were still capable of producing tuberculosis in guinea pigs inoculated subcutaneously, but the disease was slower than when untreated t. b. milk was used, being latent for about 4 weeks. Young rabbits fed the (A) or (B) milk did not get tuberculosis. Bact. standards for "preserved" milks should be fixed with the knowledge, that with proper care, recontamination may be almost entirely prevented. The total number of aerobic bacilli should seldom exceed 100 per g.

H. S. BAILEY.

Sudden change in composition of a cow milk. O. ALLEMAN. *Milchwirtschaft. Zentr. 44, 122-3(1915).*—Milk which was abnormal in taste and comp. and which did not react with rennin changed its compn., becoming more nearly normal in two days; it was drawn 7 weeks after beginning of lactation period. In a second sample sp. gr. fat, lactose and casein increased, while ash albumin and lactoglobulin decreased. The later milk reacted with rennin. In the ash, the Ca, Mg, K and P_2O_5 increased in the second sample, while Na, Cl and S decreased.

L. L. VAN SLYKE.

Bacteriological control of feeding-stuffs in relation to the feeding of milk cows and production of hygienic milk. C. GORINI. *Milchwirtschaft. Zentr. 44, 129-33(1915).*—The microorganisms especially to be guarded against in milk production are the gas forming and putrefactive. These are commonly associated with impure water and partly spoiled feeds. As preventive measures, it is advised that (1) all fields on which crops are grown for cattle should be well drained, (2) hay should be well dried to prevent abnormal fermentation, and (3) careful preparation and preservation of siloed materials, using pure cultures and controlling temperature of fermentation in order to produce sweet silage or lactic acid silage.

L. L. VAN SLYKE.

Fat content of Swiss emmenthaler cheese. G. KOESTLER. *Milchwirtschaft. Zentr. 43, 517-24(1914).*—On the basis of many analyses, Swiss Emmenthaler cheese, when properly made, contains fat to the extent of at least 45% of its dry wt. The relation of the fat in the milk used to the fat in the cheese produced is so variable that the fat content of the milk cannot be used with sufficient accuracy for the purpose of calcg. the fat in the dry mass of the cheese.

L. L. VAN SLYKE.

Modification of Eichloff's flask for the determination of fat in cheese. C. BARTHEL. *Milchwirtschaft. Zentr. 43, 529-30(1914).*

L. L. VAN SLYKE.

Fat content in dry substance of the most important commercial kinds of Italian cheese. G. FASCETTI. *Milchwirtschaft. Zentr. 43, 538-40(1914).*—The discussion is limited to (1) Grana cheese with the two types "Reggiano" or "Emiliano," and "Lodigiano" or "Lombardo;" (2) Pecorino cheese and (3) Gorgonzola. The percentage of fat was found to vary widely. In Grana cheese, the fat should amount to at least 30% the dry substance; in Pecorinos cheese 40%; in Gorgonzola 45 or 50%.

L. L. VAN SLYKE.

Normal fat content of Danish varieties of cheese. ORLA JENSEN. *Milchwirtsch. Zentr.* 43, 540-42(1914).—The fat content of cheese is discussed when cheese is made from normal milk and from milk containing 50%, 25%, 15% and 10% of skim-milk.

L. L. VAN SLYKE.

Regulation of fat content of milk for cheese-making. G. WENGER. *Milchwirtsch. Zentr.* 44, 113-18(1915).—A method is given by which milk can be skimmed so as to reduce the amt. of fat to a uniform percentage for making cheese. Various formulas are given enabling one to calculate amt. of fat to be removed, when milk of a known percentage of fat is used, in order to reduce the percentage of fat to uniformity.

L. L. VAN SLYKE.

A rapid method for determining fat in cheese. TEICHERT. *Allgäuer Monatsschr. Milchw. u. Viehs.* 2, 13-4(1914).—A method by which the fat content of cheese may be detd. in 15 min. is described. A sample weighing 2.5 g. is dissolved in a porcelain dish with 8 cc. of H_2SO_4 (sp. gr. 1.6) and the resulting mixt. poured into a butyrometer graduated from 0 to 35. After rinsing the dish with 8 cc. more of H_2SO_4 , the washings and 5 cc. of amyl alc. are poured into the butyrometer which is then stoppered with rubber, centrifuged for 5 min. and placed in a water bath at 60° to 70° for 5 min. and the height of the fat column read. It is advisable to centrifuge for another 2 min. and read again, but this is not necessary.

WM. P. GARRETY.

The use of pure cultures in cheese-making. C. GORINI. *Milchwirtsch. Zentr.* 44, 118-22(1915).—The paper is a general discussion of the subject which was given at the Intern. Dairy Congress in Bern in June, 1914.

L. L. VAN SLYKE.

Use of lactic acid bacteria in cheese-making. O. GRATZ. *Milchwirtsch. Zentr.* 44, 134-36(1915).—This is an address made at the Intern. Dairy Congress at Bern in 1914, and is a statement of general facts.

L. L. VAN SLYKE.

The examination of dairy salt. A. WOLFF. *Milchwirtsch. Zentr.* 43, 545-51(1914).—W. advocates that salt which is incorporated into manufactured dairy products be carefully examd. for bacteria as well as for other impurities. A bacteriological investigation of samples of salt used in butter making and in cheese making disclosed the presence of considerable numbers of nonpathogenic bacteria as well as molds and yeast. The salt used in cheese was found to be more contaminated than that used in butter. In one case the brine made from such salt contained 315,000 bacteria per cc., including lactic acid bacteria, colon bacilli, putrefying bacteria, various cocci, spore-formers, molds, yeast, and other forms. W. claims that certain of the bacteria found will decompose butter fat and that therefore their presence in butter, due to the addition of even a little contaminated salt, will cause its steady deterioration. The samples of salt studied were obtained and examined under different conditions and the indicated bacterial content varied accordingly.

G. A. MENGE.

Detection of nitrates (TINGLE) 7. Germicidal value of lactic acid in milk (HEINEMANN) 11C. Drying beet chips (ROSE) 28.

Brit., 3,824, Feb. 13, 1914. E. SHAW. Sweetmeats such as hard boiled goods are made by adding to the sugar a soln. of sugar which has been inverted by means of an acid and neutralized, $NaHSO_3$ being afterwards added. Sugar is dissolved in H_2O and brought to boiling. This soln. is then inverted by the addition of HCl after cooling to such temp. that the acid does not cause discoloration. Na_2CO_3 is added to neutralize the acid. The soln. is then mixed with sugar in the proportion of about 5 gals. of soln. to 2 cwt. of sugar, which is brought to boiling and about 5 oz. of $NaHSO_3$ added. The batch is boiled by passing it through a machine of the type described in 20,766, 1908 (cf. C. A. 6, 1869).

Brit., 3,867, Feb. 14, 1914. J. ANFOSSI. In a process of preserving fruit, tangerines or other fruit are maintained at 60-70° in a sirup of sugar and glucose at about 10° Bé. in open earthenware pans. Sirup is added from time to time, and is coned. to about 33° Bé. The tangerines are finally drained, washed with hot H₂O, and glazed in pure sugar sirup. Before treatment, the tangerines are lightly skinned, and boiled in H₂O. The earthenware pans are heated by a flue from a coal or gas fire. The temp. is controlled by a register and vents, and metal sheets may be placed beneath any pans receiving too much heat. The fire may be replaced by a steam heater.

Brit., 4,589, Feb. 23, 1914. E. SAMUELSON and J. BACKHOUSE. A heater for grain or the like. Cf. C. A. 9, 339.

Brit., 4,649, Feb. 23, 1914. R. NORTON, H. SIMON, LTD., E. SAMUELSON and J. BACKHOUSE. In conditioning grain, the container in which the grain is subjected to steam or air has a perforated bottom coating with a movable perforated plate to control the outflow.

Can., 160,831, Feb. 23, 1915. C. H. CAMPBELL. The method of treating liquid as in the pasteurization of milk, by rapidly raising the temp. uniformly throughout the entire mass of liquid under treatment, and then rapidly lowering the temperature uniformly throughout the said entire mass.

Ger., 278,942, Oct. 18, 1913. S. MAYER, SR. App. for the automatic and individual charging of vinegar vats.

Ital., 118,304, 391,242, Jan. 11, 1913. VON GISEWALD CONWAY. Mfg. edible gelatin by treating the raw material by high pressure steam for a short time, reducing the pressure but leaving the boiler full of steam, closing and allowing to cool, thereby producing a vacuum.

14. WATER, SEWAGE AND SANITATION.

EDWARD BARTOW.

Interpretation of chemical water analysis. R. DROSTE. *Chem. Ztg.* 39, 54 (1915); *Chem. Zentr.* 1915, I, 457.—A thorough local survey, including the geological features is necessary in addition to the analytical results. ARTHUR LEDERER.

Titration of chlorine ions in water. O. MAYER. *Z. anal. Chem.* 54, 147-58 (1915).—The Cl results obtained by Mohr's method are too high. Tillmans and Heuble (cf. C. A. 7, 4025) recommended the addition of 1 cc. of a 10% K₂CrO₄ soln. to each 100 cc. of water. M. shows exptly. that errors due to the solubility of Ag₂CrO₄ are practically negligible. The titration should be carried on in the cold. Mohr's method is convenient, but if accurate results are required the grav. method should be resorted to. ARTHUR LEDERER.

Comparison of methods for the determination of oxygen in waters in the presence of nitrites. ELIAS ELVOVE. *U. S. Hyg. Lab. Bull.* No. 96, 15-35 (1914).—Levy's method is not reliable in the presence of nitrites. In the presence of considerable nitrite the results by the Hale and Melia K acetate modification of Winkler's method may be too high if there is not a sufficiently long period intervening between the addition of K acetate and the titration of the I. At 20° with a water containing 5 p. p. m. of nitrite the proper interval is 15 min. The permanganate modification of Winkler's method is most reliable, as it also takes into account the organic matter.

ARTHUR LEDERER.

The determination of the quality of drinking water. ELMANOWITSCH AND J. ZALESKI. *Z. Hyg.* 78, 461-74 (1914).—The quality of drinking H₂O and the nature of

its contaminating substance can be ascertained by detg. the degree of absorption of O and Cl.

JULIAN H. LEWIS.

The colloidal clay treatment for trade wastes. P. ROHLAND. *Zentr. Gewerbehygiene* 2, 141-5(1914); *Wasser u. Abwasser* 9, 38(1914); cf. *C. A.* 9, 944, 1210.—R. recommends clay treatment for wastes containing much organic matter. It is not suited for the purification of the inorganic potash waste liquors.

ARTHUR LEDERER.

A comparative study of settling in Emscher, Kremer, Stieg, and Neustadt tanks, biologic treatment, and chemical precipitation, made at Stuttgart. EMIL MAIER. *Gesundh. Ing.* 37, 769-79, 805-11, 857-60(1914).—Purely mechanical purification shows the greatest efficiency at the lowest cost. Approx. $\frac{1}{2}$ of the organic substances are removed from the sewage. The cost of clarification is approx. 0.7 pfennig per cu. m. of sewage. The chem. or biologic purification is much more difficult to accomplish and more expensive. The costs of chem. and biologic treatment are 3 and 2.5 pfennig per cu. m. resp. and, while the biologically treated sewage is completely stable, the chemically treated is not.

ARTHUR LEDERER.

Purification of domestic sewage in fish ponds. HOFER. *Wasser u. Wegebau Z.* 1914, No. 5, 54-5; *Wasser u. Abwasser* 9, 38(1914).—Sewage should be diluted with an equal volume of fresh water previous to its discharge into a pond. The depth of ponds should not exceed 0.5 m. so that sunlight can penetrate to the bottom. Detrimental overgrowths by water plants can be prevented by keeping ducks. H. estimates a required area of 1000 sq. m. for each 2000 inhabitants.

A. I.

Sewage disposal in sanitariums and hospitals. HUGO KÜHL. *Die Heilanstalt* 8, 193-6(1913); *Wasser u. Abwasser* 9, 37(1914).—Irrigation in various forms is the best system. If suitable land is not available, biologic treatment should be resorted to. A number of plants for German institutions are briefly discussed.

A. I.

The colloidal clay treatment of slaughtering house waste. P. ROHLAND. *Deutsche Tierärztl. Wochenschr.* 21, 560-1(1914); *Wasser u. Abwasser* 9, 38(1914).—R. recommends this method of treatment particularly for the purification of slaughtering house waste. Cf. *C. A.* 9, 944, 1210.

ARTHUR LEDERER.

Slaughtering houses. A. STEIN. *Gesund. Ing.* 38, 217-20(1915).—Discussion of technical details of a sanitary slaughtering house.

ARTHUR LEDERER.

Apparatus for fumigation with cresyl. HARALD SEIDELIN. *Yellow fever Bulletin* No. 3; *Rev. int. Hyg. publ.; Schweiz. Apoth. Ztg.* 53, 227-8(1915).—Bouet and Roubaud obtained efficient results with 5 g. cresyl per cu. m., heating it in open, deep vessels to diminish danger of ignition. S. uses glass retorts whose stems pass through holes in the door of the room to be treated. Heating is done by petroleum or alc. Metal retorts might be used if a blast lamp is available.

S. WALDBOTT.

Gas fires and ventilation (SMITHS) 21.

Brit., 4,018, Oct. 24, 1914. R. P. VAN CALCAR and H. J. MARTIJN. In a process of drying and sterilizing air by solid desiccants and the soln. derived from their liquefaction, the air is led into the app. in a number of converging streams under strong suction, and flows through in a sinuous path over or past a number of downwardly directed baffles, down which the liquefied desiccant streams from the troughs.

Brit., 4,020, Oct. 24, 1914. R. P. VAN CALCAR, J. ELLERMAN and H. J. MARTIJN. In a process and app. for drying and sterilizing air as described in 4,018, 1914 (*supra*), a preliminary removal of moisture is effected in the lower part of the app. by the passage of the air over porous baffles which absorb the liquefied desiccant flowing into

the trough from the baffles on the bottoms of the perforated trays of desiccant. The baffles may be solid or hollow, and straight, spiral, or otherwise shaped.

Brit., 4,564, Feb. 21, 1914. C. T. KINGZETT, E. P. KINGZETT and SANITAS CO. An app. for generating gaseous formaldehyde for disinfecting consists of a vessel having fixed or cast therein a block formed of KMnO_4 and plaster, etc. The vessel received a second vessel containing HCHO soln., which is poured over the block when the gas is to be generated.

Fr., 467,687, Jan. 24, 1914. DEUTSCHE FILTERKOMPAGNIE, G. M. B. H. Natural stone, after suitable wet treatment, is prepd. for use in the purification of water by treatment with acids (HCl), whereby the injurious bases are removed, and the mass is converted into a porous condition, whereupon it is enriched with NaCl and, in certain circumstances, with Mn salts.

Fr., 468,864, Feb. 24, 1914. E. W. JANSON. Treating waste water slime by adding naphtha (0.5-4%) to the compressed slime cake, and subjecting it to dry distn., with exclusion of air, at $260-480^\circ$. The fatty acids protected from decompn. by the naphtha vapors (Ca stearate, palmitate and oleate) go over in part with NH_3 . The retort residue is heated to $540-650^\circ$ and the mass, consisting of lime, SiO_2 , animal charcoal, H_3PO_4 , etc., is used for the pptn. of further quantities of waste waters.

Ger., 280,735, Apr. 7, 1914. MARMOR-INDUSTRIE KIEFER, AKT.-GES. Separating sand from slimes.

Ger., 281,081, June 24, 1913. Addition to 278,000 (C. A. 9, 832). A. HAUSMANN. Constructional modifications in distributing channels for purifying agents in the treatment of H_2O .

Ger., 281,103, Jan. 20, 1914. GRÜNEBERGER WERKZEUGWERKE AKT.-GES. App. for purifying boiler feed water inside of the boiler.

Ger., 281,129, Jan. 17, 1914. O. STOCK. Feeding troughs, according to 267,936 (C. A. 8, 1632) for waste water clarifying tanks.

Ger., 281,131, June 25, 1913. RICHTER & RICHTER. Clarifying tank.

Ger., 281,580, May 25, 1913. M. KUSCH. Constructional details of a clarifying apparatus.

Ger., 281,810, June 7, 1913. SUCROFILTER- UND WASSERREINIGUNGS-GES. M. B. H. Obtaining sterile potable water from any impure H_2O by adding KMnO_4 and CuSO_4 in amts. sufficient to kill the microorganisms, and then, after the addition of H_2O_2 in amt. sufficient to convert the salts into insol. form, filtering the H_2O . The specified salts are applied in tablet form, and allowed to act on the H_2O for 10 mins. The effectiveness of the process resides in the fact that the CuSO_4 , besides having bactericidal properties, acts as a catalyzer by stimulating the liberation of the O from the KMnO_4 (which constitutes its bactericidal power) to such an extent that the organisms in suspension are killed in a short time. By the addition of H_2O_2 after 10 mins., the KMnO_4 is pptd. as MnO_2 and the CuSO_4 as CuO . Upon filtration the CuO goes into the slime and kills all the spores in the slime, thereby preventing growth through the filter and ensuring continued freedom of the filtrate from pathogenic organisms. E. g., impure H_2O 4 liters are mixed with 3 g. CuSO_4 and 3 g. KMnO_4 and after 10 mins. 4 g. H_2O_2 (0.36%) are added and allowed to act for 3 mins. and the mixt. is filtered.

15. SOILS AND FERTILIZERS.

R. O. E. DAVIS.

Acids and colloids of humus. GUSTAV FISCHER. Halle. *Kühn-Archiv*. 4, 1-136(1914); *Biedermanns Zentr.* 43, 660-5(1914).—Investigations are reported relative

to purification methods, especially dialysis, colloids of composts and soils, ultrafiltration, reversibility and irreversibility of colloids, H-ion concn. measurement by means of e. m. f., hydrolysis, acid reactions of materials, migratory tendency and speed both with and without acid and alkali additions, elec. potential of colloid particles, coagulation, humus colloids in presence of colloid gold, etc., precipitation limits, effects of electrolytes, comp. of inorganic constituents, microscopic and ultramicroscopic exam., fluorescence and relation of humus colloids to certain organic color-materials. The results do not lend themselves to brief abstracting.

W. H. FRY.

The biochemical reduction processes in the soil. C. A. H. VON WOLZOGEN KÜHR. *Arch. Suikerind.* 23, 501-11 (1915).—K. discusses mainly the action $2C + CaSO_4 + H_2O = CaCO_3 + H_2S$ as caused by *Microspira desulfuricans*. C — represents the organic material which serves as a source of C. In many tropical soils the black color is due to FeS from the above reaction, rather than to organic material. The detn. of the reducing power of a soil is based on its power to reduce ferric salts. Boil 50 g. of the soil for 3 min. with 200 cc. of 10% H_2SO_4 , filter, cool, and titrate with $KMnO_4$. This gives the total reducing power. To det. the ferrous salts present (as distinguished from organic material of reducing power) ext. with cold 10% AcOH and titrate with $KMnO_4$. In cane fields which show local spots of poor growth, soil samples from these spots will often show a greater reducing power than samples from localities of normal growth.

W. L. BADGER.

Isolation of *Bacillus radicola* from soil. CHAS. B. LIPMAN. *Science* 41, 725 (1915).—Correction of errors as to date and credit for priority.

W. H. FRY.

Sulfur and permanent soil fertility in Iowa. P. E. BROWN AND E. H. KELLOGG. *J. Am. Soc. Agron.* 7, 97-108 (1915).—"Iowa soils are shown to contain small amts. of total S, much less on the average than the P content in the case of each of the large soil areas. Some of the S removed from the soil by crops may be returned by the use of manure." Such amts. would be insufficient to keep up the S content of soils, and, in certain contingencies, the employment of S-bearing fertilizers may become necessary. Acid phosphate seems the logical fertilizer to use, as it supplies both S and P.

B. E. B.

The question of the dissolving action of roots. TH. W. CHIRIKOV. *Russ. J. exp. Landw.* 1914, 64; *Biedermanns Zentr.* 44, 66-7.—From expts. on barley and buckwheat with phosphorite and $Ca_3(PO_4)_2$, it is concluded that the theory of root secretion of acids does not explain a whole series of facts concerning the nutrition of the higher green plants. The plant roots are surrounded by a soln. in a certain equil.; the comp. of this soln. depends not on the quantity of the solid phase but only on the comp. of the fluid phase. Roots of different plants disturb this equil. very unequally; one absorbs chiefly CaO, another P_2O_5 . Barley does not take up P_2O_5 of phosphorite in the presence of $Ca(NO_3)_2$ or other Ca salt, but with phosphorite alone it takes up its P_2O_5 to a considerable degree. Buckwheat takes up P_2O_5 of phosphorite as well in the presence as in the absence of $Ca(NO_3)_2$. This difference can be explained on the ground that buckwheat energetically withdraws CaO from the nutrient soln. and thereby facilitates the passage of P_2O_5 into the soln., whereas with barley P_2O_5 is taken up much more energetically than CaO.

W. H. FRY.

Calcium cyanamide as a retarder of denitrification. CORRADO LUMIA. *Atti accad. Lincei* 23, II, 659-62 (1914).—Expts. showed that an addition of 0.15% Ca cyanamide to a nutrient soln. decreases the denitrification. Its advantages over $(NH_4)_2SO_4$ and $NaNO_3$ as a fertilizer are due to this fact. The best utilization of inorganic fertilizers was obtained by mixing them with Ca cyanamide.

E. J. WITZEMANN.

The inter-relationships between the constituents of basic slag. S. H. COLLINS AND A. A. HALL. *J. Soc. Chem. Ind.* 34, 526-30(1915).—The results of analysis exhibit certain relationships, the most interesting being those occurring between the citric solubility and the general compn. The coeff. of correlation is detd. from the formula: $r = \Sigma xy / \sqrt{\Sigma x^2 \Sigma y^2}$ where x is the departure from the mean of the citric solubility and y is the departure from the mean of the fineness or other property supposed to be correlated. When correlation is perfect the formula works out to be equal to unity, and when there is no correlation the result = 0, and when the quantities move in opposite directions the result has a minus sign. The probable error of the coeff. is calcd. from the formula $\mu = 0.674 (1 - r^2) / \sqrt{n}$ in which r is the coeff. and n is the number of pairs which are correlated. The correlation between the citric solubility and the CaO is very striking and shows that (in the case of a slag) a high CaO content and a high citric solubility are very intimately connected, the high CaO content having a greater influence than fineness. The evil influence of SiO_2 is striking. MgO appears to hinder the soln. of a slag in citric acid. Mn, Fe, and V have no important influence on the citric solubility. Tables and curves are given showing the correlation among the constituents, between the hay crop and the constituents of the basic slag over a 10 year period, the balance between the constituents of slags. Conclusion: "It is quite well known that such substances as MgO and Mn influence the cropping power of a soil and that these constituents vary considerably in slag. The most important constituent of slag is P_2O_5 , but no general investigation has been attempted to discover the constituents of secondary importance. The wide attempt made here to find out the most likely ingredient to rank in the second place of importance, shows that even if these be all taken into account something more will be needed to give a fair presentation of the facts of the case. Not merely do many other constituents appear to have value, but there seems much reason for supposing that a balance of the secondary constituents is needed. Medium proportions of MgO, Mn, and Fe are all useful, but extra large proportions harmful. The citric solubility of slags is correlated with the constituents of slags in such a manner that it may form a useful test, provided that its arbitrary and conventional character is recognized."

F. W. SMITHER.

Is the Lorenz-Neubauer method for the determination of citric acid-soluble phosphoric acid in Thomas meals applicable? H. DUBBERS AND CELICHOWSKI. *Landw. Jahrb.* 47, 71-8(1914).—The contentions of Lemmermann and Haussding (cf. *C. A.* 8, 2591) are opposed. The Lorenz method is uncertain and therefore inapplicable. Both the Fe citrate method proposed by Popp and the method of Darmstadt give a very satisfactory degree of certainty.

C. F. MILLER.

The determination of phosphoric acid in vegetable material, namely in crops, and in phosphates. A. STUTZER AND W. HAUPT. *J. Landw.* 63, 46-9(1915).—Details are given for the ignition of the yellow molybdate ppt. in the detn. of P_2O_5 . No new principle is involved.

L. J. GILLESPIE.

Fermented molasses as a source of nitrogen and potash fertilizers in Italy. A. VITA. *Italia agricola* Feb., 1915; *Deut. Zuckerind.* 40, 350(1915).—In connection with a consideration of the lack of artificial fertilizers as a result of the war, V. recommends that fermented molasses and the residue from BaO treatment be used as a source of N and K. V. discusses the treatment of molasses residues in Italy by calcination in so-called "Porion" ovens for the recovery of K_2CO_3 , K_2SO_4 , KCl and Na_2CO_3 (with simultaneous loss of N) and the processes of Stolzenberg (rapid heating of 3 parts perphosphate with 2.5 parts thick molasses in order to fix N), Vasseau (treatment of the molasses with a calcd. amt. of H_2SO_4 sufficient to convert all K compds., etc. into sulfates, centrifuging the K_2SO_4 and treatment of the residue with perphosphate so as to obtain a fertilizer with a high content of N and P_2O_5) and Effront (decompn. of the amino

acids of the molasses with production of NH_3 by means of cultures of butyric acid bacteria which have become habituated to large amts. of NH_3 and distn. of this NH_3 with absorption in H_2SO_4 for the recovery of N from molasses residues. The use as fertilizer of the alk. (formerly exported from Italy) obtained from molasses presents difficulties because of the caustic action of the carbonates. Transformation of the latter into sulfates is not complete and is, furthermore, accompanied by increased expense due to the cost of H_2SO_4 . H. S. PAINE.

Toxic effect of iron and aluminum salts on clover seedlings. R. W. RUPRECHT. Mass. Agr. Expt. Sta., *Bull.* 161, 125-29(1915).—Fe and Al sulfates are shown to be quite harmful to the roots of clover plants. CaCO_3 and Ca(OH)_2 neutralize the injurious properties of the salts of Fe and Al in dil. solns. B. E. B.

The effect on a crop of clover of liming the soil. F. W. MORSE. Mass. Agr. Expt. Sta., *Bull.* 161, 119-124(1915).—Liming a soil increased the size of clover plants and the % of N in them when the clover was grown on soils without an application of N or when supplied with $(\text{NH}_4)_2\text{SO}_4$. The increase in the assimilation of N was apparently promoted by the action of the lime on the properties of the soil and not by its action within the plants. B. E. B.

Fertilizing sugar beets without Chile saltpeter. K. STÖRMER. *Blätter f. Zucker-rübenbau* 1914, 320; through *Wochschr. Zentr. Rübenzuckerind.* 52, 882(1914).—Prescriptions for the use of $(\text{NH}_4)_2\text{SO}_4$, $\text{Ca(NO}_3)_2$, or CaCN_2 , with phosphates and K; and with Na added as kainite to replace the Na of NaNO_3 . W. L. BADGER.

Fertilizing sugar beets with "cattle salt" (denatured common salt). A. STUTZER. *Deut. landw. Presse* 1914, 1007; *Wochschr. Zentr. Rübenzuckerind.* 52, 882(1914).— NaNO_3 may be replaced by $(\text{NH}_4)_2\text{SO}_4$ if at the same time a corresponding amt. of Na is added. This may be most cheaply obtained by using denatured NaCl , or from kainite. In the latter case K is also obtained. W. L. BADGER.

The action of common salt used with ammonium sulfate (in beet fertilizers). SCHNEIDEWIND, D. MEYER AND F. MÜNTER. *Landwirtsch. Wochschr. Provinz Sachsen* 1915, 3; through *Wochschr. Zentr. Rübenzuckerind.* 53, 68(1915).—Expts. were carried out with 40% K salts, with 40% K salts and NaCl , and with kainite (50% NaCl), all with both $(\text{NH}_4)_2\text{SO}_4$ and NaNO_3 . Both fodder and sugar beets gave as good results with kainite as with the mixed salts, irrespective of whether $(\text{NH}_4)_2\text{SO}_4$ or NaNO_3 was used. With fodder beets the dry substance was decreased but the yield per ha. increased; with sugar beets, neither dry substances or yield was effected. W. L. BADGER.

Experiments on the combating of stinking smut in winter wheat by means of the formaldehyde treatment. H. MÜLLER AND E. MOLZ. *Fühlings Landw. Z.* 63, 742-52(1914); *Chem. Zentr.* 1915, I, 799-800; cf. *C. A.* 9, 1363.—Results are given in considerable detail of seed treatments for the protection of wheat against smut. The investigators found that the soln. used in the steeping process (seeds immersed for 15 min. in a 1/4% soln. of the 40% formalin) can be used over and over without losing its efficacy if only a few hours elapse between the first and last treatments. The wetting process (wetting of seeds with 2-3 liters of the soln. per 100 lbs., mixing and drying) proved less satisfactory than the former. The superiority of HCHO over CuSO_4 as a steeping soln. is due especially to its slight injury to the viability of the seeds. The weakness of the method lies in the susceptibility of the seeds to reinfection. Paraformaldehyde proved altogether unsuitable. C. F. MILLER.

The toxicity of insecticides (WOODWORTH) 11D. Direct assimilation of atmospheric nitrogen by plants (MAMELI) 11D.

16. FERMENTED AND DISTILLED LIQUORS.

ROBERT WAHL.

Absorption of sulfurous acid by wine. T. OMEIS. Würzburg. *Arb. kais. Gesundheits.* 49, 495-501(1914).—O. gives results of additional expts. to his earlier investigation. Cf. C. A. 8, 547. L. W. HAAS.

Spontaneous acid retrogression in wine. T. OMEIS. Würzburg. *Arb. kais. Gesundheits.* 49, 488-94(1914).—O. investigated the influence of (1) temp. of storage, (2) stirring up of yeast after principal fermentation, and (3) removal of yeast soon after completed fermentation. The expts. carried out with specimens of a poor vintage, confirm O.'s earlier observation. Cf. C. A. 8, 547. L. W. HAAS.

Refinement of beer. R. WAHL. *Am. Brewers Rev.* 29, 216-8(1915).—The efforts to increase stability and chill-proof quality of beer by the modification of the undesirable proteins in the finishing cask (by application of the peptic strength of malt activated by bacterial lactic acid) are reviewed. L. W. HAAS.

Importance of lactic acid in production of malt and beer. R. WAHL. *Am. Brewers Rev.* 29, 224-6(1915).—A review (cf. preceding abst.). L. W. HAAS.

Enzymes in malt that produce polypeptides and amino acids. LUDWIG ADLER. Weihenstephan. *Z. ges. Brau.* 38, 129-31, 137-42, 146-9, 153-5(1915).—In the expts. the polypeptide and the amino acid N were detd. by means of Sørensen's formol titration (cf. C. A. 8, 2025). From the exptl. data A. draws the following conclusions: The optimum temp. for both the polypeptide (or peptic) and the amino acid (or tryptic) producing enzymes in malt lies at 46°. Even after a duration of mashing of 24 hrs. under sterile conditions, the enzymic activity has not completely ceased; most work is accomplished during the first 8 hrs., possibly because until that moment by the action of a phosphatase (most probably phytase) the inorganic P_2O_5 and simultaneously the acidity increases. The largest quantity of formol-titratable N is produced in mashes with a H^+ conc. characterized by $pH = 4.3$ to 5.0 . This optimum H^+ conc. is not reached by spontaneous acidification until 12 hrs. after the start of mashing at 46°. Both enzymes are more sensible to H^+ than to OH^- , and by the latter the peptic enzyme is much more easily destroyed than the tryptic. The formation of amino acids seems to be due principally to an endoenzyme, while the secretion enzymes produce polypeptides and amino acids at equal rates. The proteolytic enzymes in malt also act upon foreign proteins (those tried were Witte peptone, edestin and gelatin), preferring proteins peculiar to malt, and barley, respectively. L. W. HAAS.

Use of sugar (sucrose) as additional mashing material. F. KORITSCHNER. *Brau. Malsind.* 16, 108-15(1915).—The appearance of fermentation of pure malt wort differs in no way from that of worts in the preparation of which varying proportions of malt are replaced by beet sugar, and in no case was it possible to draw conclusions from the course of fermentation as to an addition of sugar. Of greatest importance is the regulation of the degree of final fermentation, which, as is shown, may easily be effected by joint employment of black or caramel malt. L. W. HAAS.

Preservation of wort. F. SCHÖNFELD. *Wochschr. Brau.* 31, 354(1914).—It may be economical (for small breweries to meet the fluctuating demand for beer of quick consumption) to make large brews and to preserve the wort in a sterile condition for fermentation as and when required. Suitable storage is provided by cylindrical metal tanks (after the pattern of those used for the cultivation of pure yeast by the Stockhausen-Coblitz method), holding 1 to 10 hl. of wort. These are filled with the hot wort and closed with a cover having a rubber washer and held down by a weak spring; as the wort cools the cover is drawn down and closes the tank gas-tight. To

prevent the collapse of the tank under the partial vacuum, the bottom, which is constructed of relatively thin metal, is made convex and is drawn inwards as the contents of the tank contract.

L. W. HAAS.

Acceleration of fermentation (by dead yeast). E. MOUFANG. *Allgem. Brau.-Hopfen-Ztg.* 55, 605-7(1915).—It is shown that dead or killed brewer's and baker's yeast have a strong catalytic action on fermentation. M. concludes that this fact cannot be attributed solely to the nutritive value of dead yeast, but must be due to an increased enzymic activity of the living cells caused by the partial assimilation of the dead yeast.

L. W. HAAS.

Some technical phases of alcoholic fermentation. V. WM. L. OWEN. *Sugar* 17, 45-47(1915).—The influence of the shape and size of fermentation vats upon fermentation efficiency is discussed.

A. GROSS.

Results obtained by the application of the "Molhant" process of fermentation to cane molasses. V. MIROIR. *Bull. assoc. chim. suc. dist.* 31, 936-40(1914).—In the ordinary method of fermentation the molasses is dild. to 6° Bé., acidified with 1 g. H₂SO₄ per l. and various yeasts added. A "must" containing 4-4.5% alc. is obtained. In the "Molhant" process the fermentation is carried on in 3 stages. To the yeast is added a small amt. of molasses dild. to 6° Bé. and acidified with 3.5 cc. HCl per l. and the whole is allowed to become well fermented. This is then pumped to a larger tank and more molasses of the same diln. and acidity is added. This is also allowed to ferment for 24 hrs. and is then pumped to the largest tank where plain molasses of 14° Bé. is added until the whole mixt. is about 12° Bé. Fermentation is completed in 24-30 hrs. and a "must" containing 9-9.5% alc. is obtained. This more concd. soln. reduces the time and expense of distg. In the "Molhant" process there is formed 60.23 l. alc. per 100 kg. of sugar calcd. as sucrose. This is 1.5 l. per 100 kg. more than is obtained by the old process.

H. R. SMITH.

Leibniz on France's alcohol commerce. HERMANN PETERS. *Chem. Ztg.* 39 373-4(1915).—Historical.

J. H. MOORE.

Detection of amyl alcohol in alcoholic solutions (HOFLANDER) 7. Manufacture of invert sugar in breweries (BAUDREXEL) 28.

Fr., 467,838, Apr. 7, 1914. P. MARIN. Separating ethyl alcohol from amyl alcohol in the last runnings of the molasses wash and the like.

Ger., 278,646, Jan. 25, 1912. QUARZLAMPENGES, M. B. H. Sterilizing vessels with ozonized H₂O, especially for transporting beer.

Ger., 278,941, Mar. 31, 1912. J. HÖLLDAMPF. Improving the taste and body of beer.

Ger., 279,991, Jan. 21, 1913. STANDARD ALCOHOL CO. Production of fermentable sugar from initial materials containing cellulose. Cf. C. A. 6, 3340; 8, 3215.

Ger., 281,558, Jan. 9, 1913. NATHAN-INSTITUT, A.-G. In the manuf. of beer, the air is expelled from the wort before the beginning of the fermentation by means of CO₂ formed in the process and this is then freed from the O of the air. In the fermentation the yeast remains in the lower part of the vat, the CO₂ as generated carries the air with it as it passes through the supernatant liquid, and the yeast then rises. To remove the O of the air the CO₂-air mixt. is conducted over incandescent Cu turnings, or, together with H, over incandescent contact substances (Pt sponge or Pd asbestos).

17. PHARMACEUTICAL CHEMISTRY.

M. I. WILBERT.

Peroxide of hydrogen. A. MCGILL. Lab. Inland Rev. Dept., Ottawa, Canada, *Bull.* 306, 6 pp. (1915).—A report on the examn. of 37 samples of H_2O_2 on the Canadian market.

E. J. C.

A simple quantitative determination of gum in tragacanth. OTTO FREY. *Apoth. Ztg.* 30, 63-4 (1915).—The paper deals with criticisms made by Fromme (cf. *C. A.* 8, 3094) of the author's method and tends to show that the former's inability to obtain satisfactory results therewith were mainly due to the fact that too little solvent was used in the operation, and that other modifications employed or suggested by Fromme are unnecessary and undesirable. Additional analytical data are offered substantiating these views.

W. O. E.

Evaluation of organic silver preparations. F. LEHMANN. Univ. Koenigsberg *Arch. Pharm.* 253, 42-6 (1915).—After discussing the methods of Kroeber, Stoecker, Danckworrt and Warnecke for detg. Ag in organic Ag preps., the following procedure is suggested: Dissolve 0.2-1.0 g. sample (depending on the nature of the prep. under examn.) in 10 cc. H_2O contained in a 400 cc. Erlenmeyer, add with const. agitation 10 cc. conc. H_2SO_4 and follow with 2 g. finely powd. $KMnO_4$ (4-5 g. for preps. containing considerable Cl), adding the reagent in small portions and then allowing to stand 15 min. In the case of Cl-free preps., dil. the mixt. with 50 cc. H_2O , decompose the excess of manganic compds. by the addition of $FeSO_4$ in small portions until a clear yellowish soln. results and then titrate with 0.1 *N* NH_4CNS . In the case of products containing more or less chlorides, heat the mixt. on the wire gauze in order to decompose the $AgCl$ and until the condensing vapors of H_2SO_4 have washed down all traces of Mn compds. adhering to sides of flask. After cooling, dil. with 50 cc. H_2O and titrate as above. One cc. 0.1 *N* NH_4CNS soln. = 0.0108 g. Ag.

W. O. E.

Behavior of iodized starch toward the Pukall cell and Vanino's reagent. L. VANINO AND A. SCHINNER. *Arch. Pharm.* 253, 47-51 (1915).—Expts. made to det. to what degree, if at all, starch and iodized starch solns. partake of a colloidal character developed the fact that ordinary starch soln. (that of glycogen and inulin as well) is taken up by the Pukall cell, while iodized starch soln. does not permeate the cell at all. All iodized starch solns. are pptd. by Vanino's reagent, the iodized soln., however, with difficulty and then incompletely. In certain cases, this reagent not only equals but even surpasses the Pukall cell in sharpness and delicacy. Thus, it was shown that aq. solns. of Brazil wood, redwood, fustic logwood, Berlin blue and litmus are all taken up by the Pukall cell, while with the $BaSO_4$ reagent a litmus soln. of 1:300 and one of sol. Berlin blue of even higher diln. were completely pptd. after 1 shaking. Aq. I soln. is almost completely decolorized after 14 days shaking with Vanino's reagent, but is unaffected by the Pukall cell, although solns. of I in alc., $CHCl_3$, CCl_4 and CS_2 are immediately absorbed by this cell; they are not pptd. by the $BaSO_4$ reagent.

W. O. E.

Investigation of quinine sulfate. Z. P. POLAK. *Pharm. Weekblad* 52, 579-604 (1915).—The NH_4 -test has 2 chief disadvantages: (1) a much too small amt. of the other alkaloids is brought into the soln. to be analyzed, and (2) a method in which so small a portion is obtained brings about irregular results. In the prepn. of a metastable soln. which is the essential point in the Kerner-Weller test, there are too many factors which cannot be controlled. Although this is perhaps the best method known for the detn. of the purity of com. quinine, P. believes that some other method, free from so many errors, should be substituted for it, even if this is not more sensitive than the old method.

P. V. D. MEULEN.

Colombian tolubalsam. P. VAN DER WIELEN. *Pharm. Weekblad* 52, 631-4 (1915).—A sample of tolubalsam of good quality, imported directly from Colombia, gave on investigation in accordance with the methods of the German Pharm. an acid no. of 120.4, a sapon. no. of 226.8 and an ester no. of 106.4. This is higher than the ester no. of any sample of Tolubalsam previously investigated. The author suggests that the upper limit of the ester no. be raised, or else be omitted entirely, as is done by the French Pharm. P. v. D. MEULEN.

The preparation of malt extract containing vitamine. P. VAN DER WIELEN. *Pharm. Weekblad* 52, 673-4 (1915).—The prepn. from potatoes is carried out as follows: 2 kg. of potatoes are carefully cleaned or thinly pared and cut up into large pieces of uniform size. They are covered with water, boiled until they fall apart, and passed through a horsehair sieve by rubbing. The material passed through the sieve is boiled $\frac{1}{2}$ hr., cooled to 60°, mixed with $\frac{1}{4}$ kg. of finely ground barley malt, and allowed to stand at 60° until the liquid gives no test for starch. It is then filtered at once and evapd. immediately to the dry ext., preferably *in vacuo*. The yield from 1 kg. of potatoes and $\frac{1}{4}$ kg. of barley malt is about 430 g., of which 140 g. comes from the barley malt and 290 g. from the potatoes. The yield is frequently lower. P. v. D. MEULEN.

Further investigations on the content of free and combined nicotine in Hungarian Cserbl tobacco. JULIUS TORH. *Chem. Ztg.* 39, 349 (1915); cf. C. A. 8, 985.

J. H. MOORE.

The drug situation in 1914. ANON. *Chem. Ztg.* 39, 397-8, 406-7 (1915).

J. H. MOORE.

Rapid method for the determination of alcohol in alcoholic solutions containing essential oils (perfumes, etc.). MARINO ZUCO. *Ann. lab. chim. centrale Gabelle* 6; *Giorn. farm. chim.* 62, 120 (1913).—The essential oils may be eliminated by dilg. the alc. soln. to approx. 3 times its vol. with a 5% soln. of alum, cooling to 15° and filtering. One-half of the filtrate (which is quite clear) is taken and distd.; the % of alc. is then detd. as usual from the d. of the distillate by reference to the original vol. H. S. P.

Medicinal wines. ANON. *Boll. chim. farm.* 52, 6 (1913).—When a medicinal wine is desired it is advisable to use a wine which is free from tannin, inasmuch as the latter ppts. certain of the active principles of plants as tannates. The use of an artificial wine composed of cognac, H₂O and honey is suggested. H. S. PAINÉ.

Fluid extract for iodotannic sirup. ANON. *Boll. chim. farm.* 52, 504 (1913).—This fluid ext. is prepd. from 4 pts. tannic acid, 76 pts. simple sirup and 20 pts. tincture of I. The tannic acid is dissolved in the sirup and the tincture of I is then added. The mixt. is heated in a flask on a H₂O bath under a reflux condenser until it no longer gives a blue coloration with starch paste. The iodotannic sirup is prepd. from 100 pts. fluid ext. and 900 pts. simple sirup. H. S. PAINÉ.

New reaction of guaiacol. PARIDE TORTI. Como. *Boll. chim. farm.* 53, 299 (1914).—A crystal of guaiacol assumes an intense red coloration when treated with a drop of HNO₃ (d. = 1.40). The colored substance thus obtained is sol. in H₂O, alc., CHCl₃, and Et₂O. Minute, dark, glittering crystals are obtained by spontaneous evapn. of the Et₂O soln. in the air. An aq. soln. of guaiacol, when treated with HNO₃ (d. = 1.40), assumes a red coloration which is transitory and gradually changes to orange and yellow, the original color becoming more transitory as the conc. of the soln. decreases; the change of the original coloration to orange and yellow is facilitated by heat. This coloration is still perceptible when 1 drop of a 0.05% aq. soln. of guaiacol is employed; 0.0025 mg. of guaiacol may be detected. H. S. PAINÉ.

New reaction of salicylic acid. PARIDE TORTI. Como. *Boll. chim. farm.* 53, 400 (1914).—A crystal of salicylic acid heated with 1 drop HNO₃ (d. 1.40) dissolves

with a yellow coloration. When suitable amts. of the substances are taken a lively reaction with development of heat and evolution of vapors takes place after some time without previous heating. Minute lemon-yellow crystals sol. in H_2O , alc. and Et_2O are produced on cooling; solns. of these crystals give an intense red coloration with an aq. 1% Fe_2Cl_4 soln. The sensibility of this reaction is about equal to that taking place between Fe_2Cl_4 and salicylic acid. The yellow coloration of the aq., alc. and Et_2O solns. of the substance obtained by the action of HNO_3 (sp. gr. 1.40) on solid salicylic acid is rendered more intense by the addition of $NaOH$ soln. and finally becomes an orange tint; the latter is restored to the original yellow color by the addition of acid.

H. S. PAINE.

Very sensitive reaction of resorcinol. SILBERMANN AND OZOROVITZ. *Boll. chim. farm.* 53, 425(1914).—Bivalent phenols react with $HCHO$ in acid soln. to produce condensation products of resinous appearance which are insol. in all the usual solvents. When resorcinol is heated with $HCHO$ after addition of a small amt. of HCl or H_2SO_4 , there is produced after a short time a white, voluminous, flocculent ppt. which assumes a fiery carmine red coloration when placed in conc. H_2SO_4 or heated with conc. HCl . The color changes to orange after neutralization or diln. with H_2O ; excess of alk. produces a Bordeaux-red coloration.

H. S. PAINE.

Ferric chloride gelatin. BOURGET. *Boll. chim. farm.* 53, 663(1914).—One hundred grams gelatin are dissolved with gentle heating in 100 g. H_2O and 100 g. glycerol. When the mixt. is perfectly liquid 50 g. Fe_2Cl_4 are rapidly added and the mixt. is heated and stirred until it becomes homogeneous. The mass is then poured upon a suitable flat surface, allowed to cool and cut into pieces.

H. S. PAINE.

Detection of impurity in dicalcium phosphate. ACHILLE TAGLIAVINI. Vercelli. *Boll. chim. farm.* 53, 696(1914).—The sample of di-Ca phosphate in question satisfied all the tests of the official pharmacopeia (Italian), although a trace of sulfates was observed in connection with these tests. The content of P_2O_5 sol. in H_2O and NH_4 citrate soln., when detd. by the method employed for perphosphate fertilizers, showed the sample to consist of 97.81% $CaHPO_4 \cdot 2H_2O$. Detn. of ammoniacal N indicated a content of 0.102% NH_3 ; the di-Ca phosphate had doubtless been prepd. from $Ca_3(PO_4)_2$ (obtained from calcined bones) and the NH_4 salts present in the latter probably remained in the di-Ca phosphate because of incomplete washing. Mg was also found to be present in combination in the sample. In view of this exam. the sample was found to be unsuited for the purpose desired, thus giving one more illustration of the fact that the tests of the pharmacopeia are not often sufficient to guarantee the purity of a product.

H. S. PAINE.

Galyi and ludyl. MOUNEYRAT. *Boll. chim. farm.* 54, 169(1915).—Galyi and ludyl are antisiphilitic arsenical preps. proposed by M. Ludyl is phenyldisulfqaminotetrahydroxyaminoarsenobenzene containing 33% of As. Galyi is tetrahydroxydiphosphoaminodiarsenobenzene containing 35.3% of As. Both preps. are yellowish powders, inodorous and insol. in H_2O and most neutral solvents; they are, however, readily sol. in H_2O to which a relatively small amt. of Na_2CO_3 has been added. These preps. are intended to be used hypodermically in doses of 0.20–0.50 g. at such intervals as to require a total of 1.20–1.50 g. for a cure. Expts. by Troisfontaines indicate that the therapeutic effects of these 2 preps. are quite satisfactory. H. S. PAINE.

Aleudrina. ANON. *Boll. chim. farm.* 54, 229(1915).—This prep. is dichloroisopropyl carbamate; it occurs as inodorous white crystals, sol. in alc., benzene, $CHCl_3$, Et_2O , and fixed oils and slightly sol. in H_2O . The compd. m. 82° . HCl is developed when the aq. soln. is heated to boiling. Acetamide is produced by treatment with dil. KOH soln.; NH_3 and aldehydes are formed by the action of concd. alkali solns. Aleud-

rina acts as a sedative in amts. of approx. 0.50 g. and has a soporific effect in amts. of approx. 1.0 g.; it has no injurious action on the organism. H. S. PAINE.

Arsenical cod liver oil. JANNSEN. *Giorn. farm. chim.* 62, 122(1913).—One-half g. arsenious acid is dissolved in 20 g. warm abs. alc. after addition of several granules of K_2CO_3 . The filtered soln. is mixed with 1500 g. cod liver oil and heated on a H_2O bath until the alc. is completely eliminated. A clear prep. is obtained which contains approx. 0.005 g. As_2O_3 for every 30 g. of oil. H. S. PAINE.

Alkaline iodide hydrogen peroxide. ANON. *Giorn. farm. chim.* 62, 359(1913).—The formula for this new antiseptic is as follows: 3 g. NaI, 100 g. H_2O_2 soln., 100 g. H_2O . The soln. is prepd. as required; it has the advantage of not acting upon the surface alone, inasmuch as the I becomes intimately fixed upon the tissues as the latter are attacked by the nascent O. This antiseptic also has a deodorizing action. H. S. PAINE.

A preparation with bismuth base for the examination of the stomach. RÂCHOU. *Giorn. farm. chim.* 62, 359(1913).—In view of the fact that all the preps. with a base of Bi carbonate which are employed in connection with the radioscopic exam. of the stomach lack the necessary homogeneity and stability required by such material, R. proposes the following formula which may be rapidly and easily prepd.: 120 g. Bi carbonate, 20 g. gum arabic, 3 g. gum tragacanth, 150 cc. simple sirup, 350 cc. H_2O , sufficient orange flowers H_2O to aromatize. The milk of Bi thus prepd. remains perfectly homogeneous *in vitro* for approx. 24 hrs. A distinct stomachal umbra without any trace of sediment may be obtained with this prep. $\frac{1}{2}$ hr. after ingestion. H. S. PAINE.

Dried blueberries. C. Y. PALM. *Svensk Farm. Tidskrift* '19, 217(1915).—Three clean samples of blueberries from local drug stores were examd. and reported as follows: dry matter 75.8–78.0, ash 1.28–1.34, sugar 26.9–34.6, non-volatile free acids 3.8–4.2, water-sol. ext. 58.0–60.1%. A. R. R.

Rapid assay of pepsin. DELAUNAY AND BAILLY. *Bull. soc. pharm.* 1915, I; *Schweis. Apoth. Ztg.* 53, 297(1915).—Dissolve 0.5 g. edestin in 100 cc. HCl, filter and add 0.02 g. of pepsin to 20 cc. of this soln. warmed to 50° , then place the mixt. in H_2O at 17° and add 30 drops of HNO_3 . No cloudiness or ppt. will be seen when the pepsin conforms to the demands of the French Codex. A very slight opalescence is admissible. S. WALDBOTT.

A substitute for tincture of iodine. SCHUHMACHER. *Deut. med. Wochschr.* 1915, 220; *Schweis. Apoth. Ztg.* 53, 281(1915).—A 5% soln. of Br in $CHCl_3$ or eventually CCl_4 may replace tinct. of I as skin disinfectant (*Münch. med. Wochschr. Feldärz. Beilage* 1915, 132). Or, a successive brushing of the wound with the following 2 solns. has the same effect: (I) KI 2, H_2O 5, EtOH 5 parts; (II) $(NH_4)_2S_2O_8$ 2, H_2O 5, EtOH 5 parts. S. WALDBOTT.

Some drug adulterations. GUSTAV BACHMAN. *Midland Druggist* 49, 155–6 (1915).—Eleven samples each of official NH_4OH , dil. HCl and sweet spirit of niter from Minnesota pharmacies were examd. With NH_4OH , the % of NH_3 ranged from 5.78–11.24, 6 samples being close to the required 10%. With HCl, 5 samples were above strength (10.7–12.0%) 2 were correct and 4 were below strength (2.25–9.26%). The latter no doubt were made by dilg. concd. HCl with 9 vols. of H_2O . Only 1 sample of sweet spirit of niter was up to the standard of 4%. S. WALDBOTT.

Berledets. W. A. PUCKNER. *Rep. Lab. Am. Med. Assoc.* 7, 79–80(1914).—Rept. of a 2nd examn. (cf. C. A. 8, 2029). Hexamethylenamine 6.0, H_3BO_3 43.3, KH_2PO_4 18.3, starch 16.5, lactose 15.0 and flavoring (by difference) 0.9%. Each tablet contains approx.: 1 grain of hexamethylenamine, $6\frac{1}{2}$ grains H_3BO_3 , and 3 grains of KH_2PO_4 . L. E. WARREN.

Dr. W. B. Caldwell's syrup pepsin and herb laxative compound. W. A. PUCKNER. *Rep. Lab. Am. Med. Assoc.* 7, 80-82(1914).—Ingestion produced physiologic effects like those produced by phenolphthalein; consequently the product was examd. for that substance. Phenolphthalein was absent. A prepn. of senna was found, also small quantities of a salicylate, probably Na salicylate. There were no indications of the presence of pepsin.

L. E. WARREN.

Dunham's specific for whooping cough. W. A. PUCKNER. *Rep. Lab. Am. Med. Assoc.* 7, 82(1914).—Substances such as are usually found in cough and whooping cough remedies, such for example as NH_4HCl , antipyrine, ext. of glycyrrhiza, opium derivs. and tartar emetic were absent. The prepn. appeared to be a colored and sweetened mucilage.

L. E. WARREN.

Elmiton. W. A. PUCKNER. *Rep. Lab. Am. Med. Assoc.* 7, 82-4(1914).—Sold as a fat reducer. Caffeine, rhubarb, Ph salicylate and organically combined I were found in 2 specimens. In a 3rd I was not found. The I probably had been derived from thyroid or bladder-wrack.

L. E. WARREN.

M. I. S. T. No. 2 nerve tonic. W. A. PUCKNER. *Rep. Lab. Am. Med. Assoc.* 7, 84-7(1914).—The initials are said to mean "Murray's Infallible System Tonic." Brownish black cylindrical masses, weighing about 0.33 g. each, each inclosed in a gelatin capsule. Aloes, Hg, powdered glycyrrhiza, powdered althaea, starch, traces of Ca, a P compd., oil of wintergreen and a little sand were found. Nux vomica, cascara, phenolphthalein, saline purgatives, soap, iodides and Zn_3P_2 were not found. About 4% of Hg was present.

L. E. WARREN.

Nikola. W. A. PUCKNER. *Rep. Lab. Am. Med. Assoc.* 7, 87-8(1914).—Nikola is a "bathing compound weight reducer." Analysis gave Na_2CO_3 82.25 and H_2O 13.85% Traces of NaCl were present. The prepn. is evidently a com. grade of $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$.

L. E. WARREN.

Plasmon, plasmon powder and plasmon milk powder. W. A. PUCKNER. *Lab. Rep. Am. Med. Assoc.* 7, 88-92(1914).—The 3 substances are essentially identical. Each appears to be a crude milk casein rendered partially sol. by treatment with an alkali. Plasmon powder: H_2O 7.43, ash 9.06, P 1.24, N 12.09, protein (N 6.38) 77.10, Na 2.68, fat 0.38% and lactose traces. Plasmon milk powder: H_2O , 7.43, ash 7.54, P 1.25, N 12.20, protein (N 6.38) 77.87, Na 2.01, fat 0.19% and lactose traces.

L. E. WARREN.

Worner's oil liniment. W. A. PUCKNER. *Rep. Lab. Am. Med. Assoc.* 7, 93(1914).—A murky oil. It probably contains oil of turpentine, menthol, oil of sassafras and liquid paraffin.

L. E. WARREN.

Detection of amyl alcohol (HOFLANDER) 7. Determination of arsenic in organic compounds (BARTHE) 7. Arecolidine (EMDE) 10. Constitution of cantharidin (GADAMER) 10. Chemical nature of cantharidin (DANKWORTT) 10. Resin of *Picea vulg.* L. var. *Montana* Schur (BINDER) 10.

Can., 160,555, Feb. 9, 1915. M. E. GAUTHIER. The composition of matter for restoring and growing hair consisting of sage leaves, grape roots, witchhazel, water, liquid S, alc. and menthol crystals.

Can., 160,725, Feb. 16, 1915. A. BORDIN and J. EFFRONT. A process for making diastases and toxines by oxidizing ferments by using as nutrient materials a wort of nitrogenous matter containing at least 4% of N, and cultivating these bacteria on the surface of such wort.

Can., 160,988, Mar. 2, 1915. J. E. BUCHER. Process of treating a cyanogen compound of a light metal to produce a carboxyl derivative by effecting hydrolysis

in the presence of another compound of the same light metal, which other compound is capable both of raising the b. p. of the reactive mass and of substantially preventing hydrolytic dissociation of the cyanogen compound. Cf. *C. A.* 9, 357.

Ger., 280,739, Aug. 3, 1913. KINZLBERGER & Co. Mfg. aromatic chloro compounds by treating aromatic nitro compds. with thionyl chloride above 160°.

Ger., 281,008, Aug. 14, 1913. BAYER & Co. Mfg. glucosides of the purine series and their derivs.

Ger., 281,100, Feb. 6, 1914. C. VON GIRSEWALD. Mfg. aromatic amines by reducing the corresponding nitro compds. with H or gas mixts. containing H, with the employment of catalyzers and in the presence of H₂O, operating under a high pressure and at temps. above the b. p. of the resulting amines. H dild. with CO₂ or gases containing it are used preferably for the reduction of the aromatic nitro compds.

Ger., 281,136, Jan. 14, 1913. CHEM. FABRIK AUF ACTIEN (V. E. SCHERING). Mfg. esters of 2-piperonylquinoline-4-carboxylic acid and their derivs. Cf. *C. A.* 8, 2780; 9, 126, 1095, 1830.

Ger., 281,363, Nov. 22, 1913. C. BÜCKEL. Mfg. acyl derivatives of arylsulfonamides by heating arylsulfonamides or their alkali compds. with chlorides of the higher fatty acids, with or without the addition of indifferent solvent.

Ger., 281,364, Nov. 22, 1913. C. BÜCKEL. Mfg. pure fatty acid chlorides by chlorinating technical fatty acids in the presence of indifferent solvent, such as CCl₄.

18. ACIDS, ALKALIES, SALTS AND SUNDRIES.

T. LYNTON BRIGGS.

James Hargreaves. ANON. *Chem. Ztg.* 39, 349(1915).—An obituary.

J. H. MOORE.

Review of the mineral acid industry in the year 1914. K. REUSCH. *Chem. Ztg.* 39, 281-2, 342-3, 386-7, 398-400(1915).

J. H. MOORE.

Nitric acid plant and absorption towers of British manufacture. ANON. *Chem. Trade J.* 56, 311-2(1915).—A review of the situation confronting British HNO₃ manufacturers as a result of the impossibility of securing from the usual sources stoneware acid-condensing and absorbing app. normally of German production. In the Guttman HNO₃ plant, fused SiO₂, water-cooled pipes have been substituted for stoneware, the other pottery details being made from native clays. Parts for absorption and reaction towers are also furnished in Brit. chem. stoneware.

WM. W. WINSHIP.

Acids and alkalies for shop use. E. H. FISH. *Am. Machinist* 42, 1037(1915).—A brief description of the manuf. of the important chemicals used in the machine shop. A table in convenient form indicates their uses.

C. G. F.

The manufacture of concentrated ammonia water. HILGENSTOCK. *J. Gasbel.* 58, 115-7(1915).—A brief description of 2 ordinary NH₃ stills.

W. L. BADGER.

Factors influencing the stability of hypochlorite solutions. M. L. GRIFFIN AND J. HEDALLEN. *J. Soc. Chem. Ind.* 34, 530-3(1915).—An exptl. study reported in detail. CaO sludge alone, as well as 75 and 50% sludge, will give a bleach liquor of a fairly high availability when well protected by an excess of Ca(OH)₂ (over 10%), even in the form of sludge. The influence of Al(OH)₃ largely depends upon how well the liquor is protected by the alk. Ca base. When as much as 10 g. per l. of this impurity are added the availability of the Ca(ClO)₂ soln. will be depressed even in the presence of a large excess of Ca base. Fe(OH)₃, even in small quantities, rapidly reduces the availability of Ca(ClO)₂ soln., leaving a pinkish liquor; its influence is proportional to the amt. present. Both the alkaline earths and the alkali metals gave practically equally

stable hypochlorite solns., with an availability above 98% after standing 3 days. On passing Cl into $\text{Mg}(\text{OH})_2$ under the same conditions as in the case of $\text{Ca}(\text{OH})_2$, the hypochlorite at first formed will change rapidly to chloride and chlorate with about 16% of the total Cl present as chlorate. Effects of Mg: (1) The $\text{Mg}(\text{OH})_2$ has no effect upon the availability of $\text{Ca}(\text{ClO})_2$ solns. provided the liquor is protected by at least 5% Ca base. (2) The $\text{Mg}(\text{OH})_2$ sustains the stability of the hypochlorite solns. to some extent when the excess Ca is between the limits of 0% and 5%. (3) Even a large excess alkalinity in the form of $\text{Mg}(\text{OH})_2$ is incapable of maintaining the stability of $\text{Ca}(\text{ClO})_2$ when the Ca is exhausted. (4) The absorption of Cl after the Ca is consumed is very incomplete. (5) When leading Cl into a mixt. of $\text{Ca}(\text{OH})_2$ and $\text{Mg}(\text{OH})_2$, no Mg will go in soln. before all of the Ca is exhausted. With small amts. of Fe, Cr, Mn, Ni, or Co the bleach liquor was very unstable, even when well protected with an ample excess of $\text{Ca}(\text{OH})_2$. The conc. of the liquor has very little effect upon its stability. Stable bleach liquor of lower density is usually greenish in color, while at a high density it is yellowish. Bleach liquor settles more slowly with increasing conc. Temp. has very little effect upon the availability, it being decreased only 2.2% by raising the temp. from 30° to 90°. A study of methods of analysis showed that the Bunsen method gives the most accurate results, but cost of KI is a disadvantage. The Penot and Mohr methods give reasonably concordant results, which were about 0.6% lower than those with the Bunsen method. There was no indication that the electrolytic bleach liquor behaved differently from bleach liquor made from the powder. The amt. of I introduced in Mohr's method was without influence upon the results. The length of time used in titrating the samples has no effect, provided proper correction is made for the adhesion of the normal soln. to the buret. The method used for the analysis of a mixt. of hypochlorite, chloride, and chlorate is given in Sutton's "Volumetric Analysis" (10th ed. p. 178). In the daily bleach plant analysis chloride and chlorate are not detd. separately, so the shortened method is as follows: pipet 5 cc. of the liquor to be tested into a pressure flask and add about 25 cc. of a soln. containing 40 g. of $(\text{NH}_4)_2\text{Fe}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$ and 40 cc. H_2SO_4 per l. Heat to about 100°, cool slightly, and then add the Ag; filter, wash the ppt., and titrate the excess Ag with KCNS. The available Cl is detd. in a sep. sample by the Bunsen method. Tables of results are given. F. W. SMITHER.

An investigation of the extraction of potash from feldspar. E. H. QUINNEY. *Chem. Eng.* 21, 171-3 (1915).—Thesis detailing investigation by Q. in conjunction with M. F. Coolbaugh at South Dakota State School of Mines, preliminary to securing U. S. Patent 1,125,007 (cf. C. A. 9, 696). WM. W. WINSHIP.

Possible sources of potash. C. G. CRESSWELL. *J. Soc. Chem. Ind.* 34, 387-93 (1915).—C. gives a brief history of the German Potash Syndicate and discusses all available sources of K, whether of present commercial utility or otherwise, in view of the shortage of German salts. Considerable space is devoted to the extn. from feldspar, mica, etc., and the following possible sources are also covered: sea water, kelp, plant and wood ashes, saltpeter, K lakes and deposits, alunite, waste sulfite pulp liquors, sugar residues and wool scouring. WM. W. WINSHIP.

Chemicals used in shop processes requiring heat. E. H. FISH. *Am. Machinist* 42, 999 (1915).—The prepn. of a large number of fluxes and chemicals now used in steel treating is described. Purposes and properties of each are also discussed.

C. G. F.

Science and industrial problems. A. W. CROSSLEY. *Chem. Trade J.* 56, 459-61, 483-5, 503-5 (1915).—A lecture. The need of coöperation between the research chemist, industrial chemist and mfr. and the advantages of industrial organizations are emphasized. The problems discussed are: utilization of atm. N, hydrogenation of oils, and

org. colors. Analytical data and tables are given from the literature and curves constructed from this data. F. W. SMITHER.

The future status of the German chemical industry. O. NAGEL. *Chem. Ztg.* 39, 385-6(1915). J. H. MOORE.

Patents, designs and trade marks (temporary) rules, Aug. 21, 1914. *J. Soc. Chem. Ind.* 34, 585(1915).—Reproduction of rules with reference to the above subjects adopted by the Brit. government to apply during the present war period. E. J. C.

Yield of nitrogen in coal (SIMMERBACH) 21. Filter for waste gases from ammonium sulfate manufacture (REINHARD) 21.

Brit., 3,625, Feb. 12, 1914. O. G. TRIGG. A cement for preserving Fe or steel consists of a mixt. in the following proportions: chalk 8 oz., colophony resin 2 oz., pumice stone 8 oz., shellac 1 lb., Stockholm tar 1 gal., methylated spirit 1 qt., and graphite 4 oz. The cement may be put on with a brush or trowel.

Brit., 4,435, Feb. 20, 1914. B. C. HINMAN. In purifying liquids, pptg., flocculating, or like reagents are added to a uniform or variable flow of liquid by being dissolved or suspended in a liquid in a vessel from which the mixt. is displaced by progressive diln. with a predetd. increasing proportion of the flowing liquid, the discharge being mixed with the main body of liquid.

Brit., 4,628, Feb. 23, 1914. K. BOMHARD and G. KONIG. The specific gravity of a gas is estimated by detg. the resistance encountered by a body rotating or otherwise moving in it. Cf. C. A. 8, 1892.

Brit., 4,707, Feb. 24, 1914. I. MERRELL. Drying liquid by air in a desiccating chamber, part of the resulting powder remaining in this chamber and part being received in alternate or successive collecting-chambers which, when not collecting, discharge the powder to a receptacle which also receives that from the desiccating chamber, a uniform product being obtained.

Can., 160,736, Feb. 16, 1915. J. W. AYLSWORTH. Forming a hard infusible product by incorporating CH_2O with a fusible phenol resin and heating the mass.

Can., 160,737, Feb. 16, 1915. J. W. AYLSWORTH. The process of forming a hard infusible insoluble final condensation product by incorporating with a fusible phenolic condensation product, which remains fusible after repeated heating at reaction temp., a condensation product of ammonia and formaldehyde or polymer thereof, and heating the mass.

Can., 160,738, Feb. 16, 1915. J. W. AYLSWORTH. A composition of matter comprizing a phenol-methylene condensation product containing $\text{C}_6\text{Cl}_4\text{OH}$.

Can., 160,739, Feb. 16, 1915. J. W. AYLSWORTH. The process of forming a cold-plastic mass capable of being rendered hard, insol. and infusible by heat treatment, consisting in mixing intimately together a powdered, dehydrated, fusible phenol resin, and anhydrous hardening agent containing methylene, and an anhydrous fluid solvent of such nature and quantity as to be absorbed by the mixt. and to impart plasticity. Cf. C. A. 8, 3634.

Can., 160,740, Feb. 16, 1915. J. W. AYLSWORTH. The method of forming an infusible phenolic condensation product, by mixing together an anhydrous fusible phenol resin and an anhydrous solid solvent element, causing formaldehyde gas to penetrate the mass and be absorbed thereby and heating the mass sufficiently to cause a reaction to ensue and the mass to be transformed into an infusible product.

Fr., 466,918, Dec. 8, 1913. J. DE WIERUSZ-KOWALSKI. In a process of effecting chemical reactions by means of ultraviolet rays, the organic compds. to be condensed (e. g., a mixt. of acetone and MeOH) are conducted, as vapors, under reduced pressure, through hollow bodies which are in a high frequency field, in such manner that these vapors themselves act as carriers for the luminescence.

Ger., 279,694, Feb. 16, 1914. ALLGEMEINE ELEKTRIZITÄTS-GES. Production of loose metal bedding by coating the member to be fitted, with varnish, fat, resin, collodium, gum soln., paraffin, or the like, pouring the imbedding metal, and then dissolving out the coating with a solvent such as alc. or benzine.

Ger., 281,303, Aug. 27, 1913. Addition to 267,659 (C. A. 8, 1034). KARPLUS & HERZBERGER. Process of cleaning dyed gloves, stockings, garments, etc., of wool, cotton, silk, linen, and the like, consisting in employing, in addition to H_2O and soap, substances which have fixing properties, such as vegetable tannin, or which restore the color, such as the earth colors.

Ger., 281,454, Oct. 15, 1908. BAKELITE G. M. B. H. Mfg. condensation products from phenols and formaldehyde in the presence of a base acting as a condensation agent. Cf. U. S., 942,809 (C. A. 4, 680).

Ger., 281,488, May 9, 1914. O. FLECK. In producing transfer pictures, the paper is coated first with a layer of gelatin, dried rapidly, coated again, after an hr. with a layer of gelatin, dried again rapidly, and then the design in vat color is applied.

Ger., 281,532, Nov. 6, 1912. Addition to 252,423 (C. A. 7, 540). METALLISATOR G. M. B. H. Process of mfg. coatings of glass, metal, and other fusible materials. Cf. C. A. 8, 1562.

Ital., 123,464; 392-62, Jan. 14, 1913. METALS-EXTRACTION CORPORATION. Depositing salts from their solutions which are kept in motion automatically in an app. heated by means of coke oven gases.

Ital., 130,091; 398-14, Mar. 5, 1913. E. GABBIATI. Concentrating superphosphates by removing the lighter constituents of the mixt. with the aid of a current of air. A suitable app. is specified.

Ital., 130,394; 398-146, Mar. 13, 1913. OELVERWERTUNG G. M. B. H. Process of mfg. catalytic bodies, for use in effecting reactions in liquids and gases, consisting in thermolyzing a compd. of a metallic nitrate and a sol. organic compd. such as sugar. The resulting voluminous product, of low d., can be reduced by H at 200-300°, a finely divided and highly active metal powder being obtained.

Ital., 130,892; 399-143, Mar. 27, 1913. F. TASSARO. Process of calcining dolomite, with the use of any combustible material, increasing the heat if necessary to effect scorification.

19. GLASS AND CERAMICS.

G. E. BARTON, A. V. BLEININGER.

Report of the glass research committee of the Institute of Chemistry. *J. Soc. Chem. Ind.* 34, 424-5 (1915); *Analyst* 40, 263-6 (1915).—The following formulas are suggested as the result of some 400 expts. Soft glasses suitable for ordinary chem. lab. ware: (1) SiO_2 67.0, Na_2CO_3 34.2, $CaCO_3$ 11.6, Al_2O_3 6.5 parts; (2) SiO_2 67.0, Na_2CO_3 29.0, $CaCO_3$ 9.6, CaF_2 1.6, Al_2O_3 8.3, B_2O_3 2.0 pts. A resistant glass suitable for pharmaceutical purposes, etc.: (3) SiO_2 67.0, Al_2O_3 10.0, $CaCO_3$ 12.5, MgO 0.5,

KNO₃ 1.0, Na₂CO₃ 17.0, B₂O₃ 8.0 pts. Combustion tubing: (4) SiO₂ 68.2, Al₂O₃ 6.2, BaCO₃ 8.8, CaCO₃ 13.0, KNO₃ 4.3, Na₂CO₃ 5.5, B₂O₃ 5.5, CaF₂ 1.0 pts.; (5) SiO₂ 68.2, Al₂O₃ 6.2, BaCO₃ 8.8, CaCO₃ 14.2, KNO₃ 4.3, Na₂CO₃ 5.5, B₂O₃ 5.5 pts. Miners' lamp glasses: (6) SiO₂ 65.0, Al₂O₃ 1.0, CaCO₃ 0.6, As₂O₃ 2.0, Sb₂O₃ 1.0, KNO₃ 3.0, Na₂CO₃ 14.0, B₂O₃ 24.0 pts.; (7) SiO₂ 65.0, Al₂O₃ 1.0, CaCO₃ 0.6, As₂O₃ 2.0, Sb₂O₃ 1.0, KNO₃ 3.0, Na₂B₄O₇ 26.68, B₂O₃ 5.5 pts. Resistance glass: (8) SiO₂ 65.5, Al₂O₃ 2.5, MgO 5.0, ZnO 8.0, Na₂CO₃ 10.2, Na₂B₄O₇ 13.0 pts. Combustion tubing: (9) SiO₂ 72.0, Al₂O₃ 10.0, CaCO₃ 11.0, MgO 0.5, KNO₃ 3.0, Na₂CO₃ 11.2, B₂O₃ 7.2 pts. Soft soda glasses: (10) SiO₂ 68.0, Al₂O₃ 4.0, CaCO₃ 12.8, KNO₃ 14.5, Na₂CO₃ 26.0 pts.; (11) SiO₂ 68.0, Al₂O₃ 4.0, CaCO₃ 12.8, K₂CO₃ 10.0, Na₂CO₃ 26.0 pts. G. E. BARTON.

Notes on glass. ANON. *J. Soc. Chem. Ind.* 34, 210-2(1915).—The results of various tests made by the National Physical Lab. on German glasses are given including Jena 59", Jena 16", Schott und Gen., Jena Original and "New," Resistance "R," Kavalier's Bohemian, Thuringen, Jena incandescence gas, Miners' lamp A 1 B, Miners' French lamp (2 samples), Austrian lamp "Sun Brand." The general conclusion is reached that most if not all of the special properties formerly attributed to the use of layers of different comps. are the result of special heat treatments of the various objects at the time they are blown. G. E. BARTON.

The composition of some types of chemical glassware. F. W. BRANSON. *J. Soc. Chem. Ind.* 34, 471-2(1915); cf. 2 preceding abstrs.—Demands in England for chem. glassware, especially beakers and flasks and miners' lamp glasses, have been urgent, especially for the Ordinance Works. The Brit. Lab. Ware Assoc., Ltd., has adopted for this work a zinc boro-silicate. Tests of the glass in use have been satisfactory. The following table shows new analyses. In the 2nd column is given a hard Na glass now being used in place of the Kavalier K Na glass, given in the 1st column.

	Kavalier.	Hard Na glass.	Jena combustion tube.	Kavalier combustion tube.	Jena miners' lamp glass.
SiO ₂	75.96	76.18	66.90	79.57	73.08
Al ₂ O ₃	0.40	2.86	6.38	0.32	1.98
Fe ₂ O ₃	0.08	0.07	0.22	0.038	0.15
CaO	8.48	4.52	7.94	7.80	Tr
MgO	0.14	0.14	0.61	0.11	Tr
K ₂ O	7.48		2.40	11.60	
Na ₂ O	7.34	16.43	1.25	0.66	7.76
CaO			7.27		
B ₂ O ₃			7.22		17.22

The Jena miners' lamp glass batch was found pasty even at high temps. and difficult to work satisfactorily; changes had to be made. C. H. KERR.

The use of barium compounds in glass. ALEXANDER SILVERMAN. *J. Soc. Chem. Ind.* 34, 399-402(1915).—This article gives a brief historical survey of the subject and quotations from letters received in reply to a circular letter of S. The conclusion is that while at present Ba compds. are used to only a limited extent a much wider use could to advantage be made of them if the price could be reduced. J. E. B.

The causes of the opalescence of glass. JUDSON G. SMULL. *J. Soc. Chem. Ind.* 34, 402-5(1915).—It is concluded that opacity in glass is due (1) to the sepn. of either silica or alumina or both in a very finely divided, probably colloidal, form in the glass; (2) the most suitable condition for this sepn. is a glass of low m. p., that is, one containing lead, where the silica and alumina will remain suspended for some time before going into soln.; (3) the sepn. of silica and alumina is effected by (a) the use of silicates, such

as feldspar, in conjunction with a fluoride; (b) by a double fluoride, such as cryolite with or without feldspar; (c) by silicofluorides, with or without feldspar; (d) by a fusion of the major ingredients of a glass, with the addition afterwards of a fluoride and other desired substances to the fused portion.

G. E. BARTON.

The use of nitrates in the glass industry during the war. R. *Sprechtsaal* 48, 41-2(1915).—The conclusion is reached that in the case of all except lead glasses the use of nitrates is not absolutely essential. In the lead glasses more expensive substitutes are recommended, particularly $\text{Na}_2\text{BO}_3 \cdot 4\text{H}_2\text{O}$.

G. E. BARTON.

Decorating glass with iridescent coatings. RAPHAEL ED. LIESEGANG. *Sprechtsaal* 48, 2-3(1915).—Artificial pearls may be made by utilizing the iridescence obtained from the diffusion of Na_2PO_4 , $\text{Ca}(\text{NO}_3)_2$ or Ag_2CrO_4 soln. in gelatin in place of the common soln. of fish scales. The glass is coated with 10% gelatin soln., allowed to dry partially and then a small amt. of Na_2PO_4 , $\text{Ca}(\text{NO}_3)_2$ or Ag_2CrO_4 added. The coating must be slowly dried. The iridescence seems to be an optical phenomenon caused by the formation of extremely fine parallel wrinkles on the gelatin. J. B. P.

Antimony oxide as a decolorant and refining agent for glass. L. SPRINGER. *Sprechtsaal* 40, 97-8, 106-7(1915).—S. gives a review of the opinions *pro* and *con* concerning the use of Sb_2O_3 for the above purposes. His conclusion is that it is of no value as a refining agent and is not a decolorant for leadless glass. It imparts a yellow tint to lead glasses due to formation of lead antimonate.

C. S. K.

Glass shades for incandescent gas lighting. ANON. *Pott. Gaz.* 40, 200-1(1915).—The glass described is intended to give to gas light an appearance of daylight. It is known as a lead-potash glass. The greatest difficulty encountered is in making it of the desired thickness, 5% variation in thickness changing the daylight value considerably. The spectrum of the light passing through this glass is practically ideal.

C. S. K.

Mosaic glazing and the electric current. FRIEDRICH HUTH. *Diamant* 37, 225-6, 245, 265-6, 285, 305-6(1915).—Descriptive of the electrolytic methods of setting and binding together mosaics and stained glasses.

J. B. PATCH.

The introduction of the batch in pot furnaces. KA. L. *Glasind.* 26, No. 7-8, 9 illus.(1915).—Polemic. Cf. C. A. 9, 700.

J. B. PATCH.

The influence of white-ware-glaze-composition upon the development of under-glaze-colors. KARL JACOBS. *Sprechtsaal* 48, 98-100, 107-9(1915).—The under-glaze colors studied were Victoria green and chrome-tin pink. The 40 glazes studied are represented by the typical formula: 0.40 PbO , 0.40 CaO , 0.15 K_2O , 0.05 BaO , 0.25 Al_2O_3 , 0.20 B_2O_3 , 2.60 SiO_2 . The work showed that: (1) Victoria green is much more sensitive to the over-glaze compn. than the chrome-tin stain. (2) An over-glaze should contain no BaO . (3) B_2O_3 enhances the destructive action of BaO on colors. It should not exceed 0.10 equiv. if the CaO is below 0.40. If the equiv. of the latter exceeds this figure the B_2O_3 may be as high as 0.20 equiv. (4) A high CaO content (at least 0.40) is favorable to under-glaze colors.

C. S. K.

Kaolin. WILSON W. HUGHES. *Mining Sci. Press* 110, 947-50(1915).—Sixty % of the kaolin used in U. S. is imported. N. C. kaolin was exported to England before English deposits were developed. Analyses of Chinese, English, French and American kaolins are given. The usual washing process is described in detail.

C. H. KERR.

Chemical facts regarding some Tertiary and pre-Tertiary clays. H. MÜLLER. *Sprechtsaal* 48, 9-10, 17-19, 25-7, 76-7, 85-7(1915).—M. describes results of work done on a number of clays. The compn. of the different types of clay substance has been

detd. M. refers to 2 kinds of clay substance: that sol. in HCl, or the allophanes, and that sol. in H_2SO_4 or the feldspathic material. Many tables of analyses are given.

C. S. K.

Further notes on the refractory properties of zirconia. H. C. MEYER. *Met. Chem. Eng.* 13, 263-6(1915).—An av. sample of natural zirconia shows the following analysis: ZrO_2 84.1, SiO_2 7.74, Fe_2O_3 3.10, TiO_2 1.21, Al_2O_3 0.66, loss on ignition 2.72%. Bonded with 5% Warrior Ridge fire clay, this ore stands cone 32 easily. The material alone shows a linear shrinkage of 9% when fired to 2600° F. It is claimed that the natural zirconia develops very fair plasticity upon wet grinding. A mixt. of 93% zirconia (95% pure) and 7% Dry Branch kaolin had a firing linear shrinkage of 12% at 2600° F. The work of selecting a suitable binder is described, sorrel cement, phosphoric acid and sodium silicate being tried. Ultimately, water-ground zirconia was found to be the most satisfactory. A fire clay bond lowers the m. ps. too far to be entirely satisfactory. Zirconia has a considerably lower thermal cond. than magnesite and quite probably the lowest of any available material that will stand 1800° C. At this temp., zirconia bonded with clay softens to quite an extent. A brick made from this mixt. can nevertheless be considered among the 6 highest refractories.

C. S. K.

Refractories of the Rocky Mountain region, and some of their products. J. C. BAILAR. *Met. Chem. Eng.* 13, 257-8(1915).—A most superior fire clay deposit marks the eastern boundary of the Rocky Mts. in Colo. It is accompanied by large bodies of shale and plastic clay suitable for building brick, terracotta, roofing tile, etc. Mention is made of the manuf. of porcelain cooking utensils and chem. porcelain. The manuf. of enameled brick is described; this is featured by the enamel being applied to the clay bar as it issues from the machine, and by the brick being fired but once. This article does not deal with refractories.

C. S. K.

Examination of fire bricks. J. S. BECKETT. *Met. Chem. Eng.* 13, 136(1915).—B., commenting on Patterson's article (cf. *C. A.* 9, 959), suggests a procedure for detg. SiO_2 , the method being modelled largely after the one described by W. F. Hillebrand in *Bull.* 422, U. S. G. S. The method takes care, almost automatically, of the impurity of either the SiO_2 or Al_2O_3 ppt. and insures the presence of all the TiO_2 in the H_2SO_4 soln., whether or not any of it has been carried down previously with the SiO_2 .

C. S. K.

Utilization of blast furnace slag. ANON. *Iron Coal Trades Rev.* 90, 301(1915).—Results of tests of bricks made from mixts. of granulated blast furnace slag and $Ca(OH)_2$, dried in the open air or steamed under pressure. In quality they are equal to good clay or shale bricks.

H. L. OLIN.

Electrical precipitation (CREIGHTON) 4.

20. CEMENT AND OTHER BUILDING MATERIALS.

C. N. WILEY.

Petrographic study of portland cement. R. J. COLONY. *School Mines Quarterly* 36, 1-21(1914).—A study of thin sections of hydrated cement. The hydration products are an amorphous constituent which may exhibit incipient or partial recrystn. and cryst. $Ca(OH)_2$ (cf. Klein and Phillips, *C. A.* 8, 3848). The texture of the cement matrix should be exceedingly fine and carbonization should not exist to any great extent. Alit is an hydratable constituent while the occurrence in the cement matrix

of fragments of residual clinker of belit comp. in conjunction with fully developed amorphous constituent seems to be indicative of properly burned cement. A. A. K.

The constituents of portland cement clinker. G. A. RANKIN. *Geophys. Lab., J. Ind. Eng. Chem.* 7, 466-74(1915); *Concrete-Cement Age* 6, C. M. S. 55-63(1915).—R. gives a review of the data obtained in the study of the ternary system $\text{CaO-SiO}_2\text{-Al}_2\text{O}_3$, as it relates to the constitution of portland cement. Well burned clinker made up of pure oxides will consist largely of $3 \text{ CaO} \cdot \text{SiO}_2$, $2 \text{ CaO} \cdot \text{SiO}_2$, and $3 \text{ CaO} \cdot \text{Al}_2\text{O}_3$ with small quantities of CaO and $5 \text{ CaO} \cdot 3 \text{ Al}_2\text{O}_3$. Both white and gray cement clinker is composed largely of the above compds. These do not form solid solns. but have definite optical constants. MgO and alkalies are apparently taken up in solid soln. by $3 \text{ CaO} \cdot \text{Al}_2\text{O}_3$ and $2 \text{ CaO} \cdot \text{SiO}_2$ (cf. Bates, *C. A.* 7, 690, 1406; Klein and Phillips, *C. A.* 6, 3172). The % of MgO and alkali is so low that the identity of these compds. is not obscured. The minor constituents do, however, play an important role in making possible the formation of a flux at low temp., thus assisting the combination of CaO with Al_2O_3 and SiO_2 and may be considered as catalyzers. Pure cement requires a temp. of 1650° for burning; a white cement (2.4% MgO , Fe_2O_3 , etc.) requires 1525° and a gray cement (with about 6.7% minor constituents) requires 1425° for producing a clinker giving sound cement. That most commercial clinker approaches a condition of equil. is shown by the fact that at most only small amts. of CaO and $5 \text{ CaO} \cdot 3 \text{ Al}_2\text{O}_3$ are noted. Hydration of cement constituents is already being investigated (cf. Klein and Phillips, *C. A.* 8, 3848) and should lead to the detn. of the compds. which on setting give the most desirable qualities. A. A. KLEIN.

Chemical similarities of hydraulic cements. G. B. UPTON. *Sibley J. Eng.* 29, 220-2(1915).—A portland-, an Fe ore- and a natural cement are reduced to $\text{CaO} \cdot \text{Al}_2\text{O}_3$ and SiO_2 with the assumption that Fe replaces Al and MgO replaces CaO . It is presumed that these cements if completely burned would have $\frac{1}{3}$ CaO as $3 \text{ CaO} \cdot \text{Al}_2\text{O}_3$ and $\frac{2}{3}$ as Ca silicates. Natural cements have no $3 \text{ CaO} \cdot \text{SiO}_2$ while portlands have $\frac{1}{3}$ tricalcium silicates and $\frac{1}{2}$ dicalcium silicates. It is suggested that the CaO be lowered in cements until only $2 \text{ CaO} \cdot \text{SiO}_2$ and $3 \text{ CaO} \cdot \text{Al}_2\text{O}_3$ are present in order to form material more like natural cement. A. J. PHILLIPS.

British portland cement making machinery. ANON. *Engineer* 119, 552-4(1915).—An engineering description. A. A. KLEIN.

Effect of proportions on density and strength of gravel concrete. R. W. CRUM. *Eng. Contrg.* 43, 314-15(1915).—Progress report on density and strength determinations of concrete from sieve analyses, the method of voids being considered useless. A few tests are given. A. J. PHILLIPS.

Effect of the duration of mixing on the strength of concrete. H. H. SCOFIELD. *Eng. Contrg.* 43, 78-9(1915).—Seven series of compressive test specimens of 1:2:4 stone and sand and 1:5 gravel mixes were made. The results showed that max. strength and max. modulus of elasticity are obtained when materials are mixed 10-18 min. There was little difference whether mixed 0.5 min. or 2-3 min. but by increasing to 8-10 min. a marked increase obtains. A. J. PHILLIPS.

Effects of alkali on concrete drain tile. C. E. SIMS AND G. P. DIECKMAN. *Concrete-Cement Age* 6, 278-80(1915).—The tile consisted of 1:4 mix, cured 3 days. They cracked longitudinally and were coated in the interior with a lime-like deposit which consisted mainly of CaSO_4 and MgSO_4 . Disintegration is due to the crystn. of these salts and its accompanying expansion. Repeated wettings and dryings concentrate the salts in the concrete and accelerate the disintegration. A. A. KLEIN.

Effect of fineness of sand clay and loam on the strength of mortar. F. L. ROMAN. *Eng. Contrg.* 43, 403-6(1915).—In well graded sand the presence of fine material passing

a 50-mesh sieve causes a decrease in the strength of 1:3 mortars; in badly graded sand a small % of the same fine material causes a slight increase in strength which with larger amts. falls off again. Small amts. of clay in the sand cause a slight increase. This effect is assumed to be due to the filling of the voids by the extremely fine particles of clay carried in suspension by the mixing H_2O . The tests were made on dry mortars and do not hold true for wet mortars. Organic loam in the sand even in small amts. causes a decrease in strength; 1.5% in 1:3 tensile tests caused 15-20% decrease. Curves for 1:3 mortars are shown.

A. J. PHILLIPS.

Specification and selection of asphaltic materials for street pavement. F. O. X. McLAUGHLIN. *School Mines Quart.* 36, 30-9(1915).—The author suggests a possible solution to the problem that has arisen with the elimination of the long-term guaranty clause in specifications.

A. A. KLEIN.

Specification for a coal-tar creosote solution. P. C. REILLY. *Proc. Am. Wood Preservers' Assoc.* 1915, 158-68; cf. *C. A.* 9, 703, 854.—R. considers the adulteration of creosote oil with tar as unwise and gives his reason for thinking so.

C. A. N.

Relative resistance of various conifers to injection with creosote. C. H. TRESDALE. U. S. Dept. Agr., *Bull.* 101, 43 pp.(1914).—Cf. *C. A.* 8, 2933, 3623.

A. A. KLEIN.

Leaching of zinc salts and effects of improper drainage. F. J. ANGIER. *Proc. Am. Wood Preservers' Assoc.* 1915, 75-80.—A series of tests were made to det. the rate with which $ZnCl_2$ leaches from timber treated with the Burnettizing process. Lodgepole pine and Douglas fir ties were used. Some of the ties were seasoned 6 months after treatment and before the test for leaching was begun, and others were freshly treated and were full of the water soln. To det. the amt. of $ZnCl_2$ leached out, each tie was placed in a pan filled with water and left 24 hrs., after which it was taken out and allowed to dry 6 days. This process was repeated continuously for many months. After each soaking a measured quantity of the water was taken out from the pan and the $ZnCl_2$ detd. A study of the results shows that in carrying out a leaching test in this way less than 30% of the $ZnCl_2$ can be gotten out of the wood in nearly a year's time and that the largest part (approx. 18%) is leached out in the first 70 days. With the freshly treated ties the leaching was much more rapid, almost the entire loss being within 70 days.

C. A. NOWAK.

Treated timber for factory construction. F. J. HOXIE. *Proc. Am. Wood Preservers' Assoc.* 1915, 215-33.—The value of the mill timbers which rot each year is a sufficiently large sum to make preservative treatments well worth while. From the limited information thus far available the corrosive sublimate process appears to be best adapted to the general requirement of mill timber. F compds. have given good results in lab. expts. but no practical experience with them is available. With the few woods available for mill construction and the few fungi that commonly destroy them, it is probable that a reasonably cheap and convenient process, such as the use of corrosive sublimate in an open tank, will satisfy all requirements if applied soon enough. Probably a light treatment at the saw-mill and another after being cut to final shape and ready to be put in place in the mill frame will be found serviceable.

C. A. NOWAK.

Strength and quality of zinc chloride per tie or per cubic foot of timber. W. F. GOLTRA. *Proc. Am. Wood Preservers' Assoc.* 1915, 60-3.—It has been demonstrated that the absorption of individual ties, in the same charge, varies greatly, depending upon species and character of wood, degree of dryness, size of tie, etc. Some ties will absorb as little as 0.30 lb. salt, while others will absorb as much as 2.70 lbs. per tie. In the heavier solns. (30-60%) the influence of the temp. is small so that no account need be made of it in detg. strength by means of the hydrometer, but with solns. highly

dild. it is necessary to define the effect of temp. very carefully. For the treatment of railroad ties of all kinds with ZnCl_2 , either singly or in combination with creosote oil, G. recommends that the soln. have a strength of 3.5°Bé. at a temp. of 70°F. (equiv. to 3%). Ties of all kinds and sizes should be treated "to refusal." C. A. NOWAK.

Steaming ties. J. B. CARD. *Proc. Am. Wood Preservers' Assoc.* 1915, 103-10. —Repeated attempts were made to find a way in which green ties could be properly treated by first steaming for various lengths of time and then applying a vacuum to reduce the moisture content. C. succeeded in injecting only about $\frac{1}{2}$ the amt. of soln. into steamed green ties that he did in seasoned ties. Tests were carried out on a large number of ties from different species of wood, green and seasoned; the soln. absorbed is stated in lbs. per cu. ft. and gain in % are given in each case. It is possible that green ties, if given a prolonged steam and vacuum treatment, with the heating coils in operation, could be made to take a requisite amt. of soln. but the cost would be higher than air-seasoning and the strength of the wood injured. C. A. NOWAK.

Additional facts on treated ties. J. H. WATERMAN. *Proc. Am. Wood Preservers' Assoc.* 1915, 297-14. —W. gives his observation on railroad ties treated with: (a) full cell creosote, (b) empty cell creosote, (c) ZnCl_2 (Burnettizing process), (d) emulsion, creosote and Zn. Ties treated with (a) receive the best treatment which is known today, and if protected from mechanical wear will last 25 or more years. (b) Very little is known about this process. Most of the ties subjected to this process showed evidence of very poor treatment. (c) Ties treated with ZnCl_2 gave 11 to 12 yrs. av. life in the district around Newton, Kan. (d) 75% of red oak ties on the C. & E. I. treated with the Well-house process (Zn, glue and tannin) gave 14 yrs. of service. Ties treated with an emulsion of creosote and Zn (Card process) appear to be very satisfactory. W. agrees with Schrenk that from a practical standpoint no treatment can be considered which costs more than 25 to 30 cents. This would mean either a cheap creosote treatment, using small amts. of oil with as good penetration as can be obtained, or a Zn-creosote combination, both of which would cost 20 cents or thereabouts. C. A. NOWAK.

Treatment of red oak ties. J. H. WATERMAN, *et al.* *Proc. Am. Wood Preservers' Assoc.* 1915, 110-22. —The Committee on Miscellaneous Subjects has been considering the treatment of red oak ties during the past year. It sent out a list of questions to all members. The following conclusions were arrived at from the replies: (1) Red oak ties can be treated satisfactorily when air-seasoned for 10 months, if the summer months are included. (2) Red oak ties may also be treated satisfactorily when air-seasoned for 6 months, provided artificial seasoning is employed as an adjunct. (3) For practical reasons the period of seasoning should be the governing factor in detg. whether or not red oak ties are ripe for treatment. (a) However, if the boring test is used, the core withdrawn with an increment borer should appear dry for a depth of 2 inches. (b) If the wt. method is used the wt. per cu. ft. should not exceed 52 lbs. (c) If moisture detn. is resorted to, a test should indicate not over 22% of moisture in the ties. (4) Artificial seasoning of red oak ties apparently has not been sufficiently developed to justify a conclusion from the replies. The committee does not agree with some of the conclusions from the replies. The conclusions of the committee are: (1) Red oak ties should be air-seasoned for at least one year before an attempt is made to treat them. (2) It is practically impossible to season a red oak tie so as to render it dry throughout. (3) Same as "3" above. (4) Artificial seasoning of red oak ties fails to give the desired result. (5) Penetration of the heart wood of red oak ties can be secured with practically the same success as in the sap wood. (6) The use of an increment borer in detg. the penetration of an antiseptic treatment in red oak ties fails to give conclusive results. A tie showing insufficient penetration when inspecting the core, which is withdrawn by an increment borer, will in the majority of cases show satisfac-

tory penetration when the tie is sawed and then split. (7) Red oak ties may be treated satisfactorily with any standard process. C. A. NOWAK.

Bleeding and swelling wood block pavements. L. E. HESS. *Proc. Am. Wood Preservers' Assoc.* 1915, 397-401.—H. is of the opinion that correction of swelling and of bleeding can be secured by the use of a stable preservative oil, one that is scientifically suited to the purpose of wood block paving. Such an oil should not be subject to chem. change, should be non-volatile and should penetrate and permanently adhere to the fibres of the wood. If such an oil is used and proper treatment is given the blocks, the fibers are permanently waterproofed and swelling will not occur; because of its penetrative and adhesive character, and its low coefficient of expansion, such an oil will not exude by capillary attraction or by expansion from heat. C. A. NOWAK.

Bleeding and swelling of paving blocks. E. R. DUTTON. *Proc. Am. Wood Preservers' Assoc.* 1915, 401-5.—A discussion of a paper by Teesdale (cf. C. A. 9, 240). The principal cause of the bleeding lies in the treatment of the blocks, and if carried on properly the bleeding would be reduced to a minimum or removed almost entirely, provided no excess of oil was used in the treatment. There does not seem to be anything gained in the use of a distillate creosote oil. C. A. NOWAK.

The density of wood substance and porosity of wood. F. DUNLAP. *J. Agr. Res.* 3, 423-8(1914).—Density detns. were made with longleaf pine, Douglas fir, Pacific yew, mockernut hickory, beech, red oak and sugar maple. The results show that for practical purpose the d. of the wood substance of different species of trees may be considered as uniform, with a value of 1.54. The apparent d. of most com. woods varies from 0.3 to 0.6; it is apparent, therefore, that from 0.8 to 0.4 of the total vol. of the wood consists of empty cell space. E. J. C.

Brit., 4,349, Feb. 19, 1914. R. HOUBEN. Concrete, after being mixed with H₂O in the usual way, is mixed with an elastic powdered absorbent material, such as cork, sawdust, leather, or cotton, which has been impregnated with a liquid, such as a heated mixt. of tar and bitumen, which renders it impermeable. In an example, a mixt. of 400-500 parts of cement, 600 of sand, 1200 of broken stones, and H₂O is mixed with 80-100 parts of a mixt. consisting of 6 parts of sawdust and 5 of a mixt. of 10 parts of bitumen and 100 of tar. The product is used for covering large surfaces such as roads.

Brit., 4,805, Feb. 24, 1914. A. ABRAHAM. In the process, described in 10,478, 1912 (C. A. 7, 3636), of waterproofing soil or rock by the injection of 2 substances which form in the pores an insol. ppt. of large sp. vol. a neutral liquid, preferably H₂O, is injected between the injections of the 2 chemicals.

Can., 160,501, Feb. 9, 1915. S. DAVIDSON. Drying artificial stone or wet molds by filtering the moisture into the molding sand and extracting the moisture from the molding sand through a filter by mechanical means.

Fr., 467,926, Jan. 24, 1914. COMP. FRANÇ. D'INJECTION. Process of hardening and preserving wood intended especially for wood-plaster, consisting in impregnating or incorporating under pressure a naphthalene (70-80%) melted above 90°, with the addition of creosote, tar, schist-oil, and the like.

Ger., 281,866, July 29, 1913. E. TRAEGER. Mfg. decorated wall-, floor-, or roof coverings from linoleum-like masses.

21. FUELS, GAS, TAR AND COKE.

J. D. PENNOCK.

Yield of nitrogen in coal. OSKAR SIMMERBACH. *Colliery Guardian* 109, 1020 (1915).—The temp. of formation of NH₃ varies with different coals from 800 to 900°.

Decompn. of NH_3 during gasification begins at 800° and increases with rising temp. The quantity of $(\text{CN})_2$ formed amounts to 1.5% of total N and to 5% of the NH_3 . H_2O lowers the $(\text{CN})_2$ yield and raises that of NH_3 , while high gas velocity favors the formation of $(\text{CN})_2$. The size of the grain of coal has no effect upon the NH_3 yield.

H. L. OLIN.

Fuel supply contracts and progress of scientific methods of purchase and control in America and Europe. J. B. C. KERSHAW. *Met. Chem. Eng.* 13, 393-6(1915).—The article gives the methods in use in Germany, Switzerland, the United Kingdom and America for sampling and testing fuels in transit, or when discharged at the consumers' works. Some samples are given of forms of contracts in which the price paid for the fuel is made dependent either on the calorific value or upon the % of ash.

C. A. COLE.

Coal fields and coal resources of Canada. D. B. DOWLING. Canada Dept. Mines, *Memoir* 59, 157 pp. (1915).—Estimates show that the British Empire possesses nearly one-quarter of the world's reserve supply of coal. An estimate of the amt. of available coal shows 1230 billion metric tons distributed through the various provinces of Canada. The location and descriptions of the coal fields in the different districts are given. The detn. of the moisture, the proximate and ultimate analyses of the dry coals and the calorific value (B. t. u.) are included.

R. L. SIBLEY.

Coal mining in Mexico. E. O. F. BROWN. *Iron Coal Trades Rev.* 90, 525-8 (1915).—The coal production of Mexico is practically limited to mines in Coahuila, within 100 miles of the U. S. border. It is estd. that 1,850,000 metric tons were produced in 1911. Representative analyses show that ash varies from 20 to 28%, volatile matter from 20 to 23%, and fixed C from 50 to 60%. The S content ranges from 1 to 2%. At Lampacitos a battery of 36 Koppers ovens has been installed to coke the washed fines which constitute 40% of the gross output; the product is of poor quality.

H. L. OLIN.

Fohr-Kleinschmidt briquetting process. T. DACH. *Colliery Guardian* 109, 310(1915).—Pitch in an unbroken condition is heated by a steam coil to 100° and run into a melting pan proper where it is heated to 130 – 170° by direct flame. It is next led to a steam-heated atomizer where it is blown in a spray to the mixing drum. The coal-pitch mixt. is kneaded, heated and pressed.

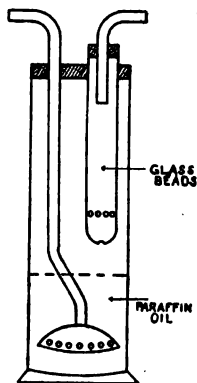
H. L. OLIN.

A problem of the modern city. W. F. M. GOSS. *Proc. Eng. Soc. Western Penn.* 31, 229-37(1915).—A general discussion of the problem of smoke abatement.

H. L. OLIN.

The determination of benzole in gas. A. KRIGER. *J. Gasbel.* 58, 61-4(1915).

—The method is suitable for the analysis of purified coke oven gas containing as little as 2 g. benzole per l. By "benzole" is meant the mixt. of benzene and its homologs as contained in the gas. The gas is led through the absorption vessel at the rate of 40 l. per hr. Two absorption vessels are used with 50 cc. of paraffin oil in each. The oil is not allowed to take up over 0.8 g. benzole in 50 cc. This is equiv. to a factor of safety of 4. The vessels must be cooled to -18 to -20° ; also care must be taken that they are filled with gas before the first weighing, and that air does not diffuse in after the absorption while the vessels are warming for the second weighing. Weighings need only be made to 0.01 g., and the detn. may be made by untrained assistants. The essential point in the absorption vessel is the tube filled with glass beads. Even with very tall Drehschmidt bottles and a very slow current of gas, several bottles were necessary to



prevent loss from oil spray. With the app. illustrated, only a trace is caught in the second bottle and none in the third.

W. L. BADGER.

The recovery and fractionation of benzole from coal gas. W. DIAMOND. *Iron Coal Trades Rev.* 90, 638-9(1915).—The amt. of crude benzole in coke oven gas varies from 2 to 3 gal. per ton of coal. It consists of C_6H_6 and its homologs, toluene, xylene, naphthalene, CS_2 , etc., in varying proportions. After the removal of NH_3 the gas goes through the benzole scrubbers where it is washed with coal-tar creosote oil, dils. 1.04, which absorbs benzole readily. The wash oil goes to the distillery where benzole is sepd. in continuous stills consisting of preheater, heater, still and condenser. The product is further purified by washing with H_2SO_4 and NaOH, and fractionation.

H. L. OLIN.

The distribution of heat in the cylinder of a gas engine. A. H. GIBSON AND W. J. WALKER. *Iron Coal Trades Rev.* 90, 713-4(1915).—Expts. made at University College, Dundee, on a gas engine with a cylinder diam. of 11 in. and a stroke of 19 in. gave the following results: Mechanical efficiency (1) increases with increasing loads; (2) diminishes as the ratio of air to gas increases; (3) diminishes as the speed increases; (4) is sensibly independent of the compression ratio. The max. efficiency obtained with a 7 : 1 mixt. and a speed of 150 r. p. m. was 88%. At the normal speed of 200 r. p. m. with the same mixt. it was 85%. The thermal efficiency as measured on the i. h. p. (1) increases with the load; (2) attains a max. with an air to gas mixt. of 10 : 1; (3) increases slightly as the speed increases; (4) increases as the compression ratio increases. At a speed of 200 r. p. m. with a compression ratio of 5.70, the efficiency was 35.3%. The thermal efficiency on b. h. p. (1) increases with the load; (2) attains a max. with an air to gas ratio of 8 : 1; (3) diminishes as speed increases; (4) increases with the compression ratio. At a speed of 200 r. p. m. and a compression ratio of 5.70, the efficiency was 28.6%. The ratio of the actual thermal efficiency measured on the i. h. p. to the corresponding air-cycle efficiency (1) increases with the load; (2) has a max. value when the ratio of air to gas is 10 : 1; (3) increases slightly with the speed; (4) is sensibly independent of the compression ratio. At a speed of 200 r. p. m. the efficiency ratio is 0.700. The % exhaust losses (1) diminish as the load increases; (2) diminish slightly as the ratio of gas to air increases; (3) increase as the speed increases; (4) diminish as the compression ratio increases. At full load the exhaust losses lay between 33.6% and 42.5%. The % heat lost by water-cooling of cylinder jackets (1) increases with the load; (2) diminishes as the ratio of air to gas increases; (3) diminishes as the speed increases; (4) and is sensibly independent of the compression ratio. A 6% increase in the temp. of the gases increases the amt. of heat lost by conduction and radiation (15%). The radiation loss (1) diminishes as the load increases; (2) increases as the ratio of air to gas increases; (3) diminishes as the speed increases; (4) increases slightly as the compression ratio increases. The % heat entering the exhaust valve jacket ranges from 8% to 12.5%, being greatest at low loads, low speeds, and with low compression ratios and rich mixts.

H. L. OLIN.

Second report of the joint committee in ventilation research. Institution of Gas Engineers and University of Leeds. ARTHUR SMITHELLS, et al. *J. Gas Lighting* 130, 573-579(1915).—These expts. were undertaken primarily to investigate the various influences affecting the flow of gases about burners where the main motive power is the heat of combustion of the gas, and to det. or confirm the laws of flow. The app. allowed for the burning of the gas under a flue in a chamber where conditions could be adjusted and factors measured with convenience and accuracy. On comparing a ring burner with a bunsen burner under similar conditions of gas consumption and of position with respect to the flues, it was found that the ring burner produced the greater

pressure-head. Whenever a burner is used in conjunction with a flue for ventilating purposes, there is a position at which the burner should be placed relative to the flue in order that (1) the products of combustion can pass directly into the flue, and (2) the max. use of the heat in the products of combustion can be made. Figures show only 2% difference between good inverted incandescent burners and upright ones. Providing no heat is lost from the ventilating system, the vol. of gases moving up a flue may be represented by the equation $V = vK/Ts$, where V = vol. at 0° and 760 mm. pressure, T = temp., K = calorific value of gas in kg. centigrade units per cu. ft. at 0° and 760 mm. pressure, s = mean sp. heat of products between 0° and T° in kg. centigrade units per degree per cu. ft. at 0° and 760 mm. pressure, and v = vol. in cu. ft. of gas burnt. In the specially constructed exptl. room, well insulated thermally and atmospherically and fitted with gas-fire and flue, by reducing the opening for the inlet of air the temp. increased until a certain small size of opening was reached, after which further reduction in the opening caused a decrease in the temp. within the flue and an accumulation of the products of combustion in the room, due to the failure of the gas-fire to turn all its products up the chimney. Increased ventilation was produced by enlarging the area of inlet, up to a certain low limit. The canopy and flue vent should be wide and simple, to offer as little resistance as possible to the flow of the flue gases. The tests showed that the ventilating capacity of gas fires is increased (with the same consumption of gas) by the provision of auxiliary openings at the back of the fires, care being taken that these openings be smaller than the flue vent lest there be a passing of products from the latter to the former.

B. W. GRIMES.

An important advance in gas producer efficiency. ANON. *Met. Chem. Eng.* 13, 399-400(1915).—The Morgan gas producer is based upon the principle that the best results are obtained by leaving the fuel bed undisturbed provided certain conditions are fulfilled. The coal should be properly spread and the surface properly leveled. The ash is removed without producing an uneven fuel bed and the coal is fed in small quantities regularly and continuously. These functions are performed by continuous mechanical means without hand labor. The mfrs. claim 50% increase in capacity combined with 20% advantage in quality of gas, over any other gas producers.

C. A. COLE.

Inclined retorts. R. B. RICHARDSON. *Chem. Eng.* 21, 238-40(1915); see C. A. 9, 1386.

E. J. C.

Lynn producer-gas and ammonia recovery plant. ANON. *Engineering* 99, 624-6(1915).—In a general way the plant is based upon the Mond producer. It is automatically regulated and capable of using a large range of fuels. By-products can be profitably recovered in units as small as 500 h. p. The large bulky towers of the Mond system have been replaced by a novel system of vertical washers in which the gas is washed chiefly by its own momentum. The water seal in the grate allows the ashes to be removed without interfering with the working of the producer. The operation is automatically or manually performed. From the superheater the air and steam mixt. may pass through the jacket of the producer, through the grate and into the fuel. The saturator and absorber are of special design, consisting of a vertical cylinder chamber containing a series of truncated cones. Also in *Met. Chem. Eng.* 13, 456-8(1915).

C. A. COLE.

Charcoal filter for waste gases from the manufacture of ammonium sulfate. REINHARD. *J. Gasbel.* 58, 64(1915).—The gases are led through 2 vertical filters, each composed of an Fe pipe 14 in. diam. and 13 ft. long, packed with charcoal. The odor is almost entirely removed, so that no nuisance is caused by discharging the gases directly into the air in a crowded business district. About 75 kg. of charcoal are used for each filter, and after 6 weeks a regeneration by igniting the charcoal in a gas retort

restored its original efficiency with a loss of 20%. No direct figures are available for the vol. of gases purified; but during this 6 weeks period, 2500 cu. m. of crude NH_4OH were worked up. W. L. BADGER.

Gas producers with by-product recovery. ARTHUR H. LYNN. *Iron Coal Trades Rev.* 90, 743-5(1915).—A description of various types in use. H. L. OLIN.

The distillation of tar according to Kubierschky's patent. C. H. BOORMANN. *Essen. Chem. Ztg.* 39, 387-8, 422-4(1915).—Four cuts of the app. are shown and general directions for operating given. A statement of results and costs is included. Cf. C. A. 9, 1684. J. H. MOORE.

Chemistry of coke-oven operation. JOHN W. LEE. *Iron Coal Trades Rev.* 90, 334(1915).—An address. Cf. C. A. 9, 1240. H. L. O.

Coke briquets. BEHR. *J. Gasbel.* 58, 110-3(1915).—Coke breeze may be burned under boilers or in gas producers, or used for aggregate for concrete floors and partitions. The first requires special grates and blowers, and results in considerable loss of coke and frequent cleaning of flue-gas canals. The second gives entirely satisfactory thermal efficiency if the right type of producer is used; but local conditions often prevent this use. Cinders are serious competitors of coke for the third use. B. has operated a briquetting plant in connection with a gas plant for 6 yrs. at a good profit. The coke is less than 5 mm. in size and is mixed with 6% of hard pitch. The mixer is heated by steam at 350-400°, so that the pitch melts. The cylindrical briquets are 6 × 6 cm., stand handling while still hot, and find a ready market for domestic heating, especially in furnaces. Five % H_2O in the coke does not affect the quality of the briquets, and they are not harmed by exposure to the weather. They cost \$1.28 per ton to manuf. (allowing \$0.79 for the cost of the coke, which is too high as it cannot now find a market at any price) and sell for \$1.85 per ton. W. L. BADGER.

Heating experiments with gas coke and metallurgical coke in a hot water heating system. ORTO. *J. Gasbel.* 58, 166-9(1915).—The furnace was operated 3 days on each coke, 2 days only being used in the calcs. Weather conditions favored the metallurgical coke slightly; but the av. temp. rise was the same in both cases. The chimney losses were 8.5% with gas coke and 10.2% with metallurgical coke. This was due to the gas coke burning with less excess air because of its open structure. 1730 kg. of gas coke of 23% H_2O and 12800 B. t. u. air-dry, were burned against 1550 kg. of metallurgical coke of 2.5% H_2O and 12750 B. t. u. air-dry. The gas coke had been exposed to rain and snow, which was the reason for its high H_2O . The costs were \$6.30 and \$8.80 per ton, resp. This means a saving of 25% in favor of the gas coke; but if the abnormal H_2O content of the gas coke is considered, the saving becomes 40%. W. L. BADGER.

Determination of the specific gravity of gases (HOFSSÄSS) 1. Origin of coal (JEFFREY) 8. Photometry of vari-colored light sources (PIRANI) 2.

Brit., 3,886, Feb. 14, 1914. B. COCHRANE and R. PREL. A vertical coking-retort, carbonizing chamber, or the like, is provided with an inner cylinder imperforate except at the base, wherein are arranged a number of smaller tubes, which are in communication at the top with a suction main, and at the bottom open into, or are connected by, tubes to the space containing the coal, etc., to be carbonized. The inner cylinder may be partly or wholly filled around the smaller tubes therein with heat-retaining material, such as broken firebrick. The carbonizing chamber is heated by flames from

gas nozzles preferably arranged tangentially to the chamber and at the center and bottom thereof. Gas nozzles may also be arranged for heating the material within the inner cylinder, the upper part of the cylinder being in that case connected to a flue by pipes.

Brit., 3,888, Feb. 14, 1914. M. A. ADAM and WETCARBONIZING, LTD. Electro-osmosis under pressure is employed to assist the further removal of water liberated in peat by a heat-treatment, such as wet-carbonization, and partly removed by filter-pressing or otherwise. Elec. current, at a pressure of about 50 v. and a c. d. of some 50 amps. to the sq. ft., is passed through lukewarm peat in a space the vol. of which is decreased gradually so as to maintain a pressure of, say, 250 lbs. to the sq. in. Preferably, for this purpose, a filter-press is employed, with collapsible chambers in which the H_2O content of the peat is first reduced to, say, 68% under a fluid pressure of some 100 lbs. to the sq. in., whereupon the chambers are squeezed, and current is applied until the H_2O content is reduced to, say, 55%, leaving material fit for use in a gas producer. The peat may have been heated with or without acids or metallic compds., and may be dealt with subsequently according to the methods of 17,610, 1911 (C. A. 7, 411) or 25,146, 1912 (C. A. 8, 1498). Specifications 10,834, 1903, 4684, 1911 (C. A. 6, 2309) and 17,427, 1912 (C. A. 8, 416) are referred to also.

Brit., 3,899, Feb. 14, 1914. B. O. JENKINS. A fuel for internal-combustion engines is obtained by distg. at $80-160^\circ$ a mixt. of EtOH or other volatile alc. with benzole naphtha, or other distillate of coal tar or from coke ovens, and about 1% of camphor.

Brit., 4,120, Feb. 17, 1914. E. L. KNOEDLER. Incandescent mantles are shaped and hardened in 1 operation by directing a hardening flame into a mantle placed in a mold or muffle, which is such that a thin film of hot gases is maintained between the mantle and the mold. The mold is a perforated tube of Pt, ceramic material, or other refractory material, and may be open or closed at its lower end. Cf. C. A. 9, 522.

Brit., 4,242, Feb. 18, 1914. BERLIN ANHALTISCHE MASCHINENBAU AKT.-GES. Gas liquor has a part of its volatile NH_4 compds. driven off in an evapg. vessel at the top of a retort setting, the remainder being driven off by strong heating of the liquor in a second vessel. The liquor from this second vessel passing through a coil gives up its heat to an acid bath into which the volatile NH_4 compds. are passed, and is then conducted into a vat below the grate of the retort furnace. The cold liquor is fed to a jacket surrounding a condenser in which NH_4 compds. from the evapg. vessel collect, and flows into the evapg. vessel from which it passes into a second evaporator heated by a gas burner. The NH_4 compds. from the second evaporator pass by a bent pipe into the acid bath in a saturator from which noxious gases escape by a flue.

Brit., 4,757, Feb. 24, 1914. T. H. PETERS, G. L. and C. P. TUXFORD. A composition fuel consists of a mixt. of 1 cwt. of portland cement, 5 lbs. of ocher, and 5 oz. of $KMnO_4$ with 1 ton of small coal, coke, or peat, the whole being damped and molded.

Brit., 4,829, Feb. 24, 1914. COMPAGNIE FRANÇAISE DU CENTRE ET DU MIDI POUR L'ECLAIRAGE AU GAZ. Illuminating gas. See Ger., 276,634 (C. A. 9, 522).

Ger., 279,950, Aug. 19, 1913. WÄRME-VERWERTUNGS-GES. M. B. H. A double compartment chamber for dry cooling of coke. Cf. C. A. 9, 859.

Ger., 280,811, Aug. 6, 1913. R. GEIPERT. Constructional details of a chamber furnace, wherein the less highly heated portions are reduced in cross-section by means of filling or division plates, with a view to better utilization of the heating gas.

Ger., 280,842, July 16, 1913. DEUTSCHE ÖL-FEUEERUNGS-GES. M. B. H. **Firing with fusible fuel**, especially naphthalene.

Ger., 281,111, May 17, 1912. R. VOIGT. **Charging different grades of liquid fuel** in oil firing, through a common conduit, with provision for preventing depositions in the conduits and ensuring a continuous feed.

Ger., 281,190, Sept. 5, 1913. E. ARMBRUSTER. A heating furnace for flameless (surface) combustion of liquid fuel.

Ger., 281,252, Aug. 21, 1913. C. STILL. **Coke oven** with optional heating with rich gas or poor gas.

Ger., 281,398, June 1, 1912. J. ALEXANDER. **Fuel briquets**. See Brit., 16,838, 1913 (C. A. 8, 369).

Ger., 281,472, Oct. 9, 1913. MASCHINENBAU-ANSTALT HUMBOLDT. **Utilizing brown coal filter slimes**. In the manuf. of brown coal briquets the drying of the ground material gives rise to a fine highly explosive brown coal dust which is sepd. by means of a series of filters in the wet way and then partly freed from H_2O (up to 50-60%). Attempts have been made heretofore to utilize this slime, especially as a fuel for boiler firing, but this is not practicable on a large scale. The drying was attended by serious difficulties. By this process the filter slime is mixed with dry powdered clay by a screw mixer or in a centrifuge, and compressed to briquets.

Ger., 281,611, Aug. 17, 1913. WESTFALISCHE GASÖHL-LICHTFABRIK F. W. & DR. C. KILLING. Mfg. incandescent bodies for pendant lights by converting a flat impregnated material into bag form.

Ger., 282,279, Sept. 6, 1913. BERLIN-ANHALTISCHE MASCHINENBAU-AKT.-GES. Constructional details of a **tar separator**, with a bell provided with at least 1 tar separating wall made up of 2 mantles.

Ger., 282,309, May 20, 1913. Addition to 269,792 (C. A. 8, 2243). H. E. THRISEN. App. for **purifying, cooling, and mixing gases**. Cf. C. A. 9, 709, 1559.

Ger., 282,355, Mar. 6, 1914. A. HECKERT. **Process and retort for the dry distillation of coal or the like**, with the addition of steam which is first superheated and then decomposed, the products of decomp. being conducted to the coal. The superheating, decomp., and the action of the decomp. products on the coal being gasified are effected in sequence within the retort, incandescent graphite being employed as the decomposing agent. A suitable app. is specified.

Ger., 282,356, Jan. 6, 1914. G. L. WILKINSON. An **absorbent for acetylene solutions**, used in lieu of the filling, such as alk.-earths, coke, powdered stone, cement, pumice, asbestos, cotton, used heretofore. The new mass consists of silk or silk waste, the fibers of which have the property of absorbing acetone, crude acetone, or any other solvent for acetylene. This material can be packed much more densely in the containers than has been possible heretofore. The silk expands as it takes up the solvent, filling the container and leaving no pockets for the accumulation of the liquids. The silk material is forced into the container under pressure. A definite amt. of solvent is then introduced. As soon as this has been completely absorbed by the silk, the purified acetylene gas is forced into the packing material and is absorbed by the solvent. Cf. C. A. 9, 371.

Ital., 125,984; 396-213, Feb. 24, 1913. H. CLARKE and J. A. CAMPBELL. Modifications in the construction of **retorts for distilling coal and the like**, comprizing improved details of arrangement, and economy of fuel.

22. PETROLEUM, ASPHALT AND WOOD PRODUCTS.

F. M. ROGERS.

Origin of naphtha. N. KIZHNER. *J. Russ. Phys. Chem. Soc.* 46, 1428-41 (1914).

—A new hypothesis of the origin of naphtha. It is based upon Forquignon's expts. (*Ann. chim. phys.* [5], 23, 516), which showed that when H is passed over red hot cast iron the C in the latter is converted into hydrocarbons, while the traces of S, P and As are changed to org. compds. of these elements. These expts. also showed that the passage of N over red hot cast iron yields (CN)₂. The hypothesis assumes that naphtha owes its origin to the interaction of the H with the C, both of which are held in soln. by the Fe existing in the bowels of the earth. This interaction began when in the process of cooling, the earth reached the state of a red star. The difficultly fusible Fe and C liquefied and solidified first, and owing to its high sp. gr., the Fe, holding in soln. the H, settled at the lower strata of the globe. Owing to the high temp. prevailing in the depths of the earth, the reaction between the H and the C has been going on for ages and doubtless is going on now. The comparatively low sp. gr. of the hydrocarbons causes them to rise as naphtha to the surface, passing through various strata which modify its character. The cyclic hydrocarbons of naphtha owe their formation to the high temp. and pressure prevailing in the innermost strata. As to the optical activity of naphtha, it is due to the influence of terrestrial magnetism on the different degrees of reactivity (decomp., condensation, oxidation, etc.) of optical antipodes, it being assumed that these differ in reactivity to such a slight extent that the difference escapes our observation. Hence in the usual reactions racemic compds. are formed. But the magnetism of the earth enhancing the reactivity of both antipodes and acting through geologic ages, may favor the reactivity of one of them, changing it to other substances, and thus permitting the other antipode to impart activity to the naphtha.

H. M. GORDIN.

The Rittman gasoline process. W. F. RITTMAN. *Nat. Petroleum News* [1] 7, 2-4 (1915).—Vaporized petroleum is passed into a hot tube at 450°, the pressure being 90-500 lbs. per sq. in. The vapors are condensed under pressure and the condensate distd. for its gasoline content. The residue may be revaporized and passed through the tube. By using the oil in the form of vapor any combination of temp. and pressure may be applied, and in the case of fire only a small amt. of oil is exposed. Any oil from kerosene up may be used and it is claimed that by reason of the reaction being gaseous instead of liquid, the C deposited is so small as to be negligible.

A. J. PHILLIPS.

The McAfee gasoline process. M. MCAFEE. *Nat. Petroleum News* [2] 7, 20-5 (1915).—Petroleum oils are heated with 3-10% of AlCl₃ in ordinary stills, molecular rearrangement taking place and lighter oils being formed. Temps. of 260-315° are used and no pressure. Some test runs showed the gasoline content of Texas asphaltic crude to be 24%, Mex. crude 10%, Caddo 26% and reduced Oklahoma oil 20%. The light distillates require no treatment with acid and about 1/3 of the original oil is left in the still; this is treated with H₂SO₄ and worked up into lubricating oil. Most of the AlCl₃ remains as a coke residue from which the AlCl₃ is regenerated. *Cf. C. A.* 9, 860.

A. J. PHILLIPS.

Motor cylinder lubrication. G. S. BRYAN. *J. Am. Soc. Mech. Eng.* 37, 293-4 (1915).—Under the intense heat of the cylinder motor oil may volatilize without decompn., may decompose with formation of free C and H, in which case most of the C will be blown out of the exhaust as a fine dust, or the oil may decompose with formation of other hydrocarbons of a different nature, in which case C deposits will form a gummy,

sticky layer. Oils from southern asphalt base crudes have shown less C-forming proclivities in the cylinder than oils from paraffin base Penn. oils. The asphaltic oils are mostly of the ethylene and naphthene series and as compared with the paraffin series they tend to distill without decompn. Sp. gr. detns. are without value to the consumer.

A. J. PHILLIPS.

The recovery of benzine from synthetic crude oil. WALTER O. SNELLING. *Pittsburg. Chem. Ztg.* 39, 359-60(1915).—A general statement of his results. Cf. *C. A.* 9, 1388, 1841.

J. H. MOORE.

Nature and classification of paraffins and their extraction from naphtha. M. A. RAKUZIN. *J. Russ. Phys. Chem. Soc.* 46, 1544-66(1914).—The primary object of the investigation was to obtain a naphtha that does not congeal readily and that is free from paraffins. In the course of the work numerous other problems were met with and were investigated. The results may be summarized as follows: The higher, so-called hard paraffins are removable from naphtha by centrifugalization. In absence of excessive pressure the Chamberlain-Pasteur filter absorbs both tar and paraffin, while the material of this filter in powdered form absorbs chiefly paraffin. The filtration of naphtha through this filter in candle form is 4 times faster than through a disk made of its powdered material, but to exercise its full efficiency the candle must be completely immersed in the liquid to be filtered. Kaolin and Al_2O_3 also absorb both tar and paraffin. Floridin (hydrated $AlMg$ silicate) has both decolorizing and tar- and paraffin-absorbing properties, but the paraffins absorbed by it are chiefly the soft ones, m. about 50° . Successive centrifugalization and treatment with floridin still leaves in naphtha about 1.7% of paraffin which cannot be extd. in the cold. The naphtha paraffins may be classified into such as are removable by centrifugalization (hard paraffins, m. 69°), such as are removable by digestion with floridin (soft, m. 50°) and paraffins removable by distn. (m. 59°). Owing to the strong tendency of naphtha to supercooling, there is no exact relation between its congealing p. and its paraffin content. The opinion that some of the naphtha paraffins (proto- and pyro-paraffins) are amorphous, becoming cryst. only during the distn., is erroneous. This is proved by the fact that the paraffins extd. in the cold (by centrifugalization or floridin) are cryst. Even after removal of the hard and the soft paraffins naphtha still shows cryst. structure when examd. optically.

H. M. GORDIN.

Saturated hydrocarbons from "vacuum tar" (PICTET) 10.

Ger., 281,036, Dec. 25, 1913. G. BAUER. Utilizing the hot boiler oil of marine engines, first for lubricating gearing, and then as a fuel.

Ger., 281,572, Nov. 5, 1912. A. W. SOUTHEY. Mfg. a gaseous fuel for internal-combustion engines from liquid hydrocarbons, by incomplete combustion of a portion thereof. The liquid fuel is sprayed under increased pressure with air into the chamber in which it is converted into gas, a considerable excess of the liquid fuel being maintained. Cf. *C. A.* 9, 374, 712.

24. EXPLOSIVES AND EXPLOSIONS.

C. E. MUNROE.

The system "nitroglycerin-guncotton." Condensation of nitroglycerin vapor on guncotton in vacuo at constant temperature. D. CHIARAVIGLIO AND O. M. CORBINO.

Rome. *Atti accad. Lincei* 24, I, 247-50(1915).—The gelatinization of guncotton, which is so important in the manuf. of explosives, is usually accomplished by means of a volatile non-explosive solvent or by means of some other substance which is usually explosive but little volatile and which is retained in the final product as an essential constituent. Of these nitroglycerin is especially important. Such mixts. of nitroglycerin and guncotton are considered to be colloidal but their structures, degree of homogeneity, etc. are not known (cf. Paterno, Traetta-Mosca, *Gazz. chim. ital.* 38, II, 512; cf. *C. A.* 4, 1808). C. and C. placed a layer of powdery nitrated guncotton in the bottom of a large flask, in the center of which a beaker containing nitroglycerin was placed. The flask, was attached to the app. previously described (*C. A.* 8, 2061). The whole was evacuated with a Hg-vacuum pump and kept in a large air thermostat at a const. temp. of 30°. The nitroglycerin was gradually evapd. from the beaker at a rate which diminished until after some days it was imperceptible. At the end of the expt. the guncotton is apparently not much changed except that it is a little more sticky. But at high pressures it is converted into a homogeneous, transparent, gelatinous mass having the appearance of ordinary ballistite. When the expt. was conducted at 30° a colloidum cotton (12.25% N) took up 31.5% nitroglycerin in 7 days and 35.6% in 40 days. A guncotton (13.27% N) took up 37.4% nitroglycerin in 40 days. In a somewhat complicated glass app. (not described) nitroglycerin and guncotton were brought together and a marked increase in temp. was observed, so that the process observed is not simply the soln. of a solid in a liquid. There is thus a true exothermic chem. reaction between the guncotton and the nitroglycerin or else all the facts must be ascribed to simple imbibition phenomena Cf. following abstr. E. J. WITZEMANN.

The system "nitroglycerin-guncotton." Extraction of nitroglycerin from ballistite by distillation in vacuo at ordinary temperature. D. CHIARAVIGLIO AND O. M. CORBINO. Rome. *Atti accad. Lincei* 24, I, 361-6(1915).—The app. described in the preceding abstract is illustrated. A layer of ballistite scales (0.04 mm.) was placed in a large flask and by suspending the empty beaker under a condenser fitted in the flask the volatilized nitroglycerin was condensed and dropped into the beaker. At a pressure of 0.001 mm. the nitroglycerin distills into the beaker at room temp. which was only slightly higher than that of the condenser water. At 32° the nitroglycerin content of ballistite was reduced in 11 days from 48% to 32% and at 40° from 51% to 20.4% by distg. off the nitroglycerin in this way. The distn. gradually becomes slower and comes to equil. at a point depending on the temp. The system "nitroglycerin-guncotton" thus behaves exactly like the system " H_2O -cellulose" in this respect. The ballistite does not show any external change even under the microscope as a result of the treatment. The nitroglycerin distd. off is colorless and shows its normal stability in the Abel test except in one case in which a deteriorated specimen of ballistite was used and in which the nitroglycerin distillate was distinctly yellow and decomposed spontaneously in a few days. The expts. are of practical interest since they make it possible to remove nitroglycerin from explosives which contain too much without raising the temp., and since they simplify the examn. of explosives of the ballistite type as to stability. In the distn. described above gaseous products are also formed, the examn. of which may prove to be of importance in the study of the slow decompn. of these explosives.

E. J. WITZEMANN.

An instrument for recording pressure variations due to explosions in tubes. J. D. MORGAN. *Proc. Phys. Soc. London* 26, 172-7(1914). PAUL D. FOOTE.

Chemical engineering in nitrocellulose manufacture. S. L. STADELMAN. *Met. Chem. Eng.* 13, 361-6(1915).—S. gives a detailed description of methods for producing cellulose nitrates for guncotton, pyrocellulose powder (propellant), and gelatin dyna-

mite (coagulant). An endeavor has been made to record from practice results such as are not given in text books or in the periodical literature and the article shows that the author has largely realized this ideal.

CHARLES E. MUNROE.

Rules for handling, storing, delivering and shipping explosives. Institute of Makers of Explosives, U. S. A. *Pamphlet No. 5, 1914.*—The object is to place in convenient form such rules as experience in the explosives business has taught to be necessary to guard against accidents from these substances, combined with the official regulations of the I. C. C.

CHARLES E. MUNROE.

Standard storage magazines. Institute of Makers of Explosives, U. S. A. *Pamphlet No. 1, 1914.*—Five types are described: (a) Medium soft brick laid in cement mortar containing 15–25% of CaO. (b) Wooden magazines sheathed outside and lined inside with boards, the intervening space being filled with weak cement mortar. (c) Standard types of portable steel magazines bullet-proofed with weak cement mortar. (d) Box magazines for small quantities of explosives for immediate use or distribution. (f) Balloon construction. The text is accompanied by 11 sheets of detailed scale drawings.

CHARLES E. MUNROE.

American table of distances. RALPH ASHETON AND EDMUND B. COY. Institute of Makers of Explosives, U. S. A. *Pamphlet No. 2, 1914.*—A table is given specifying the distances to be maintained between storage magazines (for quantities of explosives varying from 50 to 500,000 lbs.) and inhabited buildings, public railways and public highways. The conclusions have been reached by a study of the data available from the records of explosions occurring during the last 50 years, and significant data for 179 such explosions, involving quantities varying from 200 to 875,000 lbs. and 12 different kinds of explosives, are presented in tabular form and plotted into a chart. An interesting table shows the distances from the sites of explosions of persons who escaped uninjured, as for example the 2 men in a buggy but 1,000 feet away from the explosion of 398,415 pounds of dynamite and black powder at Highland, Cal.

CHARLES E. MUNROE.

Explosion in nitroglycerin final washing house. A. COOPER-KEY. *Home Office Rept. 215, 5 pp. (1915).*—The material which exploded was "cordite paste" (for use in making cordite M. D.), consisting of a mixt. of 51 lbs. of guncotton and 21 lbs. of nitroglycerin. It had been placed, for transportation to the incorporating house, in bags made of "rubber insertion" (canvas impregnated with rubber). Cordite paste is declared to be "a mixt. which in dustiness is only comparable to dry guncotton fluff" and it was customary therefore, after filling and tying the bags, to brush the dust off of the outsides before loading them on the bogie, and further, to diminish the likelihood of accident; these bags were dusted off with the hand directly. Because no other source of ignition could be detected, and because the accident occurred on a "fine, dry, cold morning" and the "men in the building were wearing stout rubber overshoes" a static elec. charge from one of them is believed to have caused the explosion. (In this connection see "Are not dynamite catastrophes intimately associated with electric phenomena?" L. J. Le Conte. *Trans. Technical Soc. Pacific Coast* 2, 223. (1885). In view of the war emergencies Major Cooper-Key advises carrying out all operations from nitration to filtration in a single building. Expert witnesses should take special note of a suggestion such as this.

CHARLES E. MUNROE.

Report on the explosion at the Hojo colliery, Japan. S. MEGURO. *Colliery Guardian* 109, 907–10, 964–5 (1915).—Report on an explosion caused by a defective safety lamp, in which 671 men lost their lives.

H. L. OLIN.

25. **DYES AND TEXTILE CHEMISTRY.**

L. A. OLNEY.

Coloring matters of the organic world. MARTIN O. FOSTER. *Pharm. J.* 94, 737-8(1915).—A report on 2 lectures. S. WALDBOTT.

Aniline dyes. MRS. DOUGLAS. *Chem. News* 111, 265(1915).—Historical notes on the discovery and manufacture of aniline are given, and a greater use of the native herbal dyes is recommended. L. W. RIGGS.

The European war and its consequences for the dyestuff and dyeing industries (of France). L. LEFEVRE. *Rev. gén. mat. color.* 18, 273-81, 291-7, 308-19(1914).

MILES R. MOFFATT.

Natural dyes and their use in dyeing. ANON. *Rev. gén. mat. color.* 18, 297-303 (1914).—Applications of natural dyes on wool, cotton and silk are described and some formulas given.

MILES R. MOFFATT.

Discharge on logwood. P. DOSNE. *Rev. gén. mat. color.* 18, 304(1914).—The following formula is given. (1) Mordant by padding twice with a 4° Bé. mixt. of 2 parts 14° Bé. Fe pyrolignite and 1 part of 11° Bé. Al pyrolignite. (2) Dry in the hot flue at 60°. (3) Print a discharge of 4 l. of commercial lemon juice, 2 l. of H₂O, 400 g. of oxalic acid, 400 g. KHSO₄, and 2250 g. of dextrin. The goods must be kept in a warm dry place until degummed and washed. (4) Degumming was formerly done with crowding and lime but now Na silicate may be used. (5) Dye as usual with logwood.

MILES R. MOFFATT.

The dyeing of cotton with "Cuano" in Tonkin and Indo-China. EDOUARD STEINER. *Rev. gén. mat. color.* 18, 320(1914).—The turnip-like roots of the "Cuano" tree are grated and dissolved as well as possible in H₂O. Cotton cloth is dipped in this liquor by hand, squeezed, and exposed on the ground to sunlight which oxidizes the dye fairly rapidly. If a deep shade is desired the operation is repeated. The same side is always exposed to the sun with a resulting darker shade on one side. Certain brands of sulfur colors after treated with CuSO₄ can rival it in fastness but not in cost.

MILES R. MOFFATT.

The (German) textile industry and the war. A. KERTESZ. *Mainkur. Chem. Ztg.* 39, 357-9, 374-7(1915).

J. H. MOORE.

Use of sodium perborate. E. TREPKA. *Rev. gén. mat. color.* 18, 193(1914); *J. Soc. Dyers Colorists* 30, 302.—For clearing whites in cotton material dyed with logwood black, Na perborate may be used where bleaching powder would only turn the shade to brown. Pad the goods with a soln. contg. 3-5 g. Na perborate per l. and dry on drums. Chrome dyes are rapidly altered by this treatment, whereas sulfide and vat dyes are brightened. The action of the perborate may be increased by the addition of alk. substances, but the solns. then tend to decompose very rapidly. Na₂HPO₄ (1-2 g. per l.) may be added.

MILES R. MOFFATT.

Notes on kapok. ANON. *J. Soc. Chem. Ind.* 34, 524(1915).—The best quality of kapok (*Bombax malabaricum*) from Java is used in life-saving jackets, having a much higher sustaining power than the inferior qualities. The inferior qualities are apt to be adulterated with waste cotton, etc. Cotton is stained more deeply by I than kapok. Kapok is beginning to take the place of eider-down. Vermin will not go near it. It is of no use for weaving or spinning. It is often adulterated with *Calotropis procera*, which is useless. By the Cross and Bevan method cotton has about 95% of resistant cellulose, kapok only about 50%. Kapok has been nitrated

and guncotton made from it, but the nitrocellulose is probably not stable. Cellulose can be obtained from it in large quantities. An inferior kind of kapok is produced from a creeper in W. Africa; the pods are nearly the size of a cocoa pod and each contains a large amt. of fiber. The vine yields a little rubber. It has been suggested that the cars of balloons be lined with this material. The H_2O -repellent power is in inverse proportion to the quality of the fiber. The yellowest varieties are the best for the purpose. They could be immersed in H_2O for 1 or 2 weeks without the H_2O penetrating them. The fiber is very brittle. If grown in large quantities, it might be used as a source of cellulose for paper, and similar purposes, as it is cheaper to grow than cotton; but it would first be necessary to ext. the resinous matter (which repels H_2O), a kind of wax readily extd. and for which com. uses might be found. F. W. S.

Stability of hypochlorite solutions (GRIFFIN) 18.

Brit., 3,796, Feb. 13, 1914. BAYER & CO. Azo dyes are obtained by combining diazo, diazoazo, or tetrazo compds., or the intermediate products from 1 mol. of a tetrazo compd., and 1 mol. of an azo dye component, with the products formed by condensing 2-naphthol-1-carboxylic-6-sulfonyl chloride with phenols, naphthols, amines, aminophenols, aminonaphthols, or their carboxylic, sulfonic, etc., derivs., and splitting off the carboxyl group if desired. If the carboxyl group is not previously removed, it splits off during the formation of the azo dye.

Brit., 4,668, Feb. 23, 1914. E. GIRZIK. Dyeing artificial leather consisting of fabric coated with cellulose compds., such as celluloid or nitrocellulose, by mixing the celluloid or like soln. with substances which readily form lakes with aniline dyes, *e. g.*, $Al(OH)_3$, Al acetate, or silicate, applying the mixt. to the fabric, drying, and dyeing with suitable dyes so as to dye both the fabric and the celluloid or like layer. In an example, a cotton fabric is coated with a soln. of nitrocellulose in alc., acetone, etc., mixed with softening agents and $Al(OH)_3$, dried, and dyed with basic dyes in an acid bath.

Brit., 4,827, Feb. 24, 1914. P. SCHILDE. Moistening yarns and the like by exposing the material repeatedly and alternately to cold and warm currents of moist air, either in different chambers or in the same chamber, and always removing the material in the cold state after treatment with the cold current of moist air.

Fr., 468,525, Apr. 25, 1913. R. VIDAL. In a process of dyeing skins and animal fibers, the known property of dichromate of protecting the material from the destructive action of the alkali sulfides is taken advantage of in dyeing the hair of the skin independently of the leather, by treating the chromed skin in a bath of Na_2S , chromogen vidal black (1 mol. *p*-phenylenediamine + 2 mols. phenol). If the leather is to be dyed also (say a blue), S-dyes are used in conjunction with the above. Cf. C. A. 8, 2638.

Ger., 271,902, July 24, 1912, addition to 248,998 (C. A. 6, 2850); Brit., 16,827, July 22, 1913; addition of July 15, 1913, to Fr., 440,303. AKT.-GES. FÜR ANILIN-FABRIKATION. Mfg. wool dyes of the anthraquinone series. Aromatic amines react with pyridazone-4-halogenanthrone derivs. If sulfonated pyridazone halogen-anthrones are employed as the initial material, or the condensation product is subjected to sulfonation, pyridazone-4-arylaminoanthronesulfonic acids are obtained which dye wool in yellow to orange shades.

Ger., 276,331, Feb. 18, 1913; Brit., 22,854, 1913, Oct. 9, 1913. BAYER & CO. Sulfophenol-*o*-carboxylic acids. See Fr., 466,236 (C. A. 9, 1369).

Ger., 280,829, Sept. 19, 1913. J. ELSNER. Machine for stiff-dressing wide mesh multi-ply fabric, so-called roll-books.

Ger., 280,973, June 20, 1913. L. GIVAUDAN and A. KAUFMANN. Mfg. 2-cyanoquinoline and 1-cyanoisoquinoline by treating 1-benzoyl-2-cyano-1,2-dihydroquinoline or 2-benzoyl-1-cyano-1,2-dihydroisoquinoline with PCl_5 , SOCl_2 , or SO_2Cl_2 , in the presence of anhydrous indifferent diluents.

Ger., 281,304, Dec. 28, 1913. E. GIRZIK. Dyeing artificial leather. See Brit. 4,668 (*supra*).

Ger., 281,352, Dec. 21, 1913. AKT.-GES. FÜR ANILIN-FABRIKATION. Dyeing skins, hair, and the like, mordanted or unmordanted, in the presence of a suitable oxidizing agent, such as H_2O_2 , in a bath which contains a salt of a base of the following comp. or of a deriv. of such a base. $\text{Me}_2\text{NC}_6\text{H}_4\text{NHC}_6\text{H}_4\text{R}$; $\text{R} = \text{NH}_2$, NMe_3 , NEt_3 , or OH . Cf. C. A. 9, 386.

Ger., 281,422, Nov. 22, 1912. BAYER & CO. Mfg. color lakes. The lakes obtained from purpurin carboxylic acid excel those obtained from purpurin and alizarin in fastness to light and purity of tone. Lakes can now be obtained from purpurin-3-sulfonic acid which have properties similar to those from purpurin carboxylic acid, by converting them into Al lakes. These lakes are very fast to light, and have a clear eosin-like shade. E. g., 100 kg. $\text{Al}_2(\text{SO}_4)_3$ (18% Al_2O_3), and 1.25 kg. purpurinsulfonic acid (1,2,4-trihydroxyanthraquinone-3-sulfonic acid) as the NH_4 salt, are dissolved, with warming, in 1000 l. H_2O , and pptd. with a soln. of 30 kg. calcined soda in 300 l. H_2O . Or, 1.25 kg. purpurinsulfonic acid (Na salt) are dissolved in H_2O and boiled up with 60 kg. $\text{Al}(\text{OH})_3$ (10%). Cf. C. A. 9, 156.

Ger., 281,423, Nov. 19, 1912. Addition to 250,387 (C. A. 7, 265). E. HAGEN. Mfg. color lakes from vegetable materials containing the dye as the glucoside. The product obtained according to the principal process can be obtained also by breaking the glucoside down by enzyme or by heating with dil. acids, as H_2SO_4 , or by means of ferments, whereby the dyes of the glucosides (rhamnetin, quercetin, fisetin, etc.) form, but are not applicable as such for dyeing on account of their low dyeing powers. These dyes do not yield satisfactory dyes with alk. earth or metal salt solns., at the room temp., but upon heating the free dyes with alk. earth or metal salt solns., color lakes of brilliant shades are formed, which are stabilized to organic acids by treatment with inorganic salts of the category specified. E. g., the initial material containing the glucoside, such as buck-thorn berries, quercitron, and the like, is heated, in a comminuted state, with dil. H_2SO_4 , or acted upon with ferments, whereby the glucosides break down and yield the free dyes which are sepd. from the fibrous material by sifting, or otherwise. The resulting dyes are boiled with solns. of alum, $\text{Al}_2(\text{SO}_4)_3$, MgSO_4 , or the like, to obtain the corresponding color lake. By the direct action of organic Al salts and $\text{Al}(\text{OH})_3$ on color glucosides, color lakes are formed but they are not stable to organic acids.

Ger., 281,449, May 14, 1913. FARBW. V. M. L. & B. Mfg. disazo dyes by coupling the tetraazo compd. of urea, *p*-aminophenylurea-*p*-aminophenyldisulfonic acid, with 2 like or unlike azo components. Cf. C. A. 9, 156.

Ger., 281,490, Jan. 29, 1914. F. ULLMANN. Separating 1-nitroanthraquinone from crude nitroanthraquinone by fractionating *in vacuo*, the dinitro products remaining as a residue. The pure product goes over at 7 mm. and 270-271°, without decompn.

Ger., 281,520-21, Mar. 21, 1913. Addition to 263,382 (C. A. 8, 257). FARBW.

v. M. L. & B. Vat dyes, resembling those obtained by 265,195 (C. A. 8, 429), by allowing H_2S to act upon halogen quinone arylides, with the employment of diluents. The operation is carried on in closed vessels under pressure in order to prevent loss of H_2S . According to 281,521, halogen quinone arylides are treated with S and a halogen-acid-binding agent.

Ger., 281,859, Jan. 10, 1912. BADISCHE. Obtaining fast color prints by printing with the Cr compds. of hydroxyanthraquinonesulfonic acids, or their derivs., specified in 280,505 (C. A. 9, 1998) and then steaming. E. g., a printing color is obtained from 200 g. of a soln. (obtained according to 280,505) 700 g. HOAc-starch-tragacanth thickening, and 300 g. H_2O . The print is steamed for 5 mins. in the mather-plate, rinsed in H_2O , and finished in the usual manner. The dye is fixed in the form of a blue-green lake very fast to washing and light.

Ger., 282,351, Jan. 3, 1914. H. GIESLER. In a process of producing designs on fabrics of all kinds, by carbonization, the warp or woof, or both, are incorporated with threads which have been treated with an acid or salt soln. which destroys vegetable fiber at a high temp. After applying an agent which to an extent renders the acid or salt inactive, the fabric is heated to a temp. sufficient for carbonization. E. g., into a voile of cotton yarn is worked a second warp of cotton threads which have been treated with 7° $AlCl_3$ soln. Upon this fabric a design is then printed with a soda soln. which is sufficiently strong to neutralize the action of the $AlCl_3$ at the points of contact. The fabric is then placed in a heating chamber and exposed to a temp. which carbonizes the prepared fabric. Finally, the combustion residues are removed by blocking, brushing, or milling. The resulting fabric has a voile ground upon which appears a strongly marked design which has the appearance of embroidery.

Ital., 129,784; 394-173, Feb. 5, 1913. I. GUARESCHI. In a process of dyeing wool, silk, cotton, etc., with the use of a new deriv. of triphenylmethane, the material is dyed with fuchsin in shades varying from rose to sky-blue, then fixed by bromination.

26. PAINTS, VARNISHES AND RESINS.

A. H. SABIN.

White paint. Inland Rev. Dept., Canada Bull. 301(1915).—Report of exam. of 116 samples of white paint collected throughout Canada. Analyses of the pigments showed that 28 samples were essentially white lead, 30 samples essentially ZnO or ZnS , 9 mixts. of Pb and Zn, 14 Pb and Zn with $BaSO_4$, and 35 chiefly $BaSO_4$.

E. W. BOUGHTON.

A study of some curious painting phenomena. H. A. GARDNER. J. Frank. Inst. 179, 681-95(1915).—*Mildew and its prevention*: A description of mildew on painted surfaces in New Orleans is given. The dark scrapings from the mildewed surfaces were added to a culture medium of cypress wood decoction and agar, and pure cultures subsequently obtained. The two principal types of fungi which developed were species of *Aspergillus* and *Penicillium*. The former was found to be the more hardy. Expts. showed that the development of fungi was much more rapid on paint coatings which were soft and subject to the retention of moisture. Paints prepared with a pigment containing 25-50% of ZnO gave films that were resistant to fungus growth. It is possible that the fungus spores are introduced into the wood during the soaking process at the lumber mill. Treatment of the wood with $ZnCl_2$ soln. previous to painting is recommended. *Washing of paint caused by inferior oil*: The failure of paint coatings due to saponification or "washing" may be caused by the use of oil

which contains moisture and "foots." Growths of mold, a species of *Fusarium*, were obtained from linseed oil "foots." The microorganisms in the foots may have a fat-splitting action with the formation of fatty acids and glycerol, thus causing softening of the coat. Both Pb and Zn paints may exhibit this "washing." "*Rusting*" or *brown spotting*: The formation of brown spots on paint coatings is apparently due to 2 causes, one being the leaching out of sol. matter in the wood by moisture. Such sol. matter is brought to the surface and forms compds. with the Pb and Zn in the paint. As brown spotting occurs on repainting jobs on old wood, a second cause may be an enzymic fat-splitting action, as mentioned above, with subsequent formation of Pb and Zn compds. of various fatty acids. *Conclusion*: "From previous consideration it is apparent that many painting defects may be prevented through the use of paints of the composite class, based upon white lead pigments but containing sufficient zinc oxide to present a firm, hard film. When paste paints are thinned by the painter, only clarified, well settled, moisture-free linseed oil should be used. E. W. BOUGHTON.

Investigations of iron tannate inks. XIII. The influence of the condition of the air and temperature of the working space upon the result of the "keeping quality" test. F. W. HINRICHSSEN AND R. KEMPF. *Mitt. kgl. Materialprüfungsamt.* 32, 536-8 (1914); through *Chem. Zentr.* 1915, I, 809-10.—The new regulations for official ink testing give directions for making the test for keeping quality in glass (C. A. 7, 2482). Expts. made according to these directions show that HCl and especially NH₃ vapors in somewhat concd. form as well as SO₂ vapor exercise a strong influence on the keeping quality test of Fe tannate inks. In the diln. in which the acid and basic vapors, H₂S, etc., occur in the chem. lab. and the relatively short time of the test, their influence appears to be negligible. However, the space used for the test should be kept as free as possible from HCl, SO₂, and NH₃. Cf. C. A. 8, 2069. E. W. SMITHER.

The composition, properties and testing of printing inks. Bur. of Standards. *Circ.* 53(1915); cf. C. A. 8, 3632.—This circular contains a general discussion of the subject under the following captions: Historical; comp. of printing inks; ink manuf.; relation of the ink to the paper; opacity of inks; necessity for proper grades of paper; what constitutes a good ink; analysis of printing inks; relation of lab. tests to tests under working conditions; manuf. and testing of linseed oil; bibliography.

E. W. BOUGHTON.

Modern methods of using China wood oil. KRUMBHARR. *Farben-Ztg.* 20, 53, 877-9(1915).

E. W. BOUGHTON.

Detection of manganese in lacquers and driers (SACHER) 7.

Brit., 29,524, Dec. 22, 1913. G. PATERNO and C. MANUELLI. HF, fluorides, fluosilicates, and fluoride compds. other than chromyl fluoride and its compds. are used in submarine varnishes for destroying algae, molluscs, etc. Cf. C. A. 9, 1552.

Brit., 3,573, Feb. 11, 1914. R. STRAUSS. Furniture polish. See Ger., 279,127 (C. A. 9, 1127).

Brit., 4,113, Feb. 17, 1914. M. BRENNEISEN. A weatherproof paint is manufd. by mixing Zn powder with linseed oil varnish to a dough-like mass, stirring in HCl, and dilg. with linseed oil varnish or the like. An example mentions linseed oil varnish 140 g., Zn dust 1 kg., strong HCl 180 g., and for diln., linseed oil varnish 320 g., and turpentine 100 g.

Brit., 4,419, Feb. 20, 1914. M. WOLFF. A basis for printing ink consists of

finely powdered mineral substances, of white, gray, or yellow color, and of a nature compatible with resin oil, crude petroleum or petroleum distillates, vegetable or carbon black, and aniline dyes, *e. g.*, diatomaceous earth or the like. The substances are mixed with the other ingredients without the application of heat or pressure and without intercedent drying. Barytes may be used. Cf. *C. A.* 8, 2072.

Can., 160,682, Feb. 16, 1915. L. V. REDMAN. The fusible anhydrous phenolic condensation product produced by direct reaction substantially in the absence of water between an anhydrous methylene compd. and a phenolic compd. in the proportions of 1 reacting weight of the methylene compd. to more than 5 reacting weights of the phenolic compd.

Can., 160,683, Feb. 16, 1915. L. V. REDMAN. In producing a phenolic condensation product, a phenolic compd. is mixed with a methylene compd. in the proportions of more than 1 phenol group to each active methylene group, and the mixt. is subjected to the action of heat substantially in the absence of water and causing an anhydrous reaction, to produce a fusible phenolic resin.

Fr., 468,598, Feb. 18, 1913. M. BRENNERSEN. In mfg. a weatherproofing paint (anti-rust compn.), Zn dust is kneaded up with linseed oil varnish, the mass is combined with HCl, the H₂O is decanted, and the product dild. with linseed oil varnish and turpentine.

Ger., 281,615, Apr. 30, 1913. C. JAEK. Mfg. colored linoleum, wax cloth, lin-crusta, and the like, bearing ornamental designs.

Ger., 281,687, July 4, 1913. CHEM. FABRIK GRIESHEIM-ELEKTRON. Mfg. technically valuable products from organic vinyl esters. By the polymerization of organic vinyl esters, alone or in admixt. with each other, products of value are obtained which, according to the initial material and the conditions of treatment, exhibit different properties. *E. g.*, by acting with chem. rays on vinyl esters (vinyl acetate or vinyl chloracetate) solid masses are obtained directly in a colorless, clear state which, by virtue of their exceptional properties, are applicable directly, and serve as a substitute for celluloid and like substances. The polymerization of the vinyl ester can be effected also by heating. If the polymerization is effected in a suitable form, the shaped article is obtained. However, the product may be shaped by softening and allowing to cool, or by dissolving and evapg. off the solvent. The softened mass permits of easy working. Foreign substances may be mixed with the mass. It may be sawed, cut, filed, and otherwise handled. By coating with acetone, epichlorohydrin, or other solvent the material may be polished and cemented together. Varnishes are obtained by soln. in suitable solvents. It is fireproof and odorless. Cf. *C. A.* 9, 149, 351.

27. FATS, FATTY OILS AND SOAPS.

E. SCHERUBEL.

Physico-chemical investigation of rape oil. P. A. MEERBURG. *Chem. Weekblad* 11, 1111-4 (1914).—The main physical detns. of rape oil are: Sp. gr., refractive index, congealing point and viscosity. M. estd. the critical congealing temp. of rape oil in 100 samples by mixing with aniline. In rape oil, as outlined graphically, it reaches its high mark at 37.6° in 80% aniline; adulteration of oil by sesame, linseed or cottonseed oil is indicated by obtaining figures outside of limits detd. The method is rapid and can be carried out with ordinary app.

P. A.

Pettigrain oil in Paraguay. ANON. *Oil, Paint and Drug Rep.* 87, No. 21, 10 (1915).—Production data. E. W. BOUGHTON.

Compounds of calcium and magnesium with higher fatty acids. J. ZINK AND R. LIERE. *Z. angew. Chem.* 28, I, 229-32 (1915).—There is no difference in the action of Ca and Mg salts in the formation of the respective soaps. Expts. by the authors show that the solubilities of the Ca and Mg soaps are not increased by the addition of NaCl. The influence which other salts exert is being investigated. E. S.

Difficulties in the handling of by-product fats. B. LACH. *Seifenfabr.* 35, 413-5, 438-9 (1915).—Discussion of the manuf. of black grease, its analysis and distn. By-product wool fat, leather extn. grease, olive oil foots and nut oil residue are also considered. E. SCHERUBEL.

The question of stearic acid in beeswax. H. FISCHER. *Z. öffent. Chem.* 21, 53-4 (1915).—Largely polemical. Buchner's method of filtering out the stearic acid after 1 hr. standing is unsatisfactory. The soln. should be allowed to stand 8-12 hrs. Those waxes (from Africa) classed as abnormal by B., according to F. should be considered adulterated. Beeswax (even from Africa) which gives a positive stearic acid test is adulterated. H. S. BAILEY.

Soap industry in war time. J. DAVIDSOHN. *Chem. Ztg.* 39, 329-30 (1915).—A discussion of raw materials and substitutes. E. SCHERUBEL.

Brit., 3,664, Feb. 12, 1914. W. T. and B. B. POWLING. App. for rendering tallow, or for extg. fat, oil, etc., from bones, fish, blubber, seeds, etc., of the kind described in 8,397, 1912 (C. A. 7, 3247) is combined with a preliminary heating vessel of such capacity as to supply 2 or more extg. vessels, and this vessel is heated by the vapors from the extg. vessels and by the exhaust steam from an engine driving the agitators.

Brit., 4,428, Feb. 20, 1914. L. J. NOEL. Purifying lubricating and like oils and fats. See Fr., 458,049 (C. A. 8, 2631).

Ger., 281,375, Sept. 29, 1912. W. H. HOFMANN. Deodorizing train- or fish-oil fatty acids. See Fr., 462,763 (C. A. 8, 3248).

28. SUGAR, STARCH AND GUMS.

A. H. BRYAN.

Production and refining of sugar in England. ANON. *J. Soc. Chem. Ind.* 34, 316-20 (1915).—Discussion by the London Section of the Soc. of Chem. Ind. on the production of sugar within the Empire. The British Empire consumes \$100,000,000 worth of sugar annually, 80% of which has been produced on the Continent. With this main supply not only cut off but largely destroyed they must look elsewhere for their sugar. Sugar beets have been successfully raised in the British Isles as well as in many of the Colonies. Expts. have shown that a good yield of fair quality may be secured under such conditions as would make the undertaking profitable. It was suggested that a preferential duty be placed upon sugar until the industry should be firmly established. H. R. SMITH.

The rise in purity of cane juice during clarification. H. C. PRINSEN-GEERLIGS. *Louisiana Planter* 54, 284-5 (1915).—The presence of salts or occluded air will affect the Brix readings so that the quotient of purity calcd. with such figures as a basis would be much too high. Suspended muddy matter as an accidental admixt. in the raw juice

will also affect the degrees Brix so that after clarification, when the mud has been carried over in the scums, the readings are not further affected. In deciding the merits or defects of a clarification scheme, the quotient should be found by drying the filtered juice for the detn. of the dry matter and the sucrose should be detd. by double polarization.

A. GROSS.

Sugar recovery from beet molasses by the use of strontia. DAUDE. *Z. Ver. Zuckerind.* 65, 139-64(1915).—A review, with many drawings. W. L. BADGER.

Determination of sucrose in beets after freezing and thawing. E. SAILLARD. *Compt. rend.* 160, 360-3(1915).—Beets stored in piles and subjected to freezing and thawing gave off an odor of alc. At one or more points on the surface of the beets the gas and also a gummy material collected in drops. The juice from these beets was ten times as acid as that from normal beets. This acidity increased on standing; at the same time the viscosity of the juice decreased, due to the hydrolysis of some of the gum to acid. In the sugar mill at first carbonation the juice deposited a viscous coating over the filter press, making filtration difficult. The filtered juice was more highly colored than usual. Five samples of beets which had been frozen and thawed, which, when dug, showed 15-16% sucrose, now gave the following results: Reducing sugar before inversion, 5.10, 2.45, 2.31, 1.77, 1.00; sucrose—chemical method, 5.26, 8.37, 9.50, 10.67, 12.82 sucrose—optical method, 4.96, 8.16, 9.16, 10.32, 12.82. These results show that those beets which contain the most reducing sugar contain the least sucrose, indicating that a large part of the original sucrose had been changed to invert. Also the chem. method of detg. sucrose gives higher results than the Clerget method. The ordinary methods of inversion do not give correct results. The following method of Ogilvie was tried: Make 16.26 g. pulp to 100.5 cc. with cold water without clarification, filter through cotton, pass SO_2 through the filtrate in the cold, neutralize with pure, dry, CaCO_3 , add kieselguhr, mix, and filter; subject 50 cc. of the filtrate to diastasic inversion at 50-5°. Calc. approx. sugar content by polarimetry before and after inversion by the usual Clerget formula. Then by means of a pure sucrose soln. of this strength, det. the Clerget factor for this method, and, by substituting this correction factor in the original polarimetric readings obtain the true sucrose content. The diastase soln. is made by macerating 5 g. compressed yeast 24 hrs. with 100 cc. water and adding to this several drops of CHCl_3 . 10 cc of this soln. will invert 75 cc. of the juice in 5 hrs. The diastase and the usual HCl methods give the same results on normal beets, but with frozen beets the HCl method always gives high results. This would indicate that frozen beets contain some substance which is hydrolyzed by HCl but not by diastase. The amt. of alc. formed in frozen beets exceeds the amount normally formed from the reducing sugar present. It has been shown that the hydrolyzable substances other than sucrose which are found in frozen beets may be transformed into reducing sugar not only by HCl at 89° but also by HCl in the cold and by tartaric or acetic acid at 30°. S. concludes that the alc. formed in frozen beets comes in part from the hydrolyzable substances other than sucrose, which are not modified by invertase but may be transformed little by little into fermentable reducing sugar under the influence of the acids occurring in the fermented juice at 28-30°.

H. R. SMITH.

Drying beet chips in ordinary pulp driers. ROSE AND KIEL. *Z. Ver. Zuckerind.* 65, 205-13(1915).—Attempts to dry sugar beet chips for fodder in pulp driers resulted in caking of the material in the app. and burning, unless very uniformly fed and carefully operated. The yield is about 25% and the dried chips contain 58-64% sugar. One manufacturer grinds the dried chips fine. Ten % of this meal may be added to bread with satisfactory results.

W. L. BADGER.

Report on the cultivation experiments with different kinds of sugar beet seeds carried out during the year 1914 by the Experimental Station of the Zentralverein for the sugar beet industry of Austria and Hungary. O. FALLADA. *Oesterr. Ung. Z. Zuckerind.* 43, 839-46(1914).—The expts. of 1913, a report upon which was published by Strohmer (*Ibid* 42, 894(1913)), were continued during 1914. F. gives a thorough description of the arrangement and *modus operandi* of the cultivation expts. as well as a report on the exam. of the beet tests. Numerous tables give the exptl. data and results.

ISADOR MILLER.

Influence of the arrangement on the soil and sugar beet yield. J. K. GREISENEGGER. *Oesterr. Ung. Z. Zuckerind.* 44, 14-22(1915).—Cultivation expts. with sugar beets on a large scale show the influence of the arrangement on the moisture content of the soil and upon the degree of production of organic substances, the results being in agreement with the expts. of Marek (*Landw. Jahrb.* 33, 357). This influence is due to the resistance which the growing plants offer to the predominant winds according to their position and to the degree of protection they afford the soil from immoderate exposure to the sun.

ISADOR MILLER.

Commercial glucose. G. W. ROLFE. Mass. Inst. Tech. *Science Conspectus* 5, No. 1(1915); *Am. J. Pharm.* 87, 269-77(1915); through *Met. Chem. Eng.* 13, 332-3. —A popular discussion of the com. manuf. and uses of glucose. Solids consisting of maltose 45, dextrose 20, and dextrin 35% are held in suspension in water and treated for 10 min. with a few tenths of 1% HCl in gunmetal boilers under a pressure of 50 lb. steam. The dextrin prevents crystn. and also renders the sirup capable of dissolving considerable sucrose. The solids in glucose also contain 0.3-0.5% mineral matter and 0.08% N. After treatment with acid the liquid is evapd. to 80% solids and is clarified with boneblack. Glucose is used in candies, preserves, and table sirups; also in cheap soaps, and for "filling" leather and tanning exts.

H. R. SMITH.

Is it possible to use breweries which are partially or entirely out of operation for the manufacture of invert sugar and other related branches of industry? A. BAUDREXEL. *Tagess. Brauerei; Deut. Zuckerind.* 40, 320(1915).—In connection with the need, during the war, of fat substitutes for use with bread, B. recommends the use of invert sugar sirup and suggests that breweries which are partly or entirely idle at the present time in Germany could be readily adapted, by reason of their equipment, to the manuf. of this product. A satisfactory product has been prepd. by dissolving 100 kg. sucrose in 27-30 kg. hot H₂O which contains 0.5 kg. CaCl₂, 1 kg. NaCl and 300 g. citric acid (or 150-250 g. tartaric acid) and heating to boiling point for 1/4-1/2 hr. The salts are added to improve the flavor and because of their nutritive value, while the citric or tartaric acid gives an agreeable fruit acid taste. The invert sugar sirup thus prepd. is recommended for the production of artificial honey (by addition of artificial flavors or some pure honey) and fruit sirups, jellies and preserves. It is believed that the manuf. of invert sugar would stimulate the consumption of sugar as a substitute for the more expensive and less abundant fats, such as butter.

H. S. PAINE.

Bone black. F. G. WIECHMANN. *Sugar* 17, 34-8(1915).—A concise review covering the historical, technical and analytical sides of the subject.

A. GROSS.

Fertilizing sugar beets (STUTZER), (STÖRMER), (SCHNEIDEWIND) 15. Biochemical reduction process in the soil (KÜHR) 15.

U. S., 1,141,572, June 1. O. MENGELBIER. Apparatus for extracting sugar juices from cane, etc., by treatment with steam and hot H₂O. Cf. C. A. 9, 160.

Brit., 3,456, Feb. 10, 1914. O. SÖDERLUND, T. BOBERG and TECHNO-CHEM. LABORATORIES, LTD. In operations such as the manuf. of sugar in which evaporators are used such as described in 12,462, 1911 (C. A. 6, 3039) and 22,670, 1911 (C. A. 7, 1119) in which vapor is compressed and utilized, the compressors are driven by steam turbines, preferably coupled directly thereto, the exhaust steam from which is used for other steps of the process, such as heating.

Brit., 3,531, Feb. 11, 1914. C. WARTH. In a process of drying potatoes, the potatoes are sepd. into starch and pulp, which are separately treated by pressure, etc., to remove H_2O , mixed, and dried by heat. Preferably, the grated potatoes are treated with H_2O on a sieve, the starch is sepd. from the starch-milk in a centrifugal, the pulp is pressed, and the starch and pulp, after mixing, are dried, exhaust steam from the engine driving the plant being used. The H_2O from the press is returned to the sieve.

Ger., 280,824, Dec. 18, 1912. MELASSESCHLEMPER G. M. B. H. Mfg. glutaminic acid and alkali chlorides from molasses distillery washings, molasses, or other waste products of the beet sugar refinery.

Ital., 126,803; 394-193, Feb. 5, 1913. AMIAERIA BERNARDI. Solubilizing starch by means of gaseous Cl which is passed to satn. through alk. H_2O containing the starch under treatment.

29. LEATHER AND GLUE.

LLOYD BALDERSTON.

The new dehydration theory of leather formation as opposed to the oxidation theory. E. O. SOMMERHOFF. *Collegium* 1915, 26-37.—Chemically fixed water of hydration is withdrawn from hide albumin by the action of partly oxidized tannins. The H acceptor is the colloidal basic phlobaphene, the O acceptor the complex tan-acids. S. was led to substitute this theory for the oxidation theory of Fahrion and Meunier by his studies on chrome tannage. Vegetable and chrome tannage are discussed in some detail. S. considers oil tannage similar, and hopes to show it in detail later.

L. B.

Degree of tannage. W. JAMES. London. *Collegium* 1915, 76-7.—Where "bloom" has been brushed on to the flesh side of leathers, the figure for "organic insolubles" is raised, and by the usual calculation the "degree of tannage" is raised. This J. thinks incorrect, and suggests that the mode of calculation be modified.

L. B.

The analysis of tanning materials. ALEXANDER T. HOUGH. *J. Soc. Chem. Ind.* 34, 472-3(1915).—H. criticizes suggestions made by Bennett (C. A. 8, 3870) for the improvement of the official method of analysis of the Intern. Assoc. of Leather Trades Chemists. He states that the higher non-tannins are not due to the diln. of the ext. solns. but to the fact that 26.5 g. of hide powder are now being used to detannize 200 cc. instead of 100 cc. The less concd. hide powder cannot do as much work in the specified time. If the quantity of tannin in the soln. be decreased by 50% and 100 cc. be shaken with 26.5 g. of wet chromed hide powder, the non-tannin will be lower than with a stronger soln. because the hide powder quickly absorbs the tannin and commences to absorb the non-tannins. It would seem best to use tannin solns. of the present official strength and reduce the quantity of hide powder so that the detannization is just effected. H. is opposed to changing the time of shaking and suggests

that the quantity of hide powder should be such that the official quarter hour is just sufficient for it to do its work. In regard to tannery liquors H. agrees with Bennett except in regard to dilg. solns. for the estn. of non-tannins as mentioned above. H. also suggests the possibility of reducing the acidity of all tannery liquors to some set standard, either by the lime water method or by the Wood, Sand and Law method (cf. C. A. 6, 1075), then adding standard soda to neutralize to a certain fixed point (slightly acid) and then detannizing without diln. The use of unwashed hide powder does not seem advisable.

J. S. ROGERS.

The analysis of tanning materials. A reply. H. G. BENNETT. *J. Soc. Chem. Ind.* 34, 473(1915); cf. preceding abstr.—In replying to the criticism by Mr. Hough B. upholds his original statements. He agrees with H. that it is undesirable to extend the time of shaking. B. has not found it necessary to extend the time of shaking in his method, which he has used over 2 yrs. He states that H.'s quotation with regard to extension of time of shaking did not refer to the revized method suggested, but to possible future expts. planned with the object of detg. the smallest possible amt. of hide powder which could be used for complete detannization. J. S. R.

Distinction and detection of tanning materials and cellulose extract in leather. R. LAUFFMANN. *Ledertech. Rundschau*, Dec. 24 and 31, 1914.—Nine pieces of hide were tanned with various materials and mixtures. The finished leather was extd. with water and the ext. tested by the formaldehyde reaction, Br water, the Procter-Hirst reaction, and several other tests. It was found that the ext. gave such tests as would be expected from the materials used in tanning. Three samples which were tanned partly with cellulose ext. gave the Procter-Hirst reaction (ppt. with aniline and HCl), but when the leather was 3 months old the reaction was much less distinct. The method of Moeller (extn. of leather with dil. NaOH, ext. neutralized with HCl, Procter-Hirst test applied) gave no result with the 3 months old samples. L. B.

Detection of sulfite-cellulose in leather. W. MOELLER. *Collegium* 1915, 99-101.—M. believes Lauffmann's failure (cf. preceding abstr.) to obtain positive results by his method applied to old leathers tanned with sulfite-cellulose is due to too fine division of the leather. L. B.

Detection of cellulose extract in leather. R. LAUFFMANN. *Ledertechnische Rundschau*, April 22, 1915, 121-3.—Repeating the tests on the 3 leathers mentioned above by Moeller's method, the leather being cut instead of ground, all gave positive results. Boiling with H₂O gave equally good results, so L. concludes that extn. with alkali is not necessary. L. B.

Tanning with formaldehyde. *Shoe and Leather Rep.* 117, No. 9, 61-63; No. 10, 57-9(1915).—By the Eitner process, sheepskins in the pelt form after the beamhouse work are treated for 24 hrs. in a liquor 0.5 part com. HCHO to 100 parts water. They are then neutralized with a weak alk. soln. A mixt. of (NH₄)₂SO₄ and Na₂CO₃ is good. The skins are then washed in clean water and allowed to drip. Next they are turned for 1 hr. in the fat liquor (100 parts neatsfoot oil, 25 parts Na₂CO₃, and 500 parts of water). The product is very supple and of the nature of ordinary alum tanned leather, although the grain is fuller and more brilliant. The flesh side may be made velvety by the use of an emery wheel. By adding a little first quality moellon in the soap fat liquor extremely supple yellow skins are obtained. Neatsfoot oil and clear cod oil produce white skins. For each skin from 60 to 70 g. of grease are necessary. Finishing may be done as for chamois or mocha. Careful buffing removes the harsh grain and leaves a velvety surface. The process for sheepskins may be varied as to time, strength of solns., etc. For HCHO tannage of kips, the skins are soaked about 2 days in a soln.

of 2 parts NaOH or 5 parts Na_2S to 1000 parts water; then 6 hrs. in pure water. They remain in the lime liquor (5 parts $\text{Ca}(\text{HS})_2$ to each 100 parts of skins) for 5 to 6 days, are washed in tepid water, and then tanned in a pit (12 to 13 days) or a paddle (5 days). The soln. is 2.5 parts com. HCHO to 100 parts of water. The tannage is continued until a section cut from the skins will stake properly. They are then washed, neutralized if necessary, fat-liquored (3 parts good white olive soap to 100 parts water—extra oil may be added to make skins particularly supple), and washed. The skins are then dried and staked thoroughly. White skins are rubbed over with talc, zinc white or lithopone. HCHO liquor may be strengthened and used for a second lot of skins; very poor weighing leather results, however. Other salts as NaHSO_4 , alum, or hypo may be used in place of alkali carbonate. HCHO seems to cause the fibers of the pelt to be so sepd. that other tannins penetrate more quickly, although fixation is not necessarily more rapid. The application of a soln. of HCHO to the grain surface before drum tanning is not recommended as it may cause a brittle grain. A HCHO bath previous to either vegetable or chrome tannage has been found by Thuau to reduce the time very much and to produce a satisfactory product. The use of HCHO with both basic and acid coloring matters is patented. HCHO may be used for brightening vegetable tanned leather. The use of glycerol and sugar is not recommended. Eitner found that a raw calf skin rubbed with a weak aq. soln. of HCHO along with MeOH kept fresh for 4 weeks. On being placed in water the hair slipped easily although the skin was fresh and sterile. To harden the grain, sheepskins (perfectly free from lime) are placed in a 0.05% bath of HCHO for 4 hrs. Calf skins are first bated and scudded and then placed in a HCHO bath up to 6 hrs. Skins for burnished leather are completely delimed and then placed in the HCHO bath for 12 hrs. Placing fur skins in a 0.5% HCHO soln. hardens the grain so the hairs are held more tenaciously. The skins are placed in a paddle with the soln., turned $\frac{1}{2}$ hr., dried $\frac{1}{2}$ hr., and turned for 1 day. They are then neutralized with a soln. of 250 g. soda and 250 g. $(\text{NH}_4)_2\text{SO}_4$, washed and put over a horse to drip. A mixt. of egg and flour with dextrose if necessary is placed on the flesh side and the hairs are degreased. J. S. ROGERS.

Artificial bates. J. T. WOOD. London. *Collegium* 1915, 82-5.—Several bates recently placed on the market are discussed and analyses given. L. B.

Russian, particularly Caucasian, tanning materials. V. G. POVARIN AND V. TOLKUNOV. *J. Russ. Phys. Chem. Soc.* 46, 1343-6 (1914).—The methods previously used for the exam. and classification of willow barks (cf. C. A. 8, 1031) were applied to numerous samples of tanning materials obtained chiefly from the Caucasus. The results are given in an extensive table that cannot be briefly abstracted.

H. M. GORDIN.

Apparatus for determining the melting point of paraffin waxes (SMALL) I.

U. S., 1,141,224, June 1. O. C. E. P. WAWRZINIOK. **Making artificial leather** by coating woven fabric with a plastic mixt. containing nitrocellulose and oil paint and exposing the coated fabric to the action of hot solvent vapor to render the coating firmly adherent and pliable.

U. S., 1,141,545, June 1. R. O. HERZOG and A. MEIER. **Substitute for ordinary leather** formed of a layer of split leather or other strengthening and backing material with an attached layer formed by growing bacteria or fungi, e. g., *B. xylinum*, *B. xylinoides* or *Mucor boidin*, on the material and tanning the layer. Before tanning, the growth may attain a thickness of 30 cm., which is reduced 95-97.5% by tanning.

Ger., 280,216, Aug. 28, 1912. J. STOCKHAUSEN. Mfg. articles from gelatin casein, and similar plastic masses. The articles are wrapped up in moist paper and heated.

Ger., 281,268, Dec. 21, 1912. Addition to 277,653 (C. A. 9, 1136). J. STOCKHAUSEN. Mfg. elastic and plastic masses from glycerol-gelatin, and the like. If finely powdered colophonium, copal, or the like, be added to the masses obtained according to the principal patent from glycerol-gelatin, camphor, and S, a favorable action shows itself even after a short period of heating. However, after heating for a long time, say 3 days, the mass becomes homogeneous, the particles of S, camphor and resin, which were before discernible, disappear, and the toughness of the mass increases. While the masses without the addition of resin break and become friable in the heat, those with the resin addition are tough even in the heat, and do not crumble; they also exhibit a certain degree of plasticity. E. g., 125 g. gelatin are dissolved in 125 g. glycerol and ground up intimately with 5-10 g. S, 20 g. camphor, and 10-50 g. colophonium. They are then hardened with 10-20 g. HCHO (4%) or 3-10 g. $\text{Na}_2\text{Cr}_2\text{O}_7$, and heated for a long time.

Ger., 281,541, Nov. 12, 1913. GRAF FRANZ VON KEGENECK. Mfg. a celluloid substitute from gelatin and casein. To a mixt. of glue or gelatin which, after softening, is melted in H_2O , are added casein and water-glass, and the product is then, in the known manner, rendered insol. by means of a hardener such as alum. A transparent, light-colored product is obtained, which is made readily and without danger, is combustible and easily worked. E. g., 200 g. gelatin or glue, after being softened in H_2O , are melted with heating, whereupon 30 g. casein, 30 g. water-glass, and if necessary a transparent dye, are added. The mass is stirred well, then filtered and discharged upon a level glass plate. After drying, the mass is left for several hrs. in tanning baths (chrome alum, alum, tannin, or the like). Even before complete drying, the mass becomes insol. in H_2O .

30. RUBBER AND ALLIED SUBSTANCES.

R. T. STOKES.

A review and discussion of the literature on the nature of latex and its treatment.

G. HÜBENER. *Kolloid-Ztg.* 16, 5-13(1915).

W. F. ZIMMERLI.

Protein in rubber and latex. F. FRANK. *Gummi-Ztg.* 29, 196-8(1915); see

C. A. 9, 2003.

M. H. DANIELS.

Brit., 3,632, Feb. 12, 1914. N. W. BARRITT. In a process of coagulating rubber latex, latex, whether pure or dild. naturally by rain or artificially by weak alk. solns. to prevent spontaneous coagulation, is concd. to a standard strength before it is coagulated. The resulting rubber is thus made uniform. The concn. is effected by partial evapn. under reduced pressure at ordinary temps., say not exceeding 50° , and the coagulation is effected by treating the latex in thin films, on a revolving cylinder of wood or otherwise, to the action of smoke or the vapor of HOAc, etc.

Brit., 3,770, Feb. 13, 1914. J. BRIGHT and BROS. and F. LYE. Pneumatic tire fabrics are made by putting a coating of rubber on a napped or raised cotton duck or like fabric.

Brit., 4,263, Feb. 19, 1914. S. J. PEACHEY. *p*-Nitrosodimethylaniline or *p*-nitroso-ethyl-aniline is employed for accelerating vulcanization. In an example, 100 parts of

rubber are mixed with 10 parts of S and 0.5 part of the accelerating agent, the mixt. being heated for 20 mins. at 135-45°.

Brit., 4,293, Feb. 19, 1914. S. WILSON. Repairing rubber articles by applying to the damaged part one or more layers of a thick soln. of masticated rubber dissolved in benzine or similar solvent, with or without a preliminary coating of a similar but thinly mixed soln., and vulcanizing the soln. so applied by a wash of SCl_2 and CS_2 or other similar solvent. The preferable proportions for the thick soln. are stated to be 1.5 pts. each of "Shell" benzine and CS_2 to 8 oz. of masticated rubber.

Fr., addition 18,705, Dec. 29, 1913, to 464,533. BAYER & Co. In a process of hastening vulcanization, addition products of CS_2 and dimethylamine (1%), tetramethylenediamine, and other bases of high b. p. or high b. derivs. of low b. bases.

Ger., 280,596, May 28, 1911. BADISCHE. Mfg. isoprene. See Fr., 435,312 (C. A. 6, 2548).

Ger., 280,751, Jan. 27, 1914. Addition to 279,649 (C. A. 9, 1860). F. KEMPTER. Mixing machine for gums.

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No. 16.

I. APPARATUS.

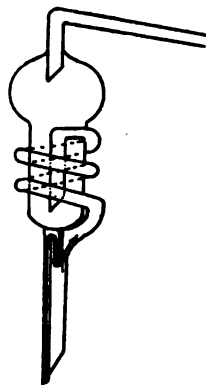
L. C. JONES.

Origin and development of the ultramicroscope. O. SCARPA. *Ann. chim. applicata* 3, 295-313(1915). S. LEVY.

Apparatus for the continuous extraction of a liquid by another and heavier liquid. I. GREENWALD. *J. Ind. Eng. Chem.* 7, 621(1915).—The app. described and illustrated is simple, compact and can be made easily by any glass-blower. ISADOR MILLER.

A modified pipet. S. BORN. *J. Ind. Eng. Chem.* 7, 621(1915).—A stopcock and bent glass tubing are fused to the ordinary pipet. ISADOR MILLER.

New tube for the rapid distillation of ammonia. E. POZZI-ESCOT. *Ann. chim. anal.* 20, 125-6(1915).—See fig. To effect a rapid distn. of NH_3 without entraining fine particles of NaOH the tube shown in cut was devised. The outer coil also serves as a cooler. F. W. SMITHER.



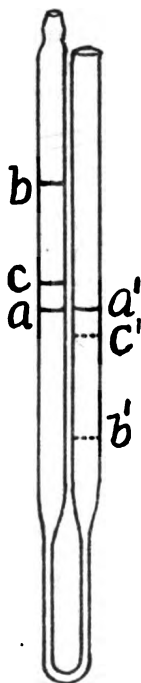
Indicator stopper for distillations. ANNIBALE FERRARO. *Boll. chim. farm.* 53, 8-9(1914).—The tube connecting the distg. flask with the condenser in the app. for detn. of total N by the Kjeldahl method is bent to an obtuse angle and the portion of the tube constituting the side of the angle next the condenser is equipped with a small tubulature provided with an accurately fitting glass stopper. The portion of this stopper which enters the tube consists of a small reservoir which is perforated in the direction of the axis of the tube so as to permit passage of NH_3 vapor. When one desires to ascertain whether or not the evolution of NH_3 vapor from the distg. flask has ceased, this stopper is quickly replaced by a similar stopper, the reservoir of which contains $\frac{1}{2}$ drop of tincture of red litmus (or preferably very dil. phenolphthalein soln.). The removed stopper (after addition of $\frac{1}{2}$ drop litmus or phenolphthalein soln. to the reservoir) may be re-inserted when it is desired to repeat the test. Suitable tests showed that no detectable amt. of NH_3 vapor is lost during removal of the 1st and substitution of the 2nd stopper. H. S. PAINE.

Adiabatic calorimeter. V. SVYENTOSLAVSKII AND I. PAKOVICH. *J. Russ. Phys. Chem. Soc.* 46, 1284-93(1914).—Richards' adiabatic calorimeter (*Z. physik. Chem.* 52, 551) has the following drawbacks: It requires a large amt. (about 25 l.) of NaOH soln. to fill the outer jacket; the latter cannot be readily cooled without removing this soln. and replacing it by a cooler one; the soln. cannot quickly be heated throughout uniformly, the stirrer being placed in the lower part and to one side of the app. All these faults are remedied by the authors' new calorimeter whose construction is minutely described. Its essential features are an arrangement for heating the outer shell by the elec. current, and for cooling it by means of cold H_2O circulating through a Pb coil. As filling kerosene is used, and the stirring is done by a special device. Drawings of the whole app. and of the heating device are given. A detailed discussion of the correc-

tions to be used in calcg. the thermal data is entered into. With respect to the heat evolved by the friction between stirrer and liquid, it was found that when the stirrer does not touch the sides of the jacket the amt. of heat due to this source is negligible. The correction for the heat of evapn. of H_2O from the top of the calorimeter is entirely avoided by covering the latter with a layer of kerosene. As to the influence of the unavoidable difference between the temps. of the calorimeter proper and the outer jacket on the heat of radiation, it is shown that in the new app. this difference is reduced to insignificant proportions, and that in general a difference of even 0.2° has little influence on the heat of radiation. Cf. *C. A.* 9, 2180.

H. M. GORDIN.

A simple instrument for the determination of viscosity. A. SPEEDY. *J. Soc. Chem. Ind.* 34, 597-8(1915).—To avoid the difficulty in reading the marks with such app. as the Ostwald viscosimeter, the instrument shown in cut was devised. The marks are placed above the surface of the liquid which, therefore, need not be transparent.



*Two-thirds
scale*

The app. consists of a piece of glass tubing drawn out to form a capillary and bent into U shape. The liquid, the viscosity of which is to be detd. is filtered into the viscosimeter, which is clamped vertically in the bath so that the level marks, aa' , are just above the surface of the heating liquid. The bath is then heated to the required temp. and after a few mins. the levels, aa' , are carefully adjusted. By means of a piece of rubber tubing the liquid is then slowly sucked up the left limb of the tube until it passes the level, b . It is then allowed to descend; the time taken to fall from b to c is recorded. Part of the liquid under observation is above the surface of the heating liquid and is, therefore, at a slightly lower temp., but as the level falls, this part of the liquid regains its former temp. The error due to unequal viscosity in different regions arising in this way is negligible, as it is only the viscosity of the liquid in capillary tube that counts. The thinness of the wall of the capillary tube ensures that the liquid passing through the tube is at the temp. of the bath. The column of liquid, bc , never reaches the capillary. The level b' is well above the point where the constriction in the right limb of the tube begins. The time of flow from b to c only, is taken because on approaching a the motion becomes slow and uncertain. The const. of the instrument can be obtained by calibrating it with pure phenol or H_2SO_4 (cf. Dunstan, *C. A.* 6, 1702; 9, 405). The instrument may conveniently be strapped to a thermometer and suspended in the heating liquid contained in a boiling tube. The cheapness of the app. renders it possible to choose from a range of tubes one with a capillary of diam. best suited to the viscosity of the liquid to be examined. The best results are obtained if the time of flow is about 1-2 mins. at the temp. of observation. Results are reported on 6

oils using the above instrument, the totally immersed type of Dunstan and the Redwood form. The readings of the first 2 instruments agree within the limits of exptl. error. At 60° Redwood secs. may be obtained approx. by multiplying these readings by 500.

F. W. SMITHER.

An electromagnetic vacuum balance. J. S. ANDERSON. *Trans. Faraday Soc.* May 11, 1915 (7 pp.) (advance proof).—A. describes in detail with photographs and drawings an electromagnetic vacuum balance devised for the measurement of the velocities of absorption of vapor or gas by such porous substances as silicic acid gels.

The principle involved is that of the Kelvin balance for "weighing" elec. currents. One of the scale pans of an ordinary balance is replaced by a circular coil of wire whose axis is vertical; this coil is movable between 2 larger fixed coils of wire, which have the same vertical axis. The 3 coils are so connected that an elec. current may be passed through them in series, through the movable coil and the lower fixed coil in one direction and through the upper fixed coil in the opposite direction. Thus when one elec. current is passed through the coils, the movable one is attracted towards the lower, and repulsed by the upper, fixed coil. These attractive and repulsive forces may be varied with the current and used to counterbalance the force of gravity acting on the substance to be weighed in the scale pan hanging from other end of beam. The whole is enclosed in a bell jar which can be evacuated. Cf. Urbain, *C. A.* 6, 1080; Anderson, 8, 3141.

F. W. SMITHER.

Experiments with thermometers with vacuum mantles. GOTTFRIED DIMMER. *Z. angew. Chem.* 28, I, 255(1915).—Hahn (*C. A.* 8, 1221) has proposed this as a means of eliminating the stem correction. D. states that the cond. of a gas is independent of its density, and hence the device is useless. Two thermometers so constructed (scales 10 and 59 cm. long, resp.) were arranged with connections to a Gaede pump and an X-ray tube. When immersed up to the zero in a flask at 100° and with air in the jacket at atm. pressure, the stem corrections were 1.0 and 0.93°, resp. When the pressure was lowered to an X-ray vacuum, neither thermometer showed any change in the correction. Some further minor corrections to H.'s article are appended.

W. L. BADGER.

A convenient thermostat for accurate specific gravity determinations and gas-pressure regulator. K. C. BROWNING AND C. T. SYMONS. *Trans. Faraday Soc.* May 11, 1915 (4 pp.) (*advance proof*).—The authors describe in detail with drawings a heavy gage Cu tank thermostat devised for use in detg. the sp. gr. of alc. (cf. *C. A.* 9, 117). The gas pressure regulator consists of a brass cylindrical casting, walls 3-4 mm. thick, 16 cm. internal diam., and about 16 cm. high. Near the bottom is a brass partition which carries the valve bush and seating. The bottom is a heavy brass plate screwed into the cylindrical casting. It is provided with a squared recessed boss in the center; the recess takes a key which is used to unscrew the bottom and enable the valve to be got at for grinding in when necessary. The top consists of a sheet of rubber insertion held in position by a brass ring, screwed by 16 screws into a flange. Through the center of the rubber passes the valve stem secured by 2 nuts and concave-convex brass washers. A large brass washer 11 cm. in diam. is placed above the rubber. The concavity of the washers is slight and should be such as to let the rubber insertion fit snugly to the washers when it is raised a little. At the top of the valve stem is a cup, in which wts. can be placed. The valve must move freely and the stem be dead true. The contact between the valve and seating must be very narrow. The valve is ground into its seating with 220-mesh carborundum powder and finished with FF carborundum. *Advantages:* No leakage at the valve or at the flexible top. It is portable and takes up little room; can be rapidly set for any desired reduction of pressure; does not require careful leveling and is very strong.

F. W. SMITHER.

Method of paraffining labels. D. L. RANDALL. *Chem. Analyst* 13, 25(1915).—Dissolve paraffin in CCl_4 . Use satd. soln. as a varnish. H. M. LANCASTER.

U. S., 1,142,826, June 15. W. C. McELHENY. Apparatus for refining and distilling oils by heating in a vertical cylindrical still the lower portion of which contains a series of concentric helical heating coils placed close together.

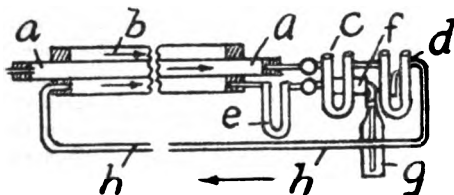
U. S., 1,143,162, June 15. J. ARMSTRONG. Gas-washing apparatus.

U. S., 1,143,790, June 22. J. F. SIMMANCE and J. ABADY. **Gas calorimeter**, in which H_2O used to absorb heat from combustion in a gas burner, as well as the gas and air supplied to the app., are all brought to the same temp. before entering the calorimeter by piping arranged to effect heat-exchange between the 3 materials.

U. S., 1,144,044, June 22. J. J. McNOON. **Acetylene generator**.

Aust., 6,910, Aug. 13, 1912. H. STRACHE. **App. for the continuous determination of the density of gases**. A container is drawn full of one gas, through a fine opening, and then another gas is drawn through the same opening. The difference of the pressure immediately before and after the beginning of the suction of the second gas is observed and registered. Cf. C. A. 8, 2827.

Brit., 4,826, Feb. 24, 1914. H. BRACH. In app. for elementary organic analysis by combustion, the combustion tube *a* containing CuO or the like is inserted with a tight joint in a wider tube, *b*, which also contains CuO , etc.; the products of combustion pass through the absorbers *c*, *d*, and CO and unabsorbed CO_2 from the absorber *d* are led by the pipe *h* back to the tube *b*, where the combustion is completed, and thence pass to an absorber, *e*; a $CaCl_2$ tube *f*, and a wash-bottle, *g*, containing $PdCl_4$ to indicate passage of CO and the speed of combustion, are provided.



Brit., 5,647, Mar. 5, 1914. R., W. G. and F. R. SIMON. In **drying apparatus**, wet materials are dried and in the process are mixed with a proportion of material already dried, in a rotary agitator machine, by providing a valve, slide, etc., in the casing of the drier or in that of a conveyor combined therewith, which discharges a regulable quantity of material and returns a regulable quantity to the feed end of the drier.

Brit., 5,905, Mar. 9, 1914. H. E. THENSEN. A device for **separating water and other liquids**, such as tar or pitch, from gases and vapors comprizes a casing containing a lower chamber serving as a depositing chamber and an upper chamber containing vertical perforated plates arranged across the chamber, so that the gas, etc., traverses an S-shaped path, first through the depositing chamber and then through the perforated plates.

Ger., 281,424, Jan. 29, 1911. B. BORZYKOWSKI. **App. for mfg. films or bands of celluloid or other masses dissolved in volatile solvents**.

Ger., 281,459, Apr. 5, 1912. E. ALTENKIRCH and G. GEHLHOFF. **Addition to 280,696 (C. A. 9, 2010). Thermoelectric cold and hot junctions**.

Ger., 281,482, Sept. 5, 1913. MASCHINENFABRIK AUGSBURG-NÜRNBERG, AKT.-GES. **Constructional details of a gas container**.

Ger., 281,621, Oct. 21, 1913. F. KRUPP AKT.-GES. GRUSONWERK. **Magnetic separator**.

Ger., 281,746, Mar. 29, 1913. **Addition to 281,324 (C. A. 9, 1708). M. ERFURTH. Constructional details of a settling machine**.

Ger., 281,836, Feb. 3, 1914. **Addition to 281,482 (supra). MASCHINENFABRIK AUGSBURG-NÜRNBERG, AKT.-GES. Sealing device for gas containers**.

Ger., 282,372, June 25, 1914. A. EBERHARD. **Drip pan under filter presses**.

Ger., 282,656, June 20, 1914. **Addition to 276,119 (C. A. 9, 5). R. TYMM. App. for expelling gases from liquids or otherwise treating liquid or solid substances in a circulating chamber**.

2. GENERAL AND PHYSICAL CHEMISTRY.

WILLIAM D. HARKINS.

Assistants: E. B. MILLARD and A. B. CARTER.

Lavoisier and Berzelius in the history of science. I. GUARESCHI. *Ind. chim. min. e metall.* 2, 233-40(1915).—A historical paper. E. J. WITZEMANN.

Physical chemistry in 1914. A. BERTHOUD. *J. chim. phys.* 13, 55-83(1915).—A review under the sub-heads stoichiometry, thermochemistry, chem. mechanics, electrochemistry, photochemistry and radiochemistry. E. H.

The periodic law. SAUL DUSHMAN. *Gen. Elec. Rev.* 18, 614(1915).—A review. C. G. F.

Oxygen content of the atmosphere. A. LEDUC. *Compt. rend.* 160, 710-1(1915).—Guye and Germann by their method of analysis (*C. A.* 8, 3386) have reported 20.8% by vol. in 2 samples of dry air after treating with KOH. L. states that 24 yrs. ago (*Compt. rend.* 113, 129(1891)) he obtained as an av. for Paris and its environs, treating the air in same manner as G., 21.0% by vol. Eckholm (*Recueil de constantes de la Soc. française de Phys.*) reported an av. of 20.99%. The value 20.8% does not accord with the d. of O and of atm. N detd. by Lord Rayleigh. On the seacoast in winter 20.83% has been noted and 20.81% in the mountains with descending wind; however, it is doubted if the air of Genève is ever this low in O. F. W. SMITHER.

Influence of allotropy on the metastability of metals and its bearing on chemistry, physics and technics. E. COHEN. *Trans. Faraday Soc.* 10, 216-39(1915); see *C. A.* 8, 1223; 9, 987, 1565, 1867. E. J. C.

Heat effects accompanying the cooling of some metals. P. N. LASCHENKO. *Proc. Don Polytechnic Inst. Novocheerkovsk, Russia*, 3, 60 pp.(1914); cf. *C. A.* 8, 2647.—Cooling curves, tables and photomicrographs of Ag, Zn, Al, Sb, Mn, Fe, Ni and Cr. B. R. HONOVSKI.

The activation of chlorates by formic acid. K. A. HOFMANN AND K. SCHUMPFELT. *Ber.* 48, 816-22(1915).—The fact that, when chlorates are "activated" by Os_2O_5 and carbonaceous matter is oxidized in their presence, the oxidation proceeds in two stages, resulting in first a slow and later a rapid evolution of CO_2 , was found to be due to the formation of HCOOH . The "activation" of chlorates by HCOOH is not dependent on the acidity of the latter. $\text{CH}_3\text{CO}_2\text{H}$, $\text{CH}_3\text{CICO}_2\text{H}$ and $\text{CCl}_3\text{CO}_2\text{H}$ and H_2PO_4 in strengths equiv. to the solns. of HCOOH that were used did not activate chlorate solns. Exptl. work on the rate of formation of ClO_2 and CO_2 in mixts. of NaClO_3 and HCOOH is recorded and also expts. on the oxidation of indigo sulfate, $\text{C}_6\text{H}_7\text{NH}_2$ and anthracene by chlorates in the presence of HCOOH . The work showed that by the reduction of chlorates by HCOOH , ClO_2 is formed; this oxidizes such compounds as indigo sulfate, $\text{C}_6\text{H}_7\text{NH}_2$, etc. This is analogous to the activation of atm. O by reducing agents. A reducing "activator" acts upon an oxidizing agent to form a more actively oxidizing substance. It follows that oxidizing and reducing agents cannot be classified by means of their electrochem. properties, but in each case the activity of the oxidizing agent depends upon the special nature of the reducing agent. E. W. BOUGHTON.

Theory of gaseous reactions. HEINRICH LÖWY. *Ann. Physik* 46, 561-8(1915). E. B. MILLARD.

Substances in the colloidal condition. CARLO MAZZOLI. *Boll. chim. farm.* 52, 903-4(1913).—In connection with the consideration of the internal structure of colloidal substances M. takes exception to the statements of Carcano that colloids may be regarded as being in a condition (designated by the term "micellae" (Nägeli)) similar to the ionic state and that colloidal I produced from HI may be regarded as existing

in an "ionic" grouping, so to speak. The physical and chem. properties of colloids indicate that the latter are in a transitory state which is essentially neither a purely molecular nor atomic grouping (inasmuch as certain physical properties are modified or lacking), but partakes of certain characteristics of these conditions. From a purely chem. standpoint the colloidal condition may be regarded as a peculiar form of aggregation which has much in common with the nascent state.

H. S. PAINE.

Causes of decolorization of the colloidal solution of arsenic sulfide and conditions under which it takes place. N. P. PRSKOV. *J. Russ. Phys. Chem. Soc.* 46, 1619-45 (1914).—It was shown by Vorländer (*C. A.* 7, 2881) that when H_2S interacts with As_2O_3 in very dil. soln. the latter remains colorless, but that the CO_2 of the air or the addition of electrolytes or other substance capable of coagulating colloids colors the soln. yellow. V. explains this by assuming the formation of a colorless unstable mol. combination $xAs_2O_3 \cdot yH_2S$, which the addition of the above substances converts into yellow As_2S_3 . This explanation P. considers unsatisfactory. The fact that just those substances which are capable of coagulating colloids impart color to the soln. clearly indicates that the colorless soln. already contains colloidal As_2S_3 in a colorless form, and that these substances merely change the form of the colloid from colorless to yellow. P. assumes that the colorless and the yellow As_2S_3 differ from each other in 2 respects: the individual particles are of different size, and while in the colorless soln. these particles exist as individual units, in the yellow soln. the latter form aggregates of several units each. This is supported by the fact that the colorless soln. is obtainable only in presence of an excess of As_2O_3 or, as shown by P., in presence of gelatin. With the latter colorless solns. are obtainable in even higher concs. of As_2S_3 than were used by V. The As_2O_3 and the gelatin have the power of stabilizing the individual particles, preventing them from forming yellow aggregates, while electrolytes and other coagulators have the opposite effect. As to the nature of the individual particles in the colorless soln., they must also be regarded as colloids, and not as crystalloids. This is proved by the fact that an elec. current passed through the colorless soln. transports the As_2S_3 like other colloids, and does not leave it where it is, as it does with cryst. nonelectrolytes, or decomp. it, as it does with cryst. electrolytes. Expts. were also carried out in order to prove that the decolorization of V.'s soln. is not due to the hydrolysis of As_2S_3 to As_2O_3 and H_2S . For this purpose a yellow soln. of As_2S_3 was gradually dild. with H_2O , and the changes in the intensity of color plotted against the changes in concn. The resulting curve was found to be a straight line, showing that it is not hydrolysis that influences the color, since if this were so the diminution in the intensity of the color ought to change faster than the concn., giving a curve that is inclined towards the axis of intensities. An app. is described in which the transport of As_2S_3 can be shown, and numerous tables and curves illustrate the article.

H. M. GORDIN.

Electrical conductivity of colloidal solutions. H. NORDENSON. *Upsala. Kolloid-Z.* 16, 65-9 (1915).—The max. charge of a colloidal or suspended particle is proportional to its radius. If a substance be in the one case in electrolytic soln., in the other case colloiddally dissolved the ratio of the conds. will be inversely as the square of the radii; thus the cond. of a colloid of known concn. and degree of dispersion can be calcd. It follows that the cond. of moderately concd. and moderately dispersed colloids, e. g., metal sols., does not reach measurable values. The values obtained experimentally are due to the small amts. of electrolytes present. In colloids of very high concn. and high degree of dispersion, especially non-metallic colloids, the cond. may reach measurable values, but here too the influence of adsorbed electrolytes must be considered.

H. I. MATTILL.

The formation of colloidal solutions by flames or electrical spark discharge. J. DONAU. *Graz. Kolloid-Z.* 16, 81 (1915).—Reduction of a gold chloride soln. by playing

an oxy-hydrogen flame upon the surface results in a violet or blue colloidal Au, because of the greater amt. of oxides of N formed. A hydrogen flame gives a red colloidal Au. A spark discharge just under the surface of a AuCl_3 soln. soon forms red colloidal gold, undoubtedly due to the reducing action of the oxides of N. H. I. MATTILL.

Colloidal gold formation. F. HARTWAGNER. Munich. *Kolloid-Z.* 16, 79-80 (1915).—By exposing AuCl_3 solns. containing hexamethylenetetramine, H_2O_2 , oxalic acid; EtOH, HCHO, MeCHO and paraldehyde, to diffused daylight, direct sunlight and the light from a Hg vapor lamp it was found that the reduction occurred most rapidly in sunlight and least rapidly in diffused daylight, the color of the colloidal gold formed in these cases being the same, and usually differing from that formed by exposure to the Hg vapor lamp. H. I. MATTILL.

Seeding action in gels. R. E. LIESEGANG. Frankfurt. *Kolloid-Z.* 16, 76-9 (1915).—Observations on gaseous seeding, the seeding action of non-cryst. substances and of "Vorkernen." Not suitable for abstracting. H. I. MATTILL.

Capillary constant of sea water. A. BERGET. *Compt. rend.* 160, 677-8 (1915).—The difference between levels in tubes of different sizes joined into a U was measured with a cathetometer for an artificial sea water, for natural sea water at several dilutions, and pure H_2O , at 0° and 12.5° . The capillary const. in mg. per mm. was 7.357 for pure H_2O , 7.553 for sea water, and 7.587 for the artificial mixt. The correction to be applied to areometer readings on account of this change is about 0.1%. E. B. MILLARD.

Experiments on emulsions. II. T. R. BRIGGS AND H. F. SCHMIDT. Cornell. *J. Phys. Chem.* 19, 479-99 (1915); cf. Newman, C. A. 8, 1039; Bancroft, C. A. 9, 1567. —The influence of time of shaking, soap concn., and the presence of Na resinate, Fe(OAc)₃, gelatin or free alkali on the formation of C_6H_6 - H_2O emulsions at "room temp." has been studied. In the presence of a suitable emulsion builder the relative amts. of the 2 phases present are without importance, the character of the emulsion depending on the interfacial membrane. If the concn. of soap in the aq. phase is over 0.01%, the ease with which C_6H_6 is emulsified is more or less const. Free alkali at low concn. has a peptizing action, and at higher concns. emulsification is retarded by it. E. B. MILLARD.

Theory of emulsification. VII. W. D. BANCROFT. *J. Phys. Chem.* 19, 513-29 (1915); cf. C. A. 9, 1567.—The Gibbs theorem in regard to the concn. in the surface film of substances which lower the surface tension applies only to substances in true soln., but a similar theorem probably applies to suspended particles. The concn. of peptone in a surface film does not give rise to the large differences of osmotic pressure calcd. by Metcalf (*Z. physik. Chem.* 52, 1 (1905)). While the presence of adsorbed gases may be a factor in causing the formation of a solid film, it probably plays only a minor part. The solid film which forms over Hg or Zn amalgams is an oxide; that over FeCl_3 solns. is probably hydrous Fe_2O_3 , and that over CoCl_2 is a carbonate formed by the action of $(\text{NH}_4)_2\text{CO}_3$. There was no reason for postulating an insol. modification of peptone; similar results can be obtained with colloidal Ag. E. B. MILLARD.

Adsorption in solution. VIII. Distribution law. G. GEORGIEVICS. *Monatsh.* 36, 391-405 (1915); cf. C. A. 8, 2832, 3735.—Sorption and the anomalous distribution of a substance between 2 non-miscible liquids are to be regarded as the same sort of process. The accepted theory of distribution which states that only the undissociated mols. are concerned in the distribution equil. is wrong, according to certain expts. by G., in which only when the total amt. in each phase was considered, were rational results obtained. If only the undissociated mols. were used in the calcn., the impossible result was obtained that piperidine was more associated in H_2O than in C_6H_6 . The assumption that only the undissociated mols. are distributed appears improbable,

since the values of the degree of dissociation obtained from f. p. detns. do not agree in many cases with α values from distribution expts. between C_6H_6 and H_2O . G. has made new detns. of the distribution of $CHCl_2COOH$ and $CH_2ClCOOH$ between H_2O and C_6H_6 , from which it was shown that the values of α increased from mono- to tri-chloro acid, just as the viscosities, and therefore the affinities for H_2O , do. Finally expts. on the distribution of pyridine, piperidine and hydrazine between C_6H_6 and H_2O showed that this equil. followed essentially the law of Henry, i. e., $\alpha = 1$. E. B. M.

Electron conception of valence. VII. Theory of electrolytic dissociation and chemical action. K. GEORGE FALK AND J. M. NELSON. *J. Am. Chem. Soc.* 37, 1732-48(1915); cf. *C. A.* 8, 1363, 1364.—F. and N. believe that "changes occurring in chem. reactions do not depend upon the electrolytic dissociation of the reacting substances. The chem. changes are accompanied very often by electrolytic dissociation phenomena, but the latter parallel the former (or *vice versa*) and do not necessarily precede or cause them." In the reaction between alkyl halides and amines to form substituted NH_4 halides and the decompn. of the latter into amines and alkyl halides, in general terms each of the positive groups in the NH_4 compd. may unite with the negative group and

there will be as many possible equil. of the type $NRRRRX \rightleftharpoons NRRR + RX$ as there are different R's; of the possible reactions only those which proceed with the greatest velocities and where one or more of the products are removed from the sphere of action will occur to a perceptible extent. The reactions involve no electrolytic dissociation but the formation of an "onium" compd. which, after its formation, may show electrolytic dissociation in suitable solvents. With this as the keynote, a number of apparently separate reactions may be correlated on the assumption of the formation

of oxonium compds. Thus we may have $Me_2O.HCl$ in equil. with $MeOH + MeCl$ or

$Me_2O + HCl$, $MeOR.HI$ with $ROH + MeI$, $ROMe + HI$ or $MeOH + RI$ (Zeisel

method for MeO detns.), $HOR.HX$ with $H_2O + RX$ or $ROH + HX$, $HOH.AcCl$ with

$HCl + AcOH$ or $H_2O + AcCl$, $AcOH.AcCl$ with $HCl + Ac_2O$ or $AcOH + AcCl$,

$MeOH.AcCl$ with $MeOAc + HCl$, $MeOH + AcCl$ or $AcOH + MeCl$, $(R'CO)OR.H-$

(OH) or $ROH.(R'CO_2)H$ with $ROH + R'CO_2H$, $H_2 + R'CO_2R$ or $ROH + R'CO_2H$.

"Onium" compds. possibly react more rapidly than do their constituents when not combined in the onium form. Thus, the rapidity of the reaction $NH_3 + HCl \rightleftharpoons NH_4Cl$ in the moist as compared with the dry state may be due to the fact that H_2O is made up of "double" and perhaps more complex mols. ($H_3O.OH$, etc.) in which oxonium O is already present; these double mols. react rapidly with HCl and the resulting oxonium chlorides then react rapidly with NH_3 . Similarly, the catalytic action of HCl in esterification or sapon. may be explained as due to the formation of an oxonium chloride of the acid or ester which then reacts rapidly to form a new oxonium compd. by the addition of Cl and the positive complex to the O of the alc. or of the H_2O . In support of their views, F. and N. point to the large number of facts regarding oxonium salts which has been accumulated in recent years. Both the nature and the strength of the acid and the character of the org. compd. influence their readiness of formation and their stability. Their formation need not be considered as connected with the electrolytic dissociation. Turning to inorg. compds., in the case of a bivalent metal halide, MX_2 , in H_2O the compd. $M[O(H_2)X]_2$ will be present and negative X combined with O carrying a predominantly negative charge will ionize into $[M(OH_2)_2]$ and $2X$ or the compd. may hydrolyze into $M(OH)_2 + 2HX$; addition of a base removes HX and produces further formation of $M(OH)_2$. Similarly, in NH_3 the compd. $M[N(H_2)X]_2$

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dissociates into $[M(NH_3)_2]$ and $2X$ but apparently there is no ammonolysis into $M(NH_3)_3$ and HX , so that the reaction between a base and MX_2 in H_2O in the presence of NH_3 salts or NH_3 will depend upon the relative amts. of the hydrated and ammoniated salt present; if there is an appreciable amt. of the former, $M(OH)_2$ may be pptd.; if only the latter is present, no $M(OH)_2$ will be pptd.

C. A. ROULLIER.

Electrical conductivity and diagram of state of the system benzoic acid-pyridine.

II. A. BASKOV. *J. Russ. Phys. Chem. Soc.* 46, 1699-716(1914).—An exam. of the system $BzOH$ -pyridine, similar to that previously made with the system $BzOH$ -aniline (cf. *C. A.* 8, 451), gave the following results: There is a definite chem. compd. containing 1 mol. each of base and acid, corresponding to a max. at 43.7° on the fusion curve. The system also contains 2 eutectics, at about 55 mol. % of $BzOH$ and 42.8° , and at about 5 mol. % of $BzOH$ and -41° . The cond. curve has a max. at 66 mol. % of $BzOH$ and up to 125° the temp. coeff. is positive and is gradually displaced in the direction of 50 mol. % of $BzOH$. Above 125° the chem. compd. begins to decomp., and the curve then has a negative temp. coeff. with a negative max. also at 66 mol. % of $BzOH$. The explanation of the appearance of a negative temp. coeff., as given in the former investigation, holds good in this case too.

H. M. GORDIN.

Anomalous electrolytic dissociation. A. N. SAKHANOV. *J. Russ. Phys. Chem. Soc.* 46, 1646-59(1914).—An exhaustive review of the work done by the author and other investigators on this subject. No entirely satisfactory explanation of this anomaly is known.

H. M. GORDIN.

Electrical conductivity in mixed solvents. A. G. DOROSHEVSKII AND S. V. DVORZHANCHIK. *J. Russ. Phys. Chem. Soc.* 46, 1676-99(1914).—Since in detg. the conditions of isohydry in mixed solvents (cf. *C. A.* 8, 288, 2515, 3143) it is necessary to have an exact method for calcg. the changes in the elec. cond. caused by diln., D. and D. examd. the proposed diln. formulas and the rules of Lenz and Cohen (*Z. physik. Chem.* 25, 1(1898)), Arrhenius (*Ibid* 9, 487(1892)) and Wakeman (*Ibid* 11, 49(1893)). Taking the results of their own former expts. as well as those of other investigators on the cond. of salts in mixed solvents, the following conclusions are arrived at: For solns. of strong electrolytes in H_2O + alcs. ($MeOH$, $EtOH$) the same diln. formulas are applicable as when the solvent is H_2O . The most suitable diln. formula within narrow intervals of conc. is $\lambda = A - a/\sqrt{v}$ in which A and a have the same values as in their former investigations, v is the diln., and n differs with the nature of the salt, being, e. g., 3 for Na and K halides, 4 for $BaCl_2$ or $Ba(NO_3)_2$, and 8 for Na_2SO_4 , K_2SO_4 , Na_2CO_3 and K_2CO_3 . The rules of Lenz-Cohen and Arrhenius are wrong. Wakeman's formula holds good for salts giving monovalent ions in H_2O + $EtOH$. For salts with divalent ions, e. g., $BaCl_2$ or $Ba(NO_3)_2$, in H_2O + $EtOH$, W.'s formula is applicable when it is given the form $\Delta^2/p(100-p) = k$, where x varies with the nature of the salt.

H. M. GORDIN.

Relation between viscosity and chemical constitution. IX. **Viscosity and fluidity of the aliphatic acids.** A. E. DUNSTAN. *J. Chem. Soc.* 107, 667-72(1915); cf. *C. A.* 8, 2291.—Detns. of viscosity by the transpiration method for 10 aliphatic acids at several different temps. Each detn. was made in 2 different viscosimeters, after their consts. had been detd. from time of flow for 8 standard liquids. The values for each acid fell on a smooth curve, which showed the rapid decrease in viscosity as the temp. rose. The CH_2 increments decreased steadily as the series was ascended, though there was some irregularity between C_4 and C_5 . Neither fluidity nor log. viscosity was strictly additive, but both are more nearly so than viscosities. The additivity of log. viscosity for these acids was somewhat affected by constitutive influences.

E. B. MILLARD.

Rate of hydration of camphoric anhydride. B. H. WILSDON AND N. V. SIDGWICK. *J. Chem. Soc.* 107, 679-82(1915); cf. *C. A.* 8, 906.—Conductivities of camphoric acid for concns. from 0.0964 to 0.618 milli-mols. at 18° and 25° have been measured by the method previously described. Camphoric anhydride was shaken with H₂O for varying lengths of time in a thermostat, after which the cond. of the soln. was measured. The hydration was complete at 25° in about 2 weeks, at 18° in about a month. Similar expts. in which the anhydride was shaken with 0.005 *N* alkali allowed the "catalytic" action of a base to be calcd. The rate of formation of acid from the anhydride was (approx.) 10000 times greater in the presence of alkali. E. B. MILLARD.

Neutralization curve of boric acid. E. B. R. PRIDEAUX. *Trans. Faraday Soc.* May 11, 1915 (3 pp.) (*advance proof*).—The calcd. points on a diagram plotting $-\log[\text{conc. H}^+ \text{ ion}]$ against the quantity of the first H⁺ neutralized did not fall on the exptl. plot. The deviation was ascribed to the formation of complex borates, since these would cause a difference between the apparent dissociation const., and that of the pure acid. Values recalcd. with a new value for this const. gave too great alkalinity, as would be expected if the degree of complex formation increased as neutralization progressed. E. B. MILLARD.

Problem of complex molecules. I. Evaporation and osmotic pressure. P. LENARD. *Sitzb. Heidelberger Akad. Wiss. Klasse A* 1914, 27, 28, 29, *Abhandlung* 23, 44, 66; *Chem. Zentr.* 1915, I, 930.—L. assumes that the charge on an electrically charged liquid cannot evap. with the fluid. The charged mols., which form large complexes by addition, are unable to evap. Even during the existence of the complex the mols. contained in it are held in the liquid by strong mol. forces as common mols., but the presence of mols. which are unable to evap., causes a depression of the v. p. of the liquid. In solns. the surface is composed of "soln. mols.," i. e., complexes between the simple solute mol. and several mols. of the solvent. From these considerations, the formulas for v. p. of a soln., and osmotic pressure are derived. Mol. forces do not come into consideration, but only the vol. of the complex mols., which accounts for the colligative properties of solns. **II. Molecular forces and their electrical action; waterfall electricity.** From the forces which act on the complex mols. in the surface an expression connecting these with the vol. of the mols., the mass of the active spheres and the temp. has been derived, from which the forces can be approx. calcd. in abs. measure. The rate of formation of surface films on freshly created surfaces could be followed (e. g. in waterfall electricity). Here the surface film consisted of an elec. double layer whose moment was a function of the dielectric const. (*D*) of the liquid. From an equation of Coehn and Raydt (*Ann. Physik* 30, 777, (1910)) according to which the elec. charge on a surface was proportional to the difference between the dielectric const. of the liquid and the gas above it, L. shows that the mol. force is proportional to (*D* - 1) for any liquid. The surface tension was substituted for the mol. force (which cannot be measured) or the inner force, since these in fact are proportional to *D* for CO₂, CCl₄, C₆H₆, CS₂, Et₂O, PhNH₂, PhNO₂ and H₂O. **III. Surface properties of liquids. Position of electrostatic charges. Vapor condensation.** The usual expression for the seat of electricity in extremely small surface films was replaced by a more refined one based on mol. structure. Electrified and unelectrified cloud particles of similar size do not show the large differences in point of condensation which are usually ascribed to them. E. B. MILLARD.

Relations between chemical constitution and crystal structure. P. GROTH. *Z. Kryst. Min.* 54, 498-504(1915); continuation of *C. A.* 8, 2832, 3049.—The chief difference between crystals and amorphous substances (gases, liquids, gels and "amorphous" solids) lies in their thermal properties. As to the uniting of atoms into the crystal structure, in diamond this can be accounted for by the valence of C, but in other

substances it is at present not possible to represent the structure on this basis. In diamond also the arrangement of the atoms corresponds with the cleavage, but in other substances this is not the case, and other phenomena such as cohesion evidently have an as yet undetd. influence. The atom is to be regarded as an anisotropic object, because of the variation in the forces it exerts with the direction; and mols. of amorphous substances, since they contain atoms in definite arrangement, must also be anisotropic; the optical isotropism of these substances is then evidently the result of the irregular arrangement of the mols. The anisotropism of mols. necessitates the exertion of orienting forces between them, which are weaker the less the anisotropism and the greater the mol. wt. The amorphous nature of all the more complicated compds. and certain phenomena of liquid and soft crystals may thereby be accounted for. Crystn. can only occur when at least a part of the constituents of the mols. become rearranged into groups of like atoms. But that certain of the more stable structural features of the mols. exert an effect on the atomic arrangement is shown by the many relations traceable between the chem. constitution and crystal structure, including the phenomena of morphotropy. Examples of these relations, chiefly organic compds., are discussed.

E. T. WHERRY.

Simple gliding (Schiebung) in lithium sulfate monohydrate. A. JOHNSEN. Kiel. *Neues Jahrb. Min. Geol.* 39 (Beil. Bd., Bauer Festschrift) 500-20(1914).—The various methods which have been used for exerting pressure on substances are critically discussed, Tresca's method (1879) being adjudged the most satisfactory, since it permits measurement of the max. one-sided pressure. The crystals of $\text{Li}_2\text{SO}_4 \cdot \text{H}_2\text{O}$ used are described crystallographically, slight differences from the accepted values of the constants being observed. After several unsuccessful or unsatisfactory trials by different methods, crystals were embedded in flowers of S, in a steel cylinder and exposed to as much as 7000 atm. pressure. for some hrs., when the S was dissolved out by CS_2 . "Sublimate," which could be dissolved away by Et_2O , and Wood's metal, which could be melted away at $80-90^\circ$ also gave good results. Gliding was found to take place on $K_1 = (\bar{1}21)$ with $\sigma_2 = ?(012)$. Translation occurred on (100), ($\bar{1}01$), (301), ($\bar{1}01$), and ($\bar{1}21$). By theoretical considerations and soln. expts. it is shown that the mols. of $\text{Li}_2\text{SO}_4 \cdot \text{H}_2\text{O}$ are not enantiomorphous.

E. T. WHERRY.

Artificial translations in magnesium sulfate. A. JOHNSEN. Kiel. *Centr. Min. Geol.* 1915, 33-8.—Translations in 5 directions, all parallel to known growth forms, were found to occur by the method previously described (cf. preceding abstract). The circular polarization was also studied, and crystals with the right bisphenoid (111) were found to be dextrorotatory. Crystals of Sr formate dihydrate showed 3 translation directions.

E. T. WHERRY.

A relation concerning the distribution of an electrolyte between water and some second solvent and its dissociation constant in aqueous solution. H. J. M. CREIGHTON. Swarthmore Coll. *J. Frank. Inst.* 180, 63-74(1915).—The following general formula has been developed for the calcn. of the concn. of the undissoc. mols. of an electrolyte in H_2O , by means of data obtained by the measurement of the distribution of the electrolyte between H_2O and a 2nd liquid phase:

$$z = \left[\frac{c' - c \sqrt{\frac{[b'(1-x') + n\sqrt{b'x'}]}{[b(1-x) + n\sqrt{bx}]}}}{\frac{[b'(1-x') + n\sqrt{b'x'}]}{[b(1-x) + n\sqrt{bx}]} - \sqrt{\frac{[b'(1-x') + n\sqrt{b'x'}]}{[b(1-x) + n\sqrt{bx}]}}} \right];$$

where z is the concn. of the undissoc. mols. in the aq. phase, c and c' are total concns. of the solute in the aq. phase in normal mols. per liter, b and b' are total concns. of the solute in the 2nd phase in normal mols. per liter, x and x' are degrees of association

of the solute in the 2nd phase for the 2 concns. b and b' , and n is the complexity of the associated mols. in the 2nd phase. In order to test the validity of this formula, measurements of the distribution of benzoic acid between H_2O and C_6H_6 have been carried out at 6° , and, from the data obtained, the concn. of the undissoc. mols. of C_6H_5COOH in the aq. phase has been calc. From these values, a mean value, 7.21×10^{-3} , has been obtained for the dissoc. const. of C_6H_5COOH in H_2O at 6° . Although the foregoing value for the dissoc. const. of C_6H_5COOH in H_2O is somewhat higher than that obtained by the cond. method, the use of the distribution method for obtaining an approx. value for the dissoc. const. of an electrolyte, in those cases where the value as detd. by the cond. method varies considerably with dilution, is suggested. H. J. C.

New method of determining solubility at different temperatures. L. A. CHUGAEV AND V. G. KHILOPIN. *J. Russ. Phys. Chem. Soc.* 46, 1659-68(1914).—The usual methods of detg. solubility at different temps. require the use of a thermostat and a special arrangement for continuous stirring. C. and K.'s method avoids the use of these. It consists in detg. the solubility of substances at the b. p. of their satd. solns., the desired temps. being obtained by varying the pressure, while the thorough mixing of the materials is insured by vigorous boiling. A suitable app. for this purpose consists of a wide-mouthed boiling flask in which the soln. is boiled with an excess of the solute, the temp. being indicated by a delicate thermometer, while the desired degree of rarefaction is effected by connecting the flask with a pump. In the upper part of the flask is suspended a weighing tube which can be filled with the satd. soln. by means of a syphon reaching to the bottom of the flask. Cuts of the app. and its parts are given. The solubilities of Li_2CO_3 , CaO , KNO_3 , $KClO_3$ and NH_4Cl were detd. by the new method, and the results found to compare very favorably with the best data given in the literature. H. M. GORDIN.

Solubility of strontium sulfate in solutions of calcium salts. M. RAFFO AND G. ROSSI. *Gazz. chim. ital.* 45, I, 45-50(1915).—The authors detd. the solubility of $SrSO_4$ (pptd. in the soln.) in aq. solns. of $Ca(NO_3)_2$ in various concns. It increases from 0.0483 g. per cc. for 0.5% $Ca(NO_3)_2$ solns. to 0.1955 g. for a 6% soln. The solubility of $BaSO_4$ in H_2O was not affected by the presence of $CaCl_2$ or $Ca(NO_3)_2$. The above gravimetric results were confirmed by elec. cond. measurements. E. J. W.

Vapor pressures and specific volumes of binary mixtures of volatile with non-volatile liquids. F. H. CAMPBELL. *Trans. Faraday Soc.* May, 11, 1915 (11 pp.) (advance proof); cf. C. A. 9, 402.—C. has made detns. of the sp. vol. and v. p. of mixts. of oleic acid and ether, oleic acid and CS_2 , $C_6H_5NH_2$ with Et_2O , oleic acid and acetone, Et_2O and H_2SO_4 , $MeOH$ and glycerol, and H_2O with glycerol, using the method worked out before. The results may be adequately explained on the assumption that the form of vapor pressure curve is detd. by mol. changes accompanying the process of soln. Thus the soln. may consist of a smaller number of particles than the liquids constituting it did before mixing, as a result of solvate formation, or the number may be greater owing to the dissociation of an associated liquid. Probably the most common case is where both processes take place together. Attempts to apply Dolazalek's theory quantitatively were not successful, even in the simplest cases. C. has suggested that the abnormal behavior of some pairs of liquids may be due to the formation of volatile complexes, *i. e.*, hydrates. E. B. MILLARD.

Equilibrium in the systems: α -naphthylamine-guaiacol and urethan-benzene. N. A. PUSHIN AND G. N. MAZAROVICH. *J. Russ. Phys. Chem. Soc.* 46, 1366-72(1914).—An exam. of the fusion diagram of mixts. of α -naphthylamine and guaiacol (a) showed that the system contains a definite compd. $C_{10}H_7(OH)(OMe).C_{10}H_7NH_2$, m. 21.4° , and 2 eutectics (e), at 40 mol. % of a and 19.8° , and at 77 mol. % of a and 14.3° . Only in the interval 43-50 mol. % of a are solid solns. probable. In the system urethan-

C_6H_6 (b) there is an ϵ at 97 mol. % of b at 4.2° , and solid solns. in the interval 97–100 mol. % of b . The existence in this system of such solns. accounts for the fact that the mol. depression of the f. p. of b caused by dissolving urethan in it is considerably smaller than the calcd. value (35.4 and 29.9 as found in 2 expts. against 51 given in Landolt-Börnstein's tables).

H. M. GORDIN.

Contact action of water vapor and carbon in the oxidation of ferrous compounds. A. G. DOROSHEVSKII AND A. YA. BARDY. *J. Russ. Phys. Chem. Soc.* 46, 1669–76 (1914).—Continuing the work on the oxidation of alcs. in presence of C containing FeO salts (C. A. 9, 1865), D. and B. examd. the influence of H_2O vapor on the catalytic power of C. For this purpose samples of C were mixed with $Fe(CO)_5$ and the mixts. divided into groups, some being kept in presence and others in absence of H_2O vapors, the temp. in both cases being about 18° . From time to time the samples were extd. by digestion with 10% H_2SO_4 , and the amt. of unchanged ferrous salt detd. with standard $KMnO_4$. It was found that oxidation of the ferrous salt took place only in presence of H_2O . Expts. were also made in order to det. the influence of temp. in this reaction by making similar detns. at 39 – 41° . The results showed that a rise in temp. greatly accelerated the oxidation. Since the previous expts. proved that the oxidation of alcs. in presence of C depends upon the latter containing FeO salts, C containing H_2O slowly loses its activity as an oxidizing agent upon prolonged keeping. If the time in the expts. at the 2 temps. be plotted against the amts. of unchanged FeO salts, it will be found that C containing the latter and H_2O will "die" as an oxidizing agent within a few days if kept at a moderately elevated temp., while at ordinary temp. its "span of life" is a few months. Unlike its oxidizing power, the adsorbing power of C seems not to be influenced by H_2O , a variation of 0.5–2.08% of H_2O having no effect on the adsorbing power. Experimenting with $FeCl_3$, it was found that shaking it with C and dil. H_2SO_4 greatly accelerates the oxidation (by the O from the air or from the C). The extn. of the above samples with H_2SO_4 was therefore made by digestion without shaking. The accelerating effect of shaking can hardly be ascribed to greater intimacy of contact between the materials. Taking into consideration the reducing effect on Fe_2O_3 salts, accompanied by an evolution of CO_2 , it can be seen that a mixt. of C and Fe actually "lives": it absorbs O from the air, changing FeO to Fe_2O_3 , and exhales CO_2 , causing the reverse reaction. As in other life phenomena, both processes require the presence of H_2O .

H. M. GORDIN.

Reaction velocity in a viscous (heterogeneous) medium. R. H. CALLOW. *Trans. Faraday Soc.* May 11, 1915 (5 pp.) (advance proof).—The hydrolysis of MeOAc by NaOH and by HCl at 18° has been studied in the presence of various amts. of gelatin added to produce a change of viscosity. No velocity const. were obtained from the alkaline hydrolysis, since the gelatin reacted with NaOH. If the gelatin was previously neutralized, its Na salt hydrolyzed on dilution with MeOAc. The relative viscosities as detd. in a Scarpa viscosimeter were 1.48, 3.69, 8.98, and 20.3. A series of reaction const. was obtained which showed a diminution as the gelatin concn. increased, but for a large change of viscosity there was a comparatively small change in the velocity const. Even in a set jelly the const. was only 10% less than when no gelatin was present.

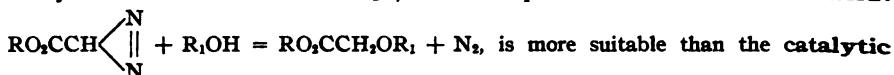
E. B. MILLARD.

Physico-chemical kinetics. II. R. MARCELIN. *Ann. phys.* 3, 185–231 (1915); cf. C. A. 9, 1710.—A physico-chem. complex in the process of transformation consists of a progressive system (of increasing mass) and a regressive system (of decreasing mass), such that the observed speed of the "reaction" is the resultant of these 2 systems. This idea was applied to the derivation of formulas for velocity of diffusion, crystn., soln., evapn., etc. From expts. on the speed of evapn. of Et_2O , CS_2 , $C_6H_5NO_2$, $C_{10}H_8$, and I, M. concludes that a liquid in contact only with its vapor may be overheated

while the pressure of the vapor is still 7 to 8 mm. Hg less than that of satd. vapor. In capillary tubes about 3 mm. in diam. the speed of evapn. when the liquid was overheated was $V = K(T_B - T_P)/rdL$, where K was a known const., T_B the temp. of the thermostat surrounding the tube, T_P the temp. at which vapor and liquid existed in equil. at the pressure P of the expt., d the density of the liquid, L its latent heat of evapn., and r the radius of the tube. The expts. showed that the temp. of the surface of an evapg. liquid was not that of the body of liquid, but that it corresponded closely to T_P , the equil. temp., and that the observed speed of evapn. was proportional to the rate of heat flow from the interior to the surface of the liquid. Expts. on the speed of sublimation of I and $C_{10}H_8$ into a vacuum showed that the speed of sublimation increased very rapidly with the temp.; e. g., from 0.0002 to 0.0165 arbitrary units from 35° to 70° . E. B. MILLARD.

Substances possessing anomalous dispersion of rotatory power. I. G. BRUHAT. *Ann. Phys.* 3, 232-82(1915).—Description of app. and methods to be used in later work. E. B. MILLARD.

Kinetics of chemical reactions. X. E. I. ORLOV. *J. Russ. Phys. Chem. Soc.* 46, 1441-81(1914); cf. *C. A.* 6, 1247; 7, 1123, 3063, 3064, 3065, 3563; 8, 3144.—An exam. of the work of Millar (*C. A.* 8, 449) showed that the velocity const. given in his tables gradually diminishes as the reaction progresses. This is due to M. having used in his calcns. the usual formula for monomol. reactions which, as was shown by O. in several articles, is in many cases inapplicable on account of intermediate reactions, making the reaction more complicated than is assumed in that formula. If O.'s formulas be used the agreement between theory and expt. is very good; this is shown by recalculating M.'s tables on the basis of these formulas. The intermediate reactions in M.'s work may consist in the formation of various complexes which are discussed at great length. It is assumed that the ions of the catalyzer (picric acid) distribute themselves between the components of the mixed solvent (alc. and H_2O) according to the law of mass action, forming various solvates. For calcg. the distribution of the H ions of the catalyzer between an alc. and H_2O , the decomp. of esters of diazoacetic acid:



esterification of an alc., because in the 1st case the reaction is not reversible, while in the 2nd the reversibility of the reaction furnishes additional H ions coming, not from the catalyzer, but from the acid. Hence the nature of distribution will vary with the nature of the acid. This is corroborated by an exam. of Goldschmidt and Thuesen's work (*C. A.* 7, 1651). Numerous tables and curves illustrate the article. H. M. G.

The effect of mechanical vibration on carbon dioxide in the vicinity of its critical temperature. W. P. BRADLEY, A. W. BROWNE AND C. F. HALE. *Z. Anorg. Stöckst.-Ind.* 6, 77; *Chem. Tech. Rept.* 38, 370(1914).—In the course of expts. on the critical state of CO_2 it was observed that shaking the pressure tube, which contained CO_2 in both liquid and gaseous phases, caused a nebulous appearance within. Although this phenomenon is a familiar one it has usually been considered the result of thermal change. The authors found that the nebula was formed only when the tube was held vertically and that the vibration of a tuning-fork dissipated it. The resulting expansion was exceedingly slight. H. L. OLIN.

Thermochemical significance of the coefficient "i" in $PV = iRT$. A. BOGORODSKI. *J. Russ. Phys. Chem. Soc.* 46, 1716-34(1914).—The coeff. i in van't Hoff's equation was introduced for the purpose of explaining the abnormal behavior of electrolytes in soln. in respect to elec. cond., lowering of f. p., etc. The explanation consists

in the assumption of electrolytic dissociation into ions caused by the solvent. Since, however, Khrushchev (*Ibid* 34, 153(1902)) showed that different salts exhibit strict individuality in that for some of them i increases, for others decreases, and for still others remains const. upon diln., the electrolytic dissociation hypothesis does not satisfactorily explain the nature of i . B. proposes therefore a new theory of soln., regarding the latter as a particular kind of hydrolysis. According to this the soln. of salts in H_2O consists in converting them into systems of $M(OH)_n(H_2O)_x$ and $RH_n(H_2O)_y$ (M = metal, R = acid radical). Part of these complexes are united with each other, forming the undissociated part of the salt, while another part is in equil. with solvent. To the latter part are due those properties of solns. which are usually ascribed to ions. From this point of view the heat of neutralization is the heat of formation of the hydrolyzed but undissociated part of the salt. If C_2 is the heat of formation of the dissociated part, and C_1 the heat of formation of the whole salt, C_2 will be equal to C_1 minus the heat of neutralization, and the ratio C_2/C_1 will have the same meaning as P_1/P for osmotic pressure and, in general, as the coeff. of dissociation i . Detg. the values of i thermochem. and cryoscopically, they were found to be almost identical, the ratio between them being from 1 to 1.1 in 28, and from 1 to 1.05 in 22 expts. This concordance entitles the theory to consideration.

H. M. GORDIN.

Heating method in investigating binary eutectic mixtures, particularly those containing silicates. N. I. BEZBOROD'KO. *J. Russ. Phys. Chem. Soc.* 46, 1830-74(1914).—The usual method of examg. binary systems of solids with respect to their eutectic and other singular p. consists in observing the p. of crystn. after the systems had been liquefied by fusion. This method presents great difficulties when the components show the phenomenon of supercooling, or when they dissociate under the influence of the high temp. to which mixts. have to be heated. B., therefore, proposes to use the method of gradually heating the mixts. instead of gradually cooling the melts. The m. p. gives as reliable data as the congealing p., and since in this method high temps. are avoided, the above drawbacks are eliminated. The applicability of this method to several systems is proved by numerous expts. in which were included several silicates of the contact-metamorphous variety (Memoirs of the Novoch. Technol. Inst., 1913, 101) which are characterized by ready dissociation. Microscopic examns. of melts obtained by this method are promised for a future date. Numerous tables and curves illustrate the expts.

H. M. GORDIN.

Vapor pressure of concentrated sugar solutions. D. O. WOOD. *Trans. Faraday Soc.* May 11, 1915 (19 pp.). (*advance proof*).—Solns. contg. 92.0, 156.6 and 224.3 g. sucrose per 100 g. H_2O were introduced into a special app. and freed from all traces of air, after which the vapor pressures were detd. barometrically. During the expts. the solns. were stirred by a glass float contg. Fe bars by means of an exterior electromagnet. Detns. of the v. p. of H_2O for every 5° from 60° to 90° agreed with the data in Landolt and Börnstein to about 3 mm. only. The heat of diln. of the weakest soln. as calcd. from the v. p. measurements increased with the temp.; for the stronger solns. it decreased with rising temp., but all of the values were of the right sign and order. Osmotic pressures calcd. from the v. p. data showed a decrease with rising temp. "While it was probable that the real pressure did not diminish, yet it certainly changes very slowly with the temp. for these strong solns."

E. B. MILLARD.

Heat of vaporization and molecular association in liquids. M. M. GARVER. *J. Phys. Chem.* 19, 500-12(1915).—Reply to Tyrer (*C. A.* 9, 993) defending the papers of C. A. 6, 1697 and 2879 against T.'s criticism. The equation discussed is $\gamma/2\epsilon = \rho RT/m$, where γ is the surface energy in dynes per cm. length, ϵ the range of mol. action, ρ the density of the liquid, m the mol. wt. of the vapor and R and T have the usual meaning.

E. B. MILLARD.

Calculation of the Despretz-Trouton constant. D. BERTHELOT. *Compt. rend.* 160, 637-60(1915).—The value of Q/T , where Q is the latent heat of vaporization and T the abs. temp., as calcd. from the integral of the equation $Q = \int_{T_1}^{T_2} (a/v^2) dv$, with the help of van der Waals' equation, was only 9 cal., in place of the usual 20 or 22. If the Berthelot equation be used in place of the van der Waals equation, the value 18 cal. may be obtained, making the same assumptions as before. E. B. M.

Von Babo's law and Kirchhoff's equation for the latent heat of dilution. A. W. PORTER. *Trans. Faraday Soc.* May 11, 1915 (10 pp.) (*advance proof*).—The equations have been derived thermodynamically proceeding as far as possible without any assumptions and without dropping "negligible" quantities which become considerable as the critical point is approached. The mathematical treatment cannot be briefly abstracted. E. B. MILLARD.

The calorimetric bomb and the heat of combustion of benzoic acid. V. SVYENTOSLAVSKII AND M. POPOV. *J. Russ. Phys. Chem. Soc.* 46, 935-75(1914).—In order that different investigators obtain concordant results in working with calorimetric bombs, it is necessary that they should all use as standard the heat of combustion (H) of the same substance, and that the detn. of the consts. of the app., the corrections, etc., should be made by the same method. The most suitable substance for use as standard is $BzOH$ (B). Since for the H of B different values are given in the literature, it is important to state in each case what value of H was used. This value, as detd. by the very careful measurements of S. and P., is 6310 cal. per g. (abs.) at 17° . The detn. of H for any substance should be carried out under exactly the same conditions as prevailed during its detn. for B . The only correct method for calcg. the H_2O value of a bomb is that of Stohmann (*J. prakt. Chem.* 39, 532). Contrary to the opinion of Fischer (*Ber. Berlin. Acad.* 1904, 687), it is immaterial whether H is expressed in abs. units or in cal. The mass of mathematical details for calcg. the various factors and corrections cannot be abstracted briefly. H. M. GORDIN.

Adiabatic determination of the heat of combustion of benzoic acid. V. SVYENTOSLAVSKII, M. POPOV AND I. PAKOVICH. *J. Russ. Phys. Chem. Soc.* 46, 1293-301(1914).—In a former investigation (cf. preceding abstr.) the heat of combustion (A) of $BzOH$ detd. non-adiabatically was found to be 6310 cal. for 1 g. (abs.). Detg. A adiabatically in their new calorimeter (cf. *C. A.* 9, 2165), its value was found to be 6304.6 cal. per g. (abs.). The occasion was used to give the new app. a thorough trial. The numerous expts. given in tables and curves showed that for this calorimeter the temp. changes for the calorimeter proper and its jacket are represented by curves that practically coincide, proving that there is practically no loss through radiation. H. M. GORDIN.

Regnault-Pfaundler's formula. V. SVYENTOSLAVSKII. *J. Russ. Phys. Chem. Soc.* 46, 1302-10(1914).—Comparing the values of the heat of combustion of $BzOH$ detd. adiabatically in the new calorimeter and non-adiabatically in a Berthelot calorimeter, it was found that the value by the 1st method is lower by 1% (cf. the 2 preceding abstrs.). The reason of this is that the correction for the heat of evapn. of H_2O on the surface of the calorimeter is omitted in Regnault-Pfaundler's formula, evidently assuming that the loss due to this source is proportional to the difference in the temps. of the calorimeter proper and its outer shell. It is shown that when this source of error is eliminated by covering the calorimeter with kerosene the 2 methods give identical results. H. M. GORDON.

New method for determining the specific heats of liquids. E. J. HARTUNG. *Trans. Faraday Soc.* May 11, 1915 (5 pp.) (*advance proof*); *C. A.* 9, 405.—A thin glass bulb contg. a large roll of Ag gauze and 3 or 4 cc. of H_2O was dipped in Hg at -4°

until the water was frozen. It was then quickly hung in a basket on the stirring rod of a small calorimeter contg. 60 cc. of the liquid under investigation. The Ag gauze caused rapid melting of the ice, and the minimum temp. was soon obtained. Thomsen's data on dil. H_2SO_4 agreed well with those obtained by this method. The new detns. were on organic liquids between 17° and 20° as follows: MeOH 0.591, EtOH 0.564, Et_2O 0.541, CS_2 0.234, $\text{C}_6\text{H}_5\text{NH}_2$ 0.472, and $\text{C}_6\text{H}_5\text{NO}_2$ 0.342. E. B. MILLARD.

Determination of the specific heats of fluids. A. HEYDWEILLER. Rostock. *Ann. Physik* 46, 253-60(1915).—Two bodies of fluid, an unknown and a standard, are heated by the same elec. current, and the temp. rise in each compared (Pfaundler's calorimeters.) Two quartz-glass inclosed Pt coils are used, each serving alternately for heater and resistance thermometers in each calorimeter. Owing to methods of transposing the fluids, etc., the effects of lack of symmetry between the two calorimeters are largely eliminated in the results. Each calorimeter consists of two Dewar tubes, one inclosing the other. The inner has only 2.4 cm. internal diameter, and both are closed by corks. Very small quantities of fluid can thus be investigated. In the example given, 20 cc. were used. Very high precision apparently was not sought, since an ammeter was used to read the current. W. P. WHITE.

The ratio of the specific heats of gases for constant pressure and for constant volume at different pressures. K. SCHÖLER. Kiel. *Ann. Physik* 45, 913-28(1914).—The method of the "Kundt's tube" for measuring the wave velocity in gases had been modified to permit using sealed tubes by Behn and Geiger, who altered the vibration period of the tube by weighting the end. Keutel and Thibaut, using this method, had observed a surprising variation of $k = c_p/c_v$ with pressure, for CO_2 and SO_2 , and at pressures ($1/3$ atm. to 1 atm.) where the condition of an ideal gas is usually supposed to be practically reached. The present investigation extends the pressure range from $1/3$ to 3 atm. (usually) and tests other gases. The gases were at 20° . For air, which was far above crit. temp. and pressure, the variation in k was 5 per mille. For CO_2 (crit. temp. 31°) it is 15 per mille. For C_2H_4 (crit. temp. 11°) it is 46 per mille, for SO_2 (crit. temp. 155°) 57; for NH_3 (crit. temp. 131°) 83. S. divides the gases into 3 groups: air, which is far above its crit. temp.; CO_2 and C_2H_4 , which are near their crit. temp. but far from being condensed; and SO_2 and NH_3 , which are near condensation and below their crit. temp. But C_2H_4 , as his data show, has values of k nearer those of SO_2 and NH_3 . W. P. WHITE.

An exponential temperature scale. R. H. WEBER. Rostock. *Physik. Z.* 16, 9(1915).—In order to establish his claim to priority the author repeats a notice published 2 years before. His suggestion, which he says is more instructive than practical, is to substitute for the ordinary definition of a degree of temp.—namely, an increase in temp. which causes a perfect gas to increase by a given fraction of its volume at zero—the definition that a degree is an increase in temp. which causes a gas to increase by a given fraction of its volume *at the temperature in question*. The length of the degree thus increases with temperature, as compared to the usual system. For a centigrade scale in the new system 500° is 371.54° , and the absolute zero becomes $-\infty$. W. P. WHITE.

Conductivity of metals. J. J. THOMSON. *Engineering* 99, 577-9(1915).—The arguments for and against the theory that conduction in metals was due to the motion of electrons have been collected into this lecture. The conds. could not be explained without assuming within a metal the presence of more electrons than were in accord with its other properties, though the transport of electricity by heat and contact differences of potential could be nicely accounted for by the electrons. The expts. of Kammerlingh Onnes with super-conductors quite put an end to the electron theory, since neither the number of electrons nor their velocity could be conceived to increase as the temp.

was lowered. A Grotthus chain theory of metallic conduction was also mentioned.

E. B. MILLARD.

Thermal electromotive forces of iron oxide and copper oxide. S. L. BROWN AND L. O. SHUDDEMAGEN. Univ. of Texas. *Physic. Rev.* 6, 385-89(1915).— Fe_2O_3 , CuO , and Cu_2O were investigated. CuO was formed by oxidizing a Cu wire, the others by fusing a higher oxide. Cu_2O decomposes into CuO and Cu when cooled to about 800° , but can be obtained cold by cooling very rapidly through 800° . The authors' Cu_2O , however, was found to contain 1.5% of CuO . Fe_2O_3 was neg. to Fe, with a thermoelectric power of 427 microvolts per degree, which was nearly const. up to 725° . The 2 Cu oxides were both positive; Cu_2O to Cu gave 1037-0.75 (θ —20) microvolts; CuO to Cu was higher still. The authors state that their values are much higher than obtained by others, but do not say how much. They suggest a difference in physical state, due to the method of prepn., as a possible cause.

W. P. WHITE.

Determination of the value of "e" by Millikan's method. J. Y. LEE. *Phys. Rev.* 4, 420-34(1914).—A physical investigation in which the mean value of "e" (the elementary elec. charge) was detd. to be 4.764×10^{-10} electrostatic units.

E. B. MILLARD.

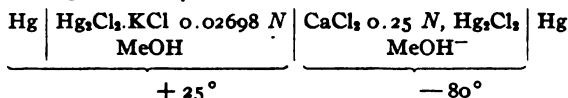
Electric charges and Brownian movement of very small metallic particles in gases. Contribution to the question of an elementary quantum of electricity. D. KONSTANTINOWSKY. *Ann. Physik* 46, 261-97(1915).—The particles of Au and Hg were so small that the characteristic color of the optical resonance was visible. Au particles showed yellow-red, orange, yellow and green, Hg was azure blue. The exptl. method and general argument are similar to those of Ehrenhaft (*C. A.* 8, 1050, 3262). It was shown that the particles were spherical in 3 different ways, so that the application of the Stokes-Cunningham equation was safe. As a result of the expts., K. claims that "the existence of an ultimate elementary quantum of electricity of a lower order of magnitude than that found by Ehrenhaft is possible." The charge of "2 electrons" must be distributed over at least 17 particles, even from calcns. based on the Brownian movement, which are certain to give high values. Even a charge of 0.1 of the elementary quantum may be distributed over 17 particles.

E. B. MILLARD.

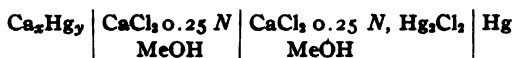
Determination of N_e for hydrogen from measurements of Brownian movement. C. F. EYRING. *Phys. Rev.* [2] 4, 412-17(1915).—Using the app. of Fletcher (cf. *C. A.* 9, 1413), and his extension of the Brownian movement, a detn. of $N \times e$ has been made. (N is Avogadro's number and e is the charge on an ion). The value obtained was $2.880 \times 10^{14} \pm 0.5\%$. The expts. show that this method may be applied to gases other than air, and that the ions of ionized H carry the same charge as the H ion of electrolysis. ($N \times e$ from electrolysis is 2.896×10^{14} .)

E. B. MILLARD.

Electromotive force of calcium amalgams. LIVIO CAMBI. Milan. *Atti accad. Lincei* 23, II, 606-11(1914).—Local soln. of the electrodes was prevented by using Ca amalgams as electrodes in a MeOH soln. of CaCl_2 at -80° . The amalgams were kept 78-100 hrs. at 220° before use. The solns. during the measurements were kept in a dry atm. of H. The compensation method was used in making the measurements and a Cd normal cell was used. The opposite electrode was a calomel electrode in MeOH at 25° , having an abs. e. m. f. of 0.288 v. The chain



has an e. m. f. of -0.070 v., from which 0.358 v. was calcd. for the cooled electrode. It was thus possible to det. the e. m. f. of various Ca amalgams by using chains



—80°

The e. m. f. values thus detd. plotted as a function of the concn. show a rise of 0.2 v. when the electrode is CaHg_y . Thus the existence of this compd. is proved electrochemically. A 2nd rise indicates the presence of the compound CaHg , which was not demonstrated thermally, possible because its temp. of formation was too near the eutectic temp. It is also possible that anomalies in the e. m. f. may be due to surface layers.

E. J. WITZEMANN.

Hall effect in tellurium-bismuth alloys. G. C. TRABACCHI. Rome. *Nuovo cimento* 9, 95-8(1915).—T. detd. the Hall effect in Te-Bi alloys ranging from 0 to 100% Te, and on plotting the results, obtained a curve resembling fairly closely the curve of thermoelectric force found by Haken for the same series of alloys. Now, considering the curve of fusion of the same series, it is probable that there is an intimate relationship between the Hall effect, the thermoelectric power, and the structure of the conductor.

S. LEVY.

A possible explanation of the Hall and Ettingshausen phenomena. EDWIN H. HALL. Firinze. *Nuovo cimento* 9, 5-12(1915).—The conception of a current in a metal as a movement of negative electrons alone, offers many difficulties in explaining the Hall and Ettingshausen phenomena. With this conception must be combined the idea of a movement of electrons from atom to atom, and from a normal atom to one with + charge, rather than between 2 normal atoms, as in this latter case the new condition (the presence of a + atom and a - atom in juxtaposition) would tend to recreate the normal atoms. It is evident then that the number of + atoms, or ions, is the same as the number of free electrons at every point of the metal. The movement of normal atoms does not produce an elec. current. The movement of free electrons takes place in one direction, and in an opposite direction for a limited distance, the movement of the + ions. With an elec. current passing from left to right in a metallic plate in a magnetic field (supposing this to be directed upwards) the free electrons and the vibrating ions are subjected to the new force. The electrons are mechanically free to yield to the force, but the ions can only undergo a change in the direction of their vibration. This action constitutes a + current upwards tending to reproduce a + charge; but the movement of the electrons upwards tends to produce there a - charge. If the tendency of the ions is stronger than that of the electrons, we have a + charge above (the case in an Fe plate); the opposite case is that of a Ni plate. In metal plates subject to these effects there is a const. process of dissociation of neutral atoms into electrons and ions at one part, and a re-association to form neutral atoms at another part. The force carrying the electrons and ions in one direction is electromagnetic, the force carrying the neutral atoms in the other direction is elastic-mechanical. There must be at the same time a distribution of thermal velocity among the free electrons of a metal. The slow electrons, i. e., the cold ones, are subject for a longer time to the elec. influence maintaining a current, which, as far as it is due to free electrons, is really a progressive movement of cold electrons. The dissociation of neutral atoms increases with the temp., and is accompanied by an absorption of heat; there exists then a latent heat of dissociation of the atoms. The movement of cold electrons towards the top (as in Fe) tends to cool that part of the plate, and to give rise to a reassociation of electrons and ions. This would explain the Ettingshausen effect in Fe. If the increase of temp. due to reassociation is stronger than the cooling tendency of the cold electrons, we have the Ettingshausen effect as it is in Sb. The same mode of consideration will explain the Hall and Ettingshausen effects in Ni.

S. LEVY.

The temperature coefficient of photochemical reactions. DANIEL BERTHELOT. *Compt. rend.* 160, 440-3(1915).—The velocity const. of an ordinary chem. reaction increases with temp., in general, according to an exponential law. For ordinary temps. the temp. coeff. of the reaction, $K_t + 10/K_t$, has a range from 2 to 3. Photochem. reactions, however, are little influenced by temp. The velocity of decompn. of levulose by ultraviolet light showed a temp. coeff. of 1.035 between 40 and 70°. A soln. of $C_4H_2O_4$ and $FeCl_3$ showed a temp. coeff. 1.01 between 21 and 61°, agreeing with Lemoine's detns. between 3 and 35°. The frequency of the exciting radiation plays the rôle in photochem. reactions that temp. plays in ordinary reactions. Thus the photochem. combination of Cl and H is slow for red light, rapid for yellow light, and explosive for violet light, while the chem. combination of O and H is imperceptible at room temp., very slow at 200°, fairly rapid at 500°, and explosive at 850°.

PAUL D. FOOTE.

Quantitative absorption spectra. I. Chemical significance of absorption spectra and the methods of examining them. F. R. LANKSHEAR. *Mem. Proc. Manchester Lit. Phil. Soc.* 58, No. 15, 12 pp.(1915).—Preliminary paper in which the Hartley method and the Hilger method are described. Somewhat arbitrary specifications are given for app., source of light, solvent, etc., and some of the general characteristics already known are mentioned again. Further work is promised. E. B. MILLARD.

Fluorescence and resonance radiation of sodium vapor. R. J. STRUTT. *Proc. Roy. Soc. London (A)* 91, 388-95(1915); cf. *C. A.* 9, 1269.—The centers emitting resonance radiation of Na vapor excited by the D-lines were not persistent enough to be carried along when the vapor was distd. away from the place of excitation. This was in contrast with the behavior of electrically excited Na vapor and with Hg vapor under either kind of excitation. Even a layer of Na vapor which was quite transparent to white light would not allow Na resonance to pass through. The resonance radiation was changed when the vapor was placed in a magnetic field, being diminished with increasing field strength if the flame was weakly salted, and increasing to a max. and then diminishing if the flame was strongly salted. A change was also observed when the exciting flame was placed in the magnetic field. All of the phenomena observed can be explained by taking into account the known Zeeman resolution of the D-lines and the observed width and structure of these lines as emitted by the flames used.

E. B. MILLARD.

Absorption spectra of the isomerides of ammonium *d*- α -bromocamphor- β -sulfonate. J. E. PURVIS. *J. Chem. Soc.* 107, 643-4(1915); cf. *C. A.* 8, 1416, 2367, 3025; 9, 207.—The 2 isomerides had the rotations: $[M]_{441} = 371^\circ$ and $[M]_{441} = 176^\circ$. Equimolar solns. of camphor and of *d*-camphoroxime were also examined for comparison. Alc. solns. were examd., using the Mo-U arc as a source of light. The sulfonates showed no difference either in their general or specific absorptions. In camphor and the oxime the camphor band was much wider and stronger than that of the sulfonates, and there was also a greater shift toward the red in the case of the heavier sulfonate mols. It was suggested that the CO group was the primary oscillation center, since camphoroxime has no soln. band and is very transparent. The final adjustment is influenced by the other atoms and groups in the mol., as was shown by the camphor bands becoming narrower in the sulfonates.

E. B. MILLARD.

Absorption spectra of the vapors and solutions of anisole, phenetole, and various derivatives. J. E. PURVIS. *J. Chem. Soc.* 107, 660-7(1915); cf. preceding abst.—The vapor bands of *p*-bromoanisole were more diffuse in appearance and fewer than those of anisole. Phenetole had a large no. of bands comparable with those of anisole; *p*-fluorophenetole and, to a greater extent, *p*-bromophenetole, showed a decreased number of vapor bands, those of the latter being more diffuse in appearance. Many of the

bands were absent from the solns., others were changed in character. Anisidines and phenetidines showed no narrow vapor bands, and the soln. spectra were similar to the vapor spectra. The larger soln. bands of *p*-azoxyanisole and *p*-azoxyphenetole than those of azoxybenzene, and the substitution in all the substances at higher temps. and pressures of all the fine vapor bands by wide and diffuse bands which were comparable with soln. bands were also mentioned. The solvent produced an association of the mols. whereby the vibrations were partly neutralized and partly exercised against this constraining force. The introduction of an aliphatic group in phenol does not alter the type of absorption in phenol, but Br or Cl cause a decrease in the number of finer bands.

E. B. MILLARD.

Distribution of energy in the radiation from the uviol-glass lamp. A. J. ALLMAND. *J. Chem. Soc.* 107, 682-8(1915).—The method used was that of Ladenburg (*Physik. Z.* 5, 525(1904)). For uviol A glass the intensities referred to the blue line γ 436 μ were as follows: 571 μ 0.27, 541 μ 0.73, 405 μ 0.56, 362 μ 0.41, and 313 μ 0.17; and for uviol W those measured were 405 μ 0.29, 362 μ 0.25, and 313 μ 0.045. For quartz the corresponding distribution, referred again to λ 436 μ as unity was: for 571 μ , 2.63, 541 μ 3.93, 405 μ 0.54, 362 μ 1.83 and 313 μ 1.28. The velocity coeffs. of photochem. reactions under the influence of the last 3 wave lengths, then, bear the relations 2.2, 4.3, and 4.4, resp., to those when 436 μ was used.

E. B. MILLARD.

Variations in the magnetic double refraction of iron with changes in the temperature. L. TIERI. *Atti accad. Lincei* 24, I, 330-5(1915).—Majorana (*Ibid* 12, I, 463) has stated that there are 3 types of magnetic double refraction in colloidal Fe: (1) positive, (2) negative and (3) a positive double refraction with weak fields which is converted into a negative effect on strengthening the field. T. found that by varying the temp. in each case with each specimen on colloidal Fe all 3 types of refraction were obtained with the same specimen. This variation in the effect is ascribed to changes in the size of the particles.

E. J. WITZEMANN.

Experiments on the nature of transmitted light action in crystals of selenium. F. C. BROWN. *Phys. Rev.* [2] 4, 404-11(1915); cf. *C. A.* 9, 1424, 1427-8. —Light falling on one part of a Se crystal produced a change in cond. in another part. No matter how much the resistance at one end of a crystal might change on account of pressure, the resistance at the other end did not change. Change of resistance on account of change of potential also was not transmitted to another part of a crystal, though the resistance was increased 10 times in the first place. Increase of pressure increased the light sensibility only when the pressure was applied to the part whose cond. was being measured. Then if elec. conduction in these crystals is due to free electrons that exist in equil. according to the law of Maxwell-Boltzmann, it cannot be possible that increasing the mechanical pressure increases the number of free electrons when the cond. is increased, since the pressure effect was not transmitted. The conclusion seemed unavoidable that elec. conduction in Se cannot be due to the traditional free electrons.

E. B. MILLARD.

Theory of cold light. W. D. BANCROFT. *Trans. Illum. Eng. Soc.* 10, 289-95 (1915).—The Moore light is very likely not due to temp. radiation but to chem. reactions; this conclusion is based on B.'s expts. (cf. *C. A.* 8, 1903, 2103; 9, 167, 404, 1573). The bulk of the light in salt flames is due to chem. reactions and not to temp. radiation. To obtain cold light one must find a reaction which can be made to go rapidly, which absorbs heat (or evolves only a small amt. of heat) and which has a high conversion factor for light.

C. G. FINK.

Alkaline earth selenides with phosphorescent properties. FRITZ KITTLEMAN. *Ann. Physik* 46, 179-96(1915); cf. Pauli, *C. A.* 6, 826.—Prepn. of some of the sub-

stances which Pauli had not made. Curves are given showing the emission bands of several of the compds. contg. Ca, Sr or Ba with Se and a heavy metal. All of the bands are between 700 and 500 μ , with bands in the visible violet or ultraviolet totally absent. With the same heavy metal in the 3 alkaline earth selenides the emission was shifted toward the longer wave lengths for increasing at. wt. Mn was an exception. Thus the max. was shifted 57 μ from CaSePb to SrSePb, and 16 μ from CaSeBi to SrSeBi in the sense of this rule.

E. B. MILLARD.

Fluorescence of uranyl salts under X-ray excitation. FRANCES G. WICK. Vassar. *Phys. Rev.* [2] 4, 418-25(1915).—The fluorescence excited in uranyl salts by X-rays differs from that excited by light in intensity only, and the intensity difference was explained by the greater absorption of these salts for light than for X-rays. The phosphorescence following excitation was of shorter duration and less intense for light than for X-rays, probably on account of the difference in penetration of the 2 kinds of radiation.

E. B. MILLARD.

Radiation of gas molecules excited by light. R. W. WOOD. Baltimore. *Proc. Phys. Soc. London* 26, 185-211(1914); see C. A. 8, 1918.

PAUL D. FOOTE.

Nature of residual valence (EPHRAIM) 6. Vapor pressure of arsenic trioxide (WELSH) 9.

3. RADIOACTIVITY.

WILLIAM H. ROSS.

Gamma ray measurements with mesothorium preparations. STEFAN MEYER AND VIKTOR F. HESS. Radium Inst., Vienna. *Sitzb. kais. Akad. Wiss., Wien, IIa Abt.* 123, 1443-58(1914).—Tables are given for calcg. the γ -ray equivalents of Ra-free Meso-Th preps. on a Ra-Ra C basis, using measurements of the penetration of the rays and the age of the specimen.

G. L. WENDT.

Soft secondary beta rays from gamma rays. K. W. F. KOHLRAUSCH AND ERWIN SCHRÖDINGER. Radium Inst., Vienna. *Sitzb. kais. Akad. Wiss., Wien, IIa Abt.* 123, 1319-67(1914).—The incidence radiation from thin foils of Al, Cu, Zn and Pb grows with their thickness until the sp. range is reached, when it remains const. The emergence radiation, always slightly harder than the former, also grows with the thickness of thin foils but later decreases in accord with the absorption law of the primary γ -rays. Measurements of the radiation at various angles of incidence agree with calculations from the assumptions: that the secondary radiation is a vol. effect; that the radiation from a vol. unit is not distributed equally but is chiefly in the direction of the primary beam; and that both primary and secondary rays are absorbed under exponential laws. The persisting scattered radiation from very thin foils makes it improbable that the original direction of the secondary electron is always that of the primary beam. Three characteristic constants are distinguished: C , the radiation coeff., is const. for Al, Fe, Ni, Cu and Zn, but rises with Sn and is doubled for Pb; β , the asymmetry coeff., decreases with increasing at. wt.; μ , the absorption coeff., is independent of the nature of the radiator, but depends on the absorber and the hardness of the primary beam. The radiation coeff. for secondary γ -rays for Cu and Zn is about 1% of that for β -rays.

G. L. WENDT.

Theoretical investigations on the cause and magnitude of the variations in range among individual alpha rays of a homogeneous beam. LUDWIG FLAMM. Radium Inst., Vienna. *Sitzb. kais. Akad. Wiss., Wien, IIa Abt.* 123, 1393-1426(1914).—Since homogeneous α -rays are emitted at equal velocities the variations in range are due to

events in the trajectory. Probability calculations on the basis of Rutherford's atomic model show that the occasional large-angle deflections of the α -particle by an encountered at. nucleus are too infrequent to account for the variations in range, as are also the energy losses on collisions with nuclei. Encounters with electrons cause large energy losses but the probability of individual variations is insufficient to account for the variation of 0.8 cm. in the range of Po, found by Geiger. Only the variations in the final 0.08 cm. of the range, traced by Friedmann, may be accounted for on this basis.

G. L. WENDT.

New determinations of the ranges of polonium, ionium and actinium. STEFAN MEYER, VIKTOR F. HESS AND FRITZ PANETH. Radium Inst., Vienna. *Sitzb. kais. Akad. Wiss., Wien, IIa Abt.* 123, 1459-88(1914).—Very careful detns. of the ranges in air at 0° resulted as follows: Po, 3.64 cm.; Io, 2.95 cm.; Act, 3.38 cm.; Radio-Act, 4.0 cm. and 4.37 cm.; Act X, 4.04 cm.; Act C, 4.88 cm.; Act Em, 5.28 cm., and Act A, 5.94 cm. The new value of Po fits precisely into the graph of the Geiger-Nuttall rule, $\log \lambda = A + B \log R$, (C. A. 6, 26), and eliminates the only exception to that rule in the U-series. Using the above range, the rule gives Io a half-life period of 1.1×10^4 yrs., about one-tenth of the accepted value. This invalidates Russell and Rossi's proof of the spectroscopic identity of Th and Io, since their Th contained only 2% of Io instead of 10% (C. A. 7, 1135). The new values for the Act-series lie on a straight line which cuts the U-series line at U 2, indicating the genesis of Act from U 2. Radio-Act gives 2 sets of α -rays, and the same is suspected of Act, which may have an isotope or a parent with a range of 4.15 cm.

G. L. W.

Experiments on slow cathode rays. J. J. THOMSON. *Electrician* 75, 60(1915); cf. C. A. 9, 21, 1006.—It is pointed out that between the long elec. waves and the extreme infra-red light waves of Rubens, there is no gap, but a gap of about 7 octaves exists on the other side of the spectrum between the extreme ultraviolet Lyman rays of the Schumann region and the longest X-rays. By using a Coolidge tube of special design, having a movable target of Al on one side and Cu on the other, the rays could be passed either into an ionization chamber containing SO₂ or into a second bulb similarly made. This second bulb was silvered inside for the detn. of the total number of electrons given out by the second target. The curve showing the number of negative particles produced for each p. d. indicates that a minimum potential of 15 v. is required to give rise to any appreciable radiation. This indicates that the emission of characteristic Röntgen rays by an atom depends upon the ionization of the atom and each ionized atom gives one unit of radiation, the kind depending upon the position of the electrons in the atom, and the radiation is due to the return of the electrons to the atom. By the use of the double metal targets, it was shown that metals give spectrum lines in this newly explored range of soft radiation.

W. E. RUDER.

A determination of the diurnal variation of the radioactivity of the atmosphere at Manila by the active deposit method. O. W. BLACKWOOD. Univ. Philippines. *Philippine J. Sci.* (A) 10, 37-47(1915).—A large and fairly regular diurnal variation has been observed for the active deposit at Manila, the mean night-value being about 3 times that of the day. The mean active deposit seems to vary with the humidity, but in the individual curves there are wide divergences. There is no evident relation between the wind and the amt. of deposit collected. The active deposit collected on Mount Maquiling, elevation 1,140 m., is about twice that of Manila. The diurnal variation on the mountain is apparently the inverse of that of Manila, the night collection being smaller than the day. The half-period value found at Manila is about 62 min., which corresponds to less than 15% Th active deposit.

W. H. ROSS.

The radioactivity of the atmosphere. EDOUARD JACOT. *South African J. Sci.* 11, 271-4(1915).—The radioactivity of the atm. in the vicinity of South African Col.

was detd. by the method of collecting the active deposit on a bare Cu wire exposed horizontally a few meters above the ground and charged to a negative potential which was varied from -700 to $-12,000$ v. The time of exposure was varied between 4 and 18 hrs. The rate of decay of the collected deposit, which was independent of the potential and of the time of exposure, showed that products of both Ra and Th contributed to the initial activity of the wire, and that the fractions of the initial activity contributed to by the respective deposits were about const. In a typical case 80% of the initial activity was due to Ra deposit, and 20% to the Th. From the results thus obtained it was calc. that there is per unit vol. of the atm. at Cape Town about 28,000 times as much Ra Em as Th Em.

W. H. Ross.

The emission and absorption of gas residues in Röntgen tubes and the emission of X-rays. P. CARDANI. Univ. Parma. *Atti accad. Lincei* 24, I, 105-19(1915).—It is known that Röntgen tubes ought to undergo a long process of exhaustion in order to eliminate the gas occluded in the electrodes and glass walls in order to obtain the best conditions for the emission of X-rays. This gas is not freely released even with prolonged rarefaction so that in order to obtain exhaustion it is necessary to enclose the tube in a special case, *e. g.*, asbestos, and raise the temp. by passing a sufficiently intense current, since the electrical discharge facilitates the emission of occluded gases. In order to avoid blackening the tubes by pulverization of the anticathodic Pt the manufacturers add a 3rd electrode that serves as an anode during the exhaustion. Skinner (*Physik. Z.* 6, 610(1905)) found that the gas evolved from cathodes of different metals is H, and that its emission is accompanied by an absorption at the anode, and that the emission is observed again after the electrodes have been left in repose some time owing to the removal of gas from the interior to the surface. Hirsch and Soddy (*Phil. Mag.* 14, 779(1907)) observed that in X-ray tubes with Al electrodes gas is emitted, the formation of which depends on a trace of Na in the electrode, but the nature of which was not detd. The fact that Röntgen tubes on long-continued use tend to harden shows that the electrodes reabsorb the gas contained in them. The purpose of the present paper was to elucidate some of the complex questions connected with the above mentioned and other phenomena and to learn the conditions necessary for the best results. The methods, app., and results are given in detail. The conclusions are as follows: The Al electrodes of Röntgen tubes after having been in contact with the air contain in considerable amts. occluded gas that is not released spontaneously at ordinary temps. nor on more prolonged exhaustion, but which is emitted through the passage of the discharge. The emission of the gas takes place spontaneously at high temp. but also in this case is considerably facilitated by the passage of the discharge: the quantity of gas liberated is much larger the higher the temp. The occluded gas encounters great difficulty in reaching the surface of the electrode even at high temps. and with prolonged exhaustion. Owing to this difficulty the electrodes may be exhausted superficially so that the pressure remains constant with the passage of the discharge even for some days, *i. e.*, the occluded gas in the deeper layers does not diminish the exhaustion produced by coming to the surface; this condition remains until the discharge is set up again and the emission of gas again begins. Having obtained the superficial exhaustion, the electrodes reabsorb, under the action of the discharge and at ordinary temp., the gas which was emitted at a high temp. under the action of the discharge. The emission and absorption depend on the particular conditions of the exhaustion in which one finds the superficial layers of the electrodes. Additional series of expts. showed among other things that the law governing the emission and absorption of gas by the electrodes is exponential (formula given). When a suitable but variable amt. of air was placed in Röntgen tubes it was found to behave quite differently from the gas ordinarily evolved so that it is concluded that chemically

the gas emitted is quite different from air. The nature of the gas was not stated in this paper.

E. J. WITZEMANN.

4. ELECTROCHEMISTRY.

COLIN G. FINK.

The electric furnace in the foundry. W. G. KRAUZ. *Bull. Am. Inst. Min. Eng.* 1915, 927-30.—The experience of the Nat. Malleable Castings Co. with elec. furnaces is given. A 6-ton Héroult furnace, 3-phase, 60-cycle, equipped with Thury regulators was installed in 1912 and has been in continuous operation since that time. Over 20,000 tons of both C and alloy steels have been made. A power factor of 94 is obtained. There is good regulation and uniform load on the line even when cold melting. The power consumption is 150 kw. hrs. per ton in the case of hot metal charges, and 500-600 kw. hrs. per ton in the case of cold charges. The greatest advantage is in the abs. control and uniformity of product. The other advantages, absence of segregation, almost entire elimination of S, great tenacity, high ratio of elas. limit to ultimate strength of product, and perfect control of the pouring temp. are discussed.

W. E. RUDER.

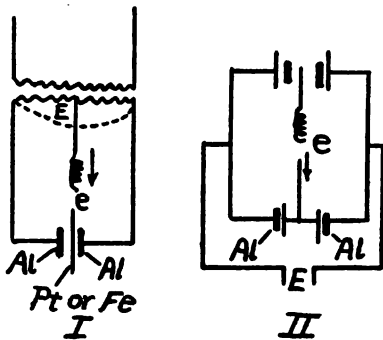
Increasing aluminium consumption in U. S. ANON. *Elec. Rev. West. Elec.* 67, 68(1915).—In 1914, 79,129,000 lbs. of Al were consumed in U. S. as compared with 72,379,000 lbs. in 1913 and 65,607,000 in 1912. Details are given.

C. G. F.

Tungsten in the British Empire. ANON. *Eng. Mining J.* 100, 50-1(1915).—Statistics of production during 1912-3.

E. H.

Aluminium rectifier. G. SCHULZE. *Archiv. f. Elek.* 3, No. 1(1914); *Elec. World* 65, 1552(1915).—The efficiency of electrolytic rectifiers with aq. solns. is limited by 3 kinds of losses, *vis.*: ohmic resistance, imperfection in the impermeability in reverse direction, and the necessity of attaining a certain minimum voltage before the current will pass in the allowed direction. This last loss is a function of the formation voltage of the Al plates. These losses are calcd. for two arrangements of the rectifier—the transformer system (Fig. 1) and the Graetz system (Fig. 2). The a. c. is applied at E and the d. c. taken off at e. The min. voltage for different electrolytes is first calcd. In both systems the possible efficiency reaches 80-85%, but this max. value is reached for a unidirectional e. m. f. of 60-80 v. for the transformer system and 100-150 v. for the Graetz system.



For small voltages these efficiencies are low. For 5 v. the max. possible efficiency for the transformer system is 40% and for the Graetz system 25%.

W. E. RUDER.

Electrolytic production of oxygen and hydrogen. A typical plant. ANON. *Elec. Rev. West. Elec.* 66, 1170(1915).—A description is given of the Bettendorf Iowa Plant. Fifty generating cells connected in series across a 110 v. d. c. line, each cell requiring 400 amp. at 2.2 v. and producing about 3.5 cu. ft. of O and 7 cu. ft. H per kw. hr. The output per 24 hr. day is 4000 cu. ft. O and 8000 cu. ft. H. The O is 99.5% and the H 99.9% pure. The gases are stored in large tanks and for shipment they are compressed at 1800 lbs. into 100 or 200 cu. ft. steel cylinders. The current for the cells is obtained by means of a motor generator set: 440 v., 3-phase, 60 cycle induction

motor connected to a 50-kw. shunt wound, commutating-pole generator. A 20 h. p. boiler furnishes distd. H_2O for the cells. Z. SMLOVICI.

The Schmidt electrolyzer. ANON. *Elektrochem. Z.* 22, 27-42(1915).—An illustrated description of the Oerlikon electrolyzer for the commercial production of O and H. (Cf. C. A. 8, 2113). W. E. RUDER.

Electrotyping. F. HUTH. *Elektrochem. Z.* 22, 63-7(1915).—A short historical review. W. E. RUDER.

New patents on accumulators and thermo-elements. B.-N. *Elektrochem. Z.* 22, 35-7(1915).—A short review. W. E. RUDER.

Mercury arc rectifier for charging small batteries. *Elec. World* 66, 102(1915); *Elec. Rev. West. Elec.* 67, 84(1915), 2 illus. C. G. F.

Methods and means for interrupting electric currents and avoiding arcing at the contacts. W. BURSTYN. *Naturwissensch.* 3, 301(1915).—B. has made a careful study of various types of interrupters and has invented an improved form (Ger. pats. 260,903, 268,889, 269,254). With the ordinary simple interrupter, using Pt contacts, no disturbing arcing takes place until the voltage is increased to about 320. At 320 even 0.001 amp. is sufficient to give a large arc; this arc does not give the spectrum of the contact metals, but that of N. With increased voltage the violet tinted N arc changes to a bright yellow metal (Pt) arc. B.'s interrupter is fitted with Ag electrodes and no arcing takes place even at 500 v. and 150 amp. (a. c.), providing the interruption is gradual. D. c. of 15 amp. and 220 v. can be successfully interrupted, providing a condenser of 0.3 microfarad is connected in circuit. Three diagrams of connections are shown. C. G. F.

Battery-bell signalling system. R. V. WHEELER. *Electrician* 75, 132-4(1915).—A report on the safety of battery-bell systems in coal mines. It is shown that the most sensitive mixts. contain between 7.5 and 9% CH_4 . Such mixts. require only about 0.2 amp. for ignition. On either side of these figures the current required rises very rapidly. The self-induction of the circuit has a decided effect. The ignition current of any mixt. rises rapidly as soon as the self-induction of the circuit falls below about 0.03 Henry. Results of the same order were obtained with currents of 60, 30 and 15 v. All bells examd. were capable of giving a highly dangerous break-flash when used on 10 wet Leclanché cells at 15 v. Ten dry cells gave a still more dangerous flash owing to lower internal resistance. Most bells are "over-powered." One bobbin with a smaller number of turns gave results just as good with less self-induction. In order to make the system safe in the most sensitive mixt. the following recommendations are made: Use a battery of 10 wet Leclanché cells (quart size) and introduce a non-inductively wound resistance coil in series with the magnet coil, or increase the resistance of the magnet windings (as by using brass wire), or use a parallel winding, or introduce tin-foil strips between the layers of the coil to produce eddy currents which absorb the energy of the self-induction. The danger of ignition from the maintained spark at the trembler of the bell should be eliminated by using a flame-tight casing. Methods of conducting the above expts. are described. W. E. RUDER.

Electrometric titration (ZIEGEL) 7.

U. S., 1,143,181, June 15. M. A. FOOS. Dry-cell electric battery (structural features).

U. S., 1,143,586, June 15. W. LAIB. Potassium chlorate is made by electrolysis of a soln. of KCl containing a small amt. of K_2CrO_4 or $K_2Cr_2O_7$ at a temp. below 35°, using a graphite anode, followed by further electrolysis in another cell with a Pt anode

at a temp. above 70° which is maintained by the current flowing through the cell. The partial conversion in the cell with graphite anode reduces the cost of apparatus for any given desired yield.

U. S., 1,143,828, June 22. P. C. C. ISHERWOOD. **Dense anodes of manganese dioxide for electrolysis of copper, zinc or nickel from solution** are made from Mn ore by leaching it with HNO_3 or H_2SO_4 to remove Fe, Ni and Co from the ore, forming a pasty mixt. of the leached ore with a soln. of $\text{Mn}(\text{NO}_3)_2$, molding, drying and heating sufficiently to decompose the nitrate and repeatedly soaking in $\text{Mn}(\text{NO}_3)_2$ soln. and drying and heating until the pores of the material are compactly filled.

U. S., 1,143,940, June 22. J. W. BROWN. **Electric furnace for calcining graphite, coke, etc.**

U. S., 1,144,000, June 22. F. A. ROUX. **Preparing aluminium surfaces to receive an electrolytic coating of metal.** The Al is thoroughly cleaned, immersed in a weak soln. of NaOH or KOH and a Sn salt, which forms a coating of metal with occluded H on the surface, and after rinsing the surface is treated with a hot soln. of NH_4 alum to expel the occluded H.

U. S., 1,144,226, June 22. C. B. MILLS. **Electroplating non-metallic articles such as cement, stone or wood.** The material is first coated with a mixt. of asphalt 10, MeOH 20, stearic acid 98 and glycerol 6 parts, then with a gum arabic sizing and a mixt. formed of PbO 1, asphalt 1, MeOH 3 and gum copal 0.12 parts, and then with a conducting coating such as powdered Cu.

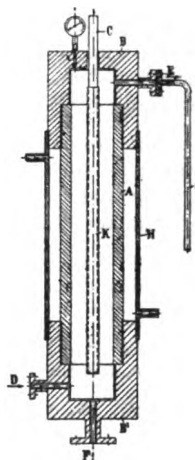
U. S., 1,144,271, June 22. W. WEBER. **Electrolytic apparatus for making hydrogen peroxide continuously.** The H_2O -jacketed tube A is formed with thick metal walls capable of withstanding great pressure and is lined with the material constituting the cathode. The anode C is covered with a tubular diaphragm K. Electrolyte is introduced through the tube D and O is supplied through the inlet F. H_2O_2 is drawn off through the outlet G. A series of cells are connected and the electrolyte passes through them successively.

U. S., 1,144,311, June 22. J. REDDING. **Making storage battery elements.** An elec. current is passed through a heated soln. of NaOH, using a series of Pb and C or Pt anodes, effecting deposition of Pb and Pb-Na compds. on the cathode. The deposit is compressed, washed with H_2O to remove the Na compds. and the remaining spongy Pb is dried in H_2 , illuminating gas or other inert gas.

U. S., 1,144,538, June 29. W. E. GREENAWALT. **Electrolytic cell for depositing copper from chloride solutions, etc.**

Brit., 3,181, Feb. 6, 1914. C. P. LANDRETH. In the electrolysis of water or other liquid, the liquid is softened by the addition of an alk. hydroxide, such as lime, soda or potash, before, during or after electrolysis, sufficient alkali being used to render the liquid permanently alk. A salt such as NaCl or MgCl_2 may also be added. Some or all of the electrodes may be of C, Pt, or other inert material, or of Fe, steel, Cu, Mn, Al, or other metal giving a hydroxide useful as pptnt. A part of the liquid may be treated and afterwards added to the main body. After treatment, pptd. matter is allowed to settle or is filtered off. Fe and other electrodes are protected from oxidation when not in use.

Fr., addition to 18,313, Sept. 11, 1913, to 434,803. E. STASSANO. **Method of suspending and operating an electric furnace for treating metals.**



Fr., 467,991, Apr. 9, 1913. E. MARGUT. In the manuf. of metallic sodium, neither the impurities of the NaOH bath nor the depositions on the cathode constitute the cause for the falling off of the yield; this may be attributed solely to the excessive temp. rise occasioned by the resoln. of the Na in the electrolyte. At the moment when the sepn. of Na has almost reached zero, the electrolyte is brought to the most favorable temp., as by internal or external cooling by cold air or H_2O , and maintained so, without changing the strength of the current.

Fr., 468,445, Feb. 14, 1914. HELFENSTEIN ELEKTROOFEN-GES. M. B. H. Collecting metal vapors by condensation. The metals Zn, Pb, etc., may be condensed, after smelting in the elec. furnace, in the pure state, if the vapors and gases evolved from the charge (H , C_xH_y , CO_2 , H_2O , especially CO) be drawn off through special conduits before the distn. proper has commenced.

Ger., 281,325, May 8, 1912. GEBR. SIEMENS & Co. Manuf. of an electric resistor from "silit."

Ger., 281,512, May 11, 1913. ALLGEMEINE ELEKTRIZITÄTS-GES. Carbon electrodes for flaming arc lamps contain Ce fluotitanate, a compd., such as a K or Na compd., which imparts a yellowish or red color to the flame, and finally a Ba compd. which converts the color of the flame again into a white. E. g., such an electrode consists of 35% Ce fluotitanate, 10% K fluotitanate, 10% BaF_2 , and 45% C. The alkali fluotitanates give off etching vapors, and can be substituted, on that account, by other alkali compds., especially Na_2SiO_3 , $NaBO_2$, Na_2CO_3 , Na_2WO_4 , Na_2MoO_4 . KBO_2 also has proved satisfactory. A good result has been secured with an electrode consisting of 37 parts Ca fluotitanate, 7 parts BaF_2 , 3 of Na_2SiO_3 , 3 of Na_2WO_4 , and 50 of C. Instead of C may be employed with advantage a mixt. of lamp-black and coke, e. g. 6 parts lamp-black and 44 of powdered coke.

Ger., 281,625, Aug. 6, 1911. ROMBACHER HÜTTENWERK and J. I. BRONN. Electric furnace for melting copper, brass, and the like. The tension between an elec. arc electrode and the metal bath is maintained less than 30 v., and each end of the secondary winding of the source of current is connected to an arc electrode.

Ger., 281,781, Mar. 5, 1914. G. MENDHEIM. Burning carbon electrodes in furnaces wherein the tar vapors from the fuel are collected and used for heating the furnace.

Ger., 281,839, June 5, 1913. FABRIK ELEKTRISCHER ZÜNDER, G. M. B. H. Constructional details of an accumulator with tubular or perforated plate electrodes.

Ger., 281,894, July 17, 1913. BERGMANN-ELEKTRIZITÄTS-WERKE AKT.-GES. Operation of mono- and poly-phase alternating current resistance furnaces with several parallel electrodes for each phase.

Ger., 281,937, Feb. 11, 1914. TITO LIVIO CARBONE. In a method of overcoming the disadvantages resulting from the slag formation in arc lamp electrodes made from mineralized coal, the ends of the carbons are ignited apart from the lamp with a view to expelling the readily fusible materials contained therein.

Ger., 281,938, Feb. 26, 1914. EHRLICH & GRAETZ and E. PODSZUS. In the manuf. of electric incandescent lamps with gas filling, convection currents are reduced by disposing near each conducting member solid refractory bodies, such as the refractory nitrides BN, etc., or stable oxides such as ThO_2 , ZrO_2 , and the like.

Ger., 281,946, Mar. 5, 1914. F. CLOUTH, G. M. B. H. and R. SCHULTZ. Device on the gas discharge of storage batteries in submarines.

Ger., 281,947, Apr. 12, 1914. W. SOMMERFELD and A. DORNHEIM. App. for the automatic manuf. of carbon electrodes for elec. batteries, imbedded in a depolarizing mass.

Ger., 282,106, Feb. 11, 1914. GEBR. SIEMENS & Co. In the manuf. of arc light electrodes, filaments, and the like, colloidal graphitic acid is used as a binder for the C mass. This colloidal graphitic acid is a glutinous mass which possesses a considerable binding power and which yields a comparatively good conducting C at a comparatively low temp. The formed product can be dried at a slightly elevated temp., or by heating to slightly below 200° it can be converted into pure C. Other binding agents may be added to supplement the action of the graphite, or the finished product may be satd. with other binders.

Ger., 282,141, Jan. 30, 1913. M. BRESLAUER. Process and construction of a furnace for the electrothermic recovery of volatile metals, especially Zn, by resistance heating. According to the methods heretofore used for the electrothermic recovery of Zn, the Zn vapor and accompanying CO escaping from the charge are in contact for a considerable distance with the charge or the heating device; this results in loss of energy and material. This disadvantage is overcome, in this process, by employing an elec. resistance furnace, whereby the Zn vapors, as soon as formed, are removed from the zone whose temp. is above that of the condensation temp., by a short course, so that they fall rapidly to the temp. of condensation.

Ger., 282,162, Dec. 14, 1913. F. KRUPP, AKT.-GES. Constructional details of an improved electric melting furnace. Cf. C. A. 9, 1721.

Ger., 282,225, Feb. 22, 1914. Addition to 221,130 (C. A. 4, 2418). SIEMENS & HALSKE, AKT.-GES. Mfg. electrodes from selected dense pyrolusite as initial material. The pyrolusite is finely ground and freed from its impurities by treatment with dil. H_2SO_4 or other acid indifferent to MnO_2 . The resulting MnO_2 powder is washed well, dried, moistened with a soln. of $\text{Mn}(\text{NO}_3)_2$, and pressed into the desired form. Otherwise the process is as specified in the principal patent. By the pressure the material becomes so firm that it retains its form during subsequent heating to decompose the nitrate. The impregnation of the MnO_2 with the nitrate and the subsequent decompn. is repeated a number of times, until the electrodes have acquired the desired d. and cond.

Ger., 282,234, June 29, 1913. CHEM. FABRIK GRIESHEIM-ELEKTRON. Rendering electrolytic zinc sponge permanent by removing adhering electrolyte and drying with exclusion of air. The electrolyte is removed by washing with H_2O after removal from the bath. If the soln. is strongly alk., it is neutralized by passing CO_2 through it, since soda is more readily washed out than alkali. A low temp., with stirring, and vacuum are employed preferably in drying the sponge, and dehydrating agents may be added. In this manner a Zn sponge of 90-95% Zn content is obtained, which is permanent in the air, and exceeds Zn dust in activity. Furthermore, on account of its purity and uniformity of structure and properties it is more suitable than Zn dust for various reactions.

Ger., 282,310, Aug. 11, 1912. Addition to 277,091 (C. A. 9, 415). E. MÖLLER. Process and app. for electrical separation of suspended matter from gases.

Ger., 282,360, Nov. 8, 1912. NOAK V. HYBINETTE. Electrolytic separation of metals from solutions. See Brit., 22,744, 1913 (C. A. 9, 1011).

Ger., 282,462, July 11, 1913. J. CHURCHWARD. Constructional details of a mixing rotary furnace, especially with elec. heating and pouring pan.

6. INORGANIC CHEMISTRY.

H. I. SCHLESINGER.

Studies on hydrates. A. JOHNSEN. Kiel. *Centr. Min. Geol.* 1915, 289-92.—As there appears to be some contradiction in the literature as to the behavior of the H_2O in $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, clear crystals of this salt were powdered and placed in a desiccator over CaCl_2 at ordinary temps. controlled within 1° . H_2O gradually escaped, until in 10-30 days, depending on actual temps., approx. 1 mol. H_2O was lost. The resulting hexahydrate does not inoculate satd. solns. of the salt, for although it is dextrorotatory, the crystals forming after its addition to a satd. soln. of MgSO_4 (containing 5% borax to produce faces showing the right- or left-handed character) are equally left and right. The fact that 1 mol. of H_2O differs from the others indicates that the true formula of the salt is $[\text{Mg}(\text{H}_2\text{O})_6]\text{SO}_4 \cdot \text{H}_2\text{O}$, the $(\text{H}_2\text{O})_6$ being probably more or less polymerized.

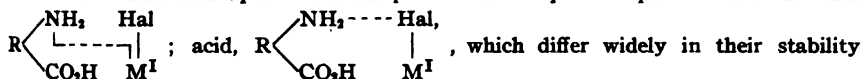
E. T. WHERRY.

Nature of residual valence. VIII. Stability of ammoniated chlorates, bromates and iodates. Thermal dissociation and explosion. FRITZ EPHRAIM AND ADOLPH JAHNSSEN. Bern. *Ber.* 48, 41-56(1915); cf. C. A. 8, 597.—Most of the following compds. were prepd. by passing NH_3 into a concd. aq. soln. of the metal salt, though in some cases it was necessary to add EtOH satd. with NH_3 ; some ammoniates were prepd. by heating in NH_3 at the requisite temp. **Copper tetraammine chlorate**, $\text{Cu}(\text{ClO}_3)_2 \cdot 4\text{NH}_3$, deep blue needles, d. 1.81; dissociation pressure at 97° is 36 mm.; at 116° , 55 mm.; 158° (approx.), 715 mm. **Copper hexaammine chlorate**, $\text{Cu}(\text{ClO}_3)_2 \cdot 6\text{NH}_3$, ultramarine blue, dissoc. pressure at -15° , 201 mm.; -1° , 286 mm.; 10° , 380; 20° , 491; 31° , 628 mm.; the shape of the curve indicates solid soln. **Nickel hexaammine chlorate**, $\text{Ni}(\text{ClO}_3)_2 \cdot 6\text{NH}_3$, blue needles, m. 180° , d., 1.52; dissoc. pressure at 120° , 50 mm.; 140.5° , 75 mm.; 15° , 140 mm. **Zinc tetraammine chlorate**, $\text{Zn}(\text{ClO}_3)_2 \cdot 4\text{NH}_3$, colorless crystals, d. 1.84; dissoc. pressure at 114° , 16 mm.; 140° , 32 mm.; 165° , 50 mm.; 177° , 88 mm. **Zinc hexaammine chlorate**, dissoc. p. at -15° , 225 mm.; -14° , 232; -10° , 270; -8° , 304; -6° , 332; -2° , 388; 0° , 427; 1° , 449; 3° , 486; 6° , 550; 7.5° , 594; 10° , 690; 11° , 747 mm. **Cadmium hexaammine chlorate**, colorless crystals, d., 1.78; dissoc. p. at 69° , 89 mm.; 82° , 156; 94° , 241; 103.5° , 330; 116.5° , 530; 122° , 772 mm. **Cadmium tetraammine chlorate**; dissoc. p. at 116.5° , 117 mm.; 125.5° , 174; 136° , 335 mm. Co and Mn compds. were prepd. but they were too easily decompd. for detn. of a pressure curve. **Copper diaquo-tetraammine iodate**, $\text{Cu}(\text{IO}_3)_2 \cdot 2\text{H}_2\text{O} \cdot 4\text{NH}_3$, deep blue prisms, was prepd. by passing NH_3 into a soln. of CuNO_3 in concd. NH_4OH soln. **Copper pentammine iodate** was prepd. from the above by dehydrating at 160° in a current of NH_3 , and satg. with NH_3 in the cold; d., 2.72; dissoc. p. at 50.5° , 141 mm.; 65° , 260; 75° , 440; 82° , 640; 84.5° , 719 mm. **Nickel triaquo-pentammine iodate**, $\text{Ni}(\text{IO}_3)_2 \cdot 3\text{H}_2\text{O} \cdot 5\text{NH}_3$, forms reddish violet columns, and from it was obtained **nickel pentammine iodate**, light violet crystals, d. 2.97; dissoc. p. at 53° , 179 mm.; 65° , 365 mm.; 77° , 670; 79° , 905 mm. **Zinc tetraammine iodate**, white needles, d. 2.82; dissoc. p. at 77° , 44 mm.; 91.5° , 81; 106.5° , 141; 119° , 242; 130° , 356 mm. $\text{Cd}(\text{IO}_3)_2 \cdot 4\text{NH}_3$, d. 3.23; dissoc. p. at 91° , 381 mm.; 101° , 486; 110° , 709 mm. The temp. at which the dissociation pressure reaches 1 atm. was estd. by extrapolation by means of the Ramsay-Young rule, and the expression $^3\sqrt{v} = ^3\sqrt{T_{760}}$ (v = atomic vol. of the central atom) gave values for $\text{Ni}(\text{ClO}_3)_2 \cdot 6\text{NH}_3$, $\text{Cu}(\text{ClO}_3)_2 \cdot 3\text{NH}_3$, $\text{Zn}(\text{ClO}_3)_2 \cdot 6\text{NH}_3$ and $\text{Cd}(\text{ClO}_3)_2 \cdot 6\text{NH}_3$ of 14.61, 13.02, 13.73 and 17.22, resp.; the discrepancy in the case of Cd is ascribed to a large change in the at. vol. of Cd. on formation of the ammoniate. Many of the above compds. can be exploded by concussion, or by heating. On heating in an open tube explosion is believed to take place usually at the temp. at which the dissociation pressure reaches 1 atm.; the authors state that this is due to the fact that "below the dis-

sociation temp., the splitting off of the NH_3 mol. is an endothermic process. However, when the dissociation temp. is exceeded, the splitting off of NH_3 gives off heat." When heated in closed tubes explosion took place at a higher temp. than in an open tube with the chlorate compds. Following are the explosion temps. (mean) of various compds. in open and closed tubes, resp.: $\text{Cu}(\text{ClO}_3)_2 \cdot 4\text{NH}_3$, 158° , 208° ; $\text{Ni}(\text{ClO}_3)_2 \cdot 6\text{NH}_3$, 201° , 240° ; $\text{Zn}(\text{ClO}_3)_2 \cdot 4\text{NH}_3$, 205° , 289° ; $\text{Cd}(\text{ClO}_3)_2 \cdot 6\text{NH}_3$, 184° , 300° ; $\text{Cu}(\text{BrO}_3)_2 \cdot 4\text{NH}_3$, 140° , 149° ; $\text{Ni}(\text{BrO}_3)_2 \cdot 6\text{NH}_3$, 195° , 191° ; $\text{Zn}(\text{BrO}_3)_2 \cdot 4\text{NH}_3$, 169° , 159° ; $\text{Cd}(\text{BrO}_3)_2 \cdot 6\text{NH}_3$, 192° , 193° . The iodate compds. did not explode in an open tube, but in a closed tube all 4 exploded between 210 and 219° . Cf. following abstr.

GEORGE W. MOREY:

Nature of residual valence. IX. Influence of the position of the neutral part in the molecule on its stability. F. EPHRAIM. Univ. Berne. *Ber.* 48, 624-9(1915); cf. preceding abstr.—A theoretical discussion in which examples are cited tending to show that for a given anionic complex, change of the cation increases the stability when such change would decrease the stability of complex cations. The reversal of the ability of neutral salts to "salt out" amino acids upon addition of a trace of acid or alkali is discussed upon the assumption that complex compds. are formed: alk.



relations. **X. Limits of the stability of complex anions.** F. EPHRAIM AND E. HOCH-ULLI. *Ibid* 629-37.—Various halide salts of organic bases were tested for their temp. stabilities. Bromides were found to be on the whole somewhat less stable than chlorides, and iodides decidedly less stable than either. Measurements of the pressure at various temps. are given for the chlorides of 14 bases, for the bromides of 3 bases, and iodides of 3 bases; of the last, one only is considered entirely reliable. **XI. Zinc amines.** F. EPHRAIM AND E. BOLLE. *Ibid* 638-48.—Measurements of the dissociation pressure at various temps. were made for a large number of zinc-ammine salts. By comparison of these data with those for Ni-ammine salts, exptl. evidence is obtained for the principle that in compds. of the type $[\text{M}^{\text{II}}(\text{NH}_3)_x] \text{X}_3$, the stability of the neutral part depends upon at least 2 superimposed factors, the cationic metal and the anion. According as the one or the other preponderates, the resultant may differ so greatly that parallel series of analogously composed compds. may present entirely different stability relations. In the Ni series the stabilities found were $\text{ClO}_4 > \text{I} > \text{Br} > \text{ClO}_3 > \text{NO}_3 > \text{S}_2\text{O}_8 > \text{Cl} > \text{SO}_4 > \text{S}_2\text{O}_7 > \text{S}_2\text{O}_8 > \text{NO}_2 > \text{H}_2\text{PO}_4 > \text{HCO}_2 > \text{CNS} > \text{CH}_3\text{CO}_2$; while for the Zn series the order was found to be $\text{S}_2\text{O}_8 > \text{I} > \text{Br} > \text{Cl} > \text{S}_2\text{O}_7 > \text{S}_2\text{O}_8 > \text{HCO}_2 > \text{ClO}_4 > \text{SO}_4 > \text{NO}_3 > \text{C}_2\text{O}_4 > \text{ClO}_3 > \text{CNS} > \text{C}_7\text{H}_5\text{O}_2 > \text{CH}_3\text{CO}_2$ and NO_2 . The stability limits at atm. pressure are scattered over more than 200° in the Ni compds., while those of the Zn series lie within 70° , showing that in the case of Ni change of the anion produces a much greater effect than with Zn. The abs. temp. of decompn. (NH_3 pressure = 1 atm.) is tabulated for 22 Zn-ammine salts and their heats of formation calcd. with the Nernst formula. Observations of the decompn. temps. of some Cu-ammine salts are appended.

A. R. M.

Salts of complex metallopyrophosphoric acids. A. ROSENHEIM AND T. TRIATA-PHYLLIDES. Berlin. *Ber.* 48, 582-93(1915).—Indications of a tendency of the trivalent metals to enter a complex anion with $\text{H}_2\text{P}_2\text{O}_7$ in which the ordinary reactions of the metal ion are suppressed, are scattered through the literature. In a systematic investigation of this tendency the authors have prepd. several new compds. When a soln. of Mn_2O_3 in ice-cold concd. HCl is allowed to drop into cold satd. soln. of $\text{Na}_4\text{P}_2\text{O}_7$, a violet flocculent ppt. is formed by each drop; this dissolves to form a deep violet soln.; from the satd. soln. microcryst. octahedrons of pale red color, insol. in cold,

decompd. by boiling water, separate. The formula, $\text{Na}[\text{MnP}_2\text{O}_7] \cdot 5\text{H}_2\text{O}$ was found in agreement with Christensen (*J. prakt. Chem.* [2] 28, 24 (1883)). The *potassium* and *ammonium* salts were similarly prepd.; the former in 2 forms with $5\text{H}_2\text{O}$ and $3\text{H}_2\text{O}$, the latter with $3\text{H}_2\text{O}$. By double decompn. from the NH_4 salt the *silver* ($3\text{H}_2\text{O}$) and *barium* ($5\text{H}_2\text{O}$) salts were prepd. Similarly with CrCl_3 were prepd. $\text{Na}[\text{CrP}_2\text{O}_7] \cdot 8\text{H}_2\text{O}$, gray-blue, and with $5\text{H}_2\text{O}$, green, and the *potassium* ($5\text{H}_2\text{O}$, green), and *ammonium* ($6\text{H}_2\text{O}$, gray-blue) salts. Properties are like those of the Mn salts except that the Cr salts are more readily hydrolyzed so that the Ag and Ba salts could not be prepd. From Al salts no cryst. complex salts could be obtained. Freshly pptd. $\text{Fe}_4(\text{P}_2\text{O}_7)_3$ dissolves in $\text{Na}_4\text{P}_2\text{O}_7$ soln. and a reddish grey cryst. dust seps. on standing (addition of NaCl increases the yield) or on evap. *in vacuo* over H_2SO_4 . It is quickly decompd. by water. Analysis of 3 preps. gave poorly concordant results approximating $\text{Na}_2\text{Fe}_4(\text{P}_2\text{O}_7)_3 \cdot 28\text{H}_2\text{O}$ instead of Pascal's (*C. A.* 3, 1505) $\text{Na}_4\text{Fe}_2(\text{P}_2\text{O}_7)_3 \cdot 9\text{H}_2\text{O}$. $\text{Bi}_4(\text{P}_2\text{O}_7)_3$ dissolves in a soln. of $\text{Na}_4\text{P}_2\text{O}_7$ and after standing a short time microscopic prisms of $\text{NaBiP}_2\text{O}_7 \cdot 3\text{H}_2\text{O}$ sep. It also dissolves in sols. of $\text{K}_4\text{P}_2\text{O}_7$ and $(\text{NH}_4)_4\text{P}_2\text{O}_7$ but no cryst. products sep. TiCl_3 dissolves in sols. of alkali pyrophosphates and from the concd. soln. of the Na salt a cryst. ppt. of white needles slightly contaminated by Ti_2O_3 is obtained, decompd. by water; analyses of 3 preps. approximated $\text{Na}_4\text{TiP}_2\text{O}_7 \cdot 6\text{H}_2\text{O}$. No cryst. ppt. formed from the K and NH_4 salt sols. K_2MoCl_6 gave stable $\text{NaMoP}_2\text{O}_7 \cdot 12\text{H}_2\text{O}$, brown-yellow, microcryst., but trivalent U and Ti salts caused evolution of H and oxidation of the metal. When crystals of V alum were thrown into $\text{Na}_4\text{P}_2\text{O}_7$ soln. there was formed a flocculent green ppt. which dissolved in excess to a permanent green soln.; this solidified to a glassy mass *in vacuo* over H_2SO_4 . The flocculent ppt. formed by adding alkali pyrophosphate to excess V alum gave upon analysis $\text{V}_4(\text{P}_2\text{O}_7)_3 \cdot 30\text{H}_2\text{O}$. Ce salts behaved like those of V. Amorphous $\text{Ce}_4(\text{P}_2\text{O}_7)_3 \cdot 12\text{H}_2\text{O}$ was prepd. $\text{Co}_2(\text{SO}_4)_3$ thrown into excess of alkali pyrophosphate gave entirely stable dark green sols. from which no cryst product could be obtained. Upon attempts to isolate the amorphous ppt. as with V, the ppt. decompd. with evolution of O even in the soln. and upon drying cobalto-pyrophosphate was found.

A. R. MIDDLETON.

Equilibrium in the system disodium hydrogen arsenate, lead nitrate and water. B. E. CURRY AND T. O. SMITH. *J. Am. Chem. Soc.* 37, 1685-8 (1915).—Sols. of Na_2HASO_4 and of $\text{Pb}(\text{NO}_3)_2$ were added to H_2O in various quantities such that the sum of As_2O_5 + PbO was 2.0 g., to 448 g. H_2O , and the bottles containing the mixts. were rotated at 25° and kept in the thermostat for 3 months. From analyses of the supernatant liquid and the solid phase it was shown that the only compd. in the system was PbHASO_4 .

E. B. MILLARD.

Chlorine salts of ruthenium. A. GUTBIER AND F. KRAUSS. Stuttgart. *J. prakt. Chem.* 91, 103-15 (1915).—The following pentachloro salts were prepd. by mixing sols. of the components, the concn. of the sols. in each case being adjusted when possible so that pptn. was immediate. The compds. are all glittering, well formed crystals, hydrolyzed by H_2O , but slightly sol. in H_2O ; they can be recrystd. from dil. HCl soln. *Methylammonium pentachlororuthenate*, $(\text{MeNH}_2)_2\text{RuCl}_5$, reddish black crystals; *dimethylammonium*, $(\text{Me}_2\text{NH})_2\text{RuCl}_5$, small black crystals with reddish tint; *trimethylammonium*, black crystals; *tetramethylammonium*, black crystals; *ethylammonium*, black crystals; *diethylammonium*, black crystals; *triethylammonium*, black crystals; *tetraethylammonium*, black crystals; *n-propylammonium*, black needles; *i-propylammonium*, black needles; *dipropylammonium*, red crystals; *tripropylammonium*, black needles; *n-butylammonium*, black crystals; *i-butylammonium*, reddish brown crystals; *di-i-butylammonium*, dark red crystals; *tri-i-butylammonium*, black crystals; *guanidinium*, dark red crystals; *ethylenediammonium*, brick red crystals; *pyridinium*, golden yellow crystals; β -*picolinium*, black

crystals; *piperidinium*, black needles; *quinolinium*, dark red crystals. The following hexachlororuthenates were prepd. by mixing solns. of RuCl_3 and the chloride of the base, dissolving the ppt. in HCl , and satg. with Cl in the cold (cf. *C. A.* 1, 1227). *Tetramethylammonium hexachlororuthenate*, $(\text{Me}_4\text{N})_2\text{RuCl}_6$, black crystals; *tetraethylammonium*, black crystals; *tripropylammonium*, black crystals; *di-*i*-butylammonium*, black crystals; *tri-*i*-butylammonium*, black crystals; *di-*n*-amylammonium*, red crystals; *guanidinium*, black crystals; β -*picolinium*, black crystals; *piperidinium*, black crystals; *quinolinium*, black crystals.

GEORGE W. MOREY.

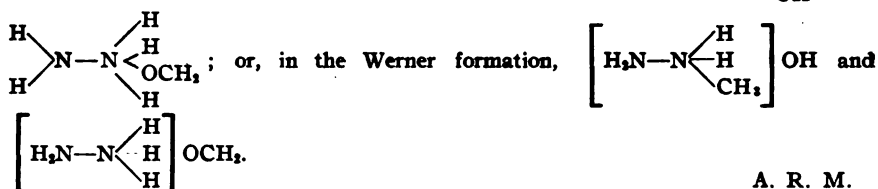
Manganese sulfides. V. M. FISHER. *J. Russ. Phys. Chem. Soc.* 46, 1481-519 (1914).—Owing to the contradictory data found in the literature regarding the different modifications of MnS , an exam. was made of the conditions of prepn. and the properties of each of them. The results of the extensive work may be summarized as follows: Green MnS is formed only when $(\text{NH}_4)_2\text{S}$ or NH_4HS is used as precipitant, and even then only when the NH_4Cl in presence of which the pptn. takes place does not exceed a certain concn., the limit of this concn. differing with the amt. of free NH_3 in the soln. To produce it without an excess of NH_3 , the soln. must be hot, the addition of MnCl_2 to the precipitant very slow, and the liquid must be constantly and vigorously stirred, but with an excess of NH_3 green MnS is produced even at ordinary temp. Usually the green MnS is microcryst., but by adding the MnCl_2 in small portions at a time the crystals may be made to grow till they become visible to the naked eye. Green MnS may be obtained either anhydrous or hydrated, the amt. of H_2O in the salt varying from 0 to 17%, according to the concn. of NH_3 and the length of time the MnS is left in contact with the mother liquor. When the above conditions are not adhered to, or under all conditions when alk. sulfides are used as precipitants the rose-colored MnS results. When obtained by using $(\text{NH}_4)_2\text{S}$ the compn. of the latter is $\text{MnS} \cdot x\text{H}_2\text{O}$, x varying from 22.9 to 55.9%, while NH_4HS ppts. a sulfide containing a little more S , and Na_2S a sulfide containing a little less S than corresponds to $\text{MnS} \cdot x\text{H}_2\text{O}$. In the last case the ppt. possibly contains some $\text{Mn}(\text{SH})_2$, while in the 2nd it is contaminated with $\text{Mn}(\text{OH})_2$. By special precautions rose-colored $\text{MnS} \cdot \text{H}_2\text{O}$ may be prepd. No matter how made and what its compn., rose-colored MnS is always amorphous. The rose-colored MnS obtained by means of NH_4HS changes to the green modification when treated with NH_3 and $(\text{NH}_4)_2\text{S}$, while the 1 pptd. by Na_2S undergoes this change when repeatedly washed with H_2O . The transformation of the rose-colored into the green MnS may be prevented by the addition of $\text{NH}_2\text{OH} \cdot \text{HCl}$. Pptd. by H_2S in acid soln. MnS has a red or orange-red color, and according to the concn. of acid is either anhydrous or contains 1 mol. H_2O . By triturating the other modifications of MnS in the dry condition they change to the green variety. Indications were obtained of the existence of $\text{MnS} \cdot 3\text{Mn}(\text{OH})_2$. Very minute descriptions are given for prep. each of the above modifications.

H. M. GORDIN.

Hydrazine. W. SCHLENK AND TH. WEICHSSELFELDER. *Univ. Jena. Ber.* 48, 669-76 (1915); (Cf. Stollé, *C. A.* 5, 1879).— N_2H_4 prepd. according to Raschig (*C. A.* 4, 2615) was treated with Na in an atm. of N , absolutely dry and free from O and CO_2 . H and much NH_3 were evolved and a colorless cryst. ppt. was formed. Excess N_2H_4 was distd. off *in vacuo*. The dry residue was pure white and violently exploded when removed from the N -filled vessel or on contact with moisture. Widely varying results were obtained in detns. of the atomic proportions $\text{Na}:\text{N}$ in the decompn. products. It was concluded that the N_2H_4 was not absolutely free from hydrate. N_2H_4 by Raschig's process was then treated with a little Na in an atm. of N and distd. *in vacuo*, using a specially devised app. (pictured). The product was entirely free from hydrate. Upon treating it with Na the metal was at first coated with a dark blue layer (Na -hydrazonium?). Upon

shaking the liquid became yellow. Much NH_3 was formed and very little H, showing that the nascent H was used nearly completely for reduction of N_2H_4 . After removal of excess N_2H_4 , the residue consisted of brilliant cryst. leaflets, which upon analysis proved to be $\text{NH}_3\cdot\text{NHNa}$. It is extremely reactive, exploding violently at the least breath of air or trace of moisture or alc. It could be decompd. without explosion by covering with much dry C_6H_6 and then gradually shaking into it C_6H_6 containing a little alc. When sufficient is added the solid disappears and the resulting soln. of N_2H_4 and EtONa seps. from the C_6H_6 . Water may then be added safely. Analysis of 2 preps. gave 2 atoms N:1.039 and 1.019 atom Na, resp. *A case of isomerism in two simple derivatives of hydrazine.* Upon mixing N_2H_4 and MeOH much heat is evolved, presumably by the formation of an alcoholate. This is much less stable than the hydrate for upon distn. the b. p. constantly rises. That at lower temp. a true chem. individual was present is shown by putting mol. amts. of N_2H_4 and MeOH in a sealed tube and cooling with solid CO_2 . The liquid solidifies completely to homogeneous colorless needles, which melt at once on bringing to room temp. This hydrazine

alcoholate is isomeric with the hydrate of Me-hydrazine:

$$\begin{array}{c} \text{H} & & \text{H} \\ & \diagdown & / \\ & \text{N} - \text{N} < \\ & / & \diagdown \\ \text{H} & & \text{H} \end{array} \begin{array}{c} \text{H} \\ | \\ \text{CH}_3 \\ | \\ \text{OH} \end{array} \quad \text{and}$$


A. R. M.

Behavior of vanadium toward silicon, nickel, copper and silver, and of boron toward nickel (GIEBELHAUSEN) 9. Cerium-magnesium alloys (VOGEL) 9. Activation of chlorates by formic acid (HOFMANN) 2.

7. ANALYTICAL CHEMISTRY.

E. G. R. ARDAGH.

Electrometric titration. H. ZIEGL. *Trans. Am. Electrochem. Soc.* 26, 91-7 (1914); cf. *C. A.* 9, 898.—To det. the end point of a titration, the author makes use of the change of potential (about 0.2) to operate a relay to close the buret. The app. used was similar to that of Forbes and Bartlett (cf. *C. A.* 7, 3938) except that a Weston No. 30 relay was used instead of a galvanometer. When the change took place, contact was made in a circuit having in it a telegraph sounder with a narrow arm 17.8 cm. long. This was attached to one side of the buret stopcock tip with a piece of fine chain. Rapid stirring was obtained by means of a small battery motor, driving a deeply nickeled disk of sheet Pt which formed the O electrode. Data given indicate very good checks obtained by this method. It was pointed out in discussion that the method is particularly adapted to the detn. of small amts. of Cl in H_2O . It was further suggested that the change in resistance in acid and alkali titration could be utilized in a similar device.

W. E. RUDER.

Inner paraffin coating for volumetric apparatus. G. POVARNIN. *J. Russ. Phys. Chem. Soc.* 46, 1898-905 (1914).—In order to avoid the adherence of droplets of liquid to the inner surface of volumetric vessels, P. advises coating them with a layer of pure

paraffin. Evidently solns. of I or alkali in alc. cannot be used with such app. Among the advantages of such vessels are the absence of interaction between aq. alkali and the glass and the possibility of drawing fractions of drops from burets. H. M. GORDIN.

Note on standardization of permanganate. H. E. MOYER. *Chem. Analyst* 13, 7-9(1915).—Weigh out KMnO_4 necessary to make the soln. somewhat weaker than the desired concn. in order to allow for some decrease in vol. by evapn., and keep near the b. p. on the steam plate for 2 days. Prepare in a similar manner a smaller amt. of a stronger soln. Remove pptd. MnO_2 by filtration through asbestos over broken glass in a funnel. Det. the concn. of the 2 solns. and the amt. of the stronger to be added to the weaker in order to bring it to the desired strength. H. M. LANCASTER.

Specific absorption of reagents for gas analysis. R. P. ANDERSON. Cornell Univ. *J. Ind. Eng. Chem.* 7, 587(1915).—Introductory note. A. defines the specific absorption as the vol. of a gas which a certain reagent will absorb up to the point at which the gas is not completely removed from its mixt. with other gases, expressed in cc. of gas per cc. of reagent. ISADOR MILLER.

Reagents for use in gas analysis. I. Alkaline pyrogallol. R. P. ANDERSON. Cornell Univ. *J. Ind. Eng. Chem.* 7, 587-96(1915).—Results on the specific absorption of alk. pyrogallol (see preceding abstr). The best soln. is prepd. by dissolving 15 g. pyrogallol in 100 cc. KOH soln., sp. gr. 1.35. Detailed instructions as to the method of analysis, apparatus, etc., are included. ISADOR MILLER.

Separation of manganese as sulfide from the alkali and the alkaline-earth metals. V. M. FISHER. *J. Russ. Phys. Chem. Soc.* 46, 1519-26(1914).—After pointing out the inconvenient features of detg. Mn as MnS in presence of alk. and alk.-earth metals and making use of his previous expts. (cf. C. A. 9, 2197), F. proposes 2 rapid and exact methods: (1) *As green MnS.* To 100-200 cc. of the analytical soln. add 5-15 g. of NH_4Cl and 50-60 cc. of NH_4OH ($d_{40} 0.895$). From a dropping funnel whose delivery point has been drawn out to a diam. of $\frac{3}{4}$ mm. add slowly during 10-15 min. 50-100 cc. of freshly prepd. NH_4HS (from 2.5% NH_4OH), constantly and vigorously stirring the liquid. If the rose-colored MnS produced at first has not by this time completely changed to the green variety, stopper the vessel and set it aside for 0.25-1.5 hrs. When all of the ppt. has turned green, dil. the liquid to 500-700 cc., collect the ppt. on a filter and wash it with H_2O containing some NH_4Cl and NH_4HS . The Mn is then detd. either as MnS by calcining the ppt. mixed with S in a current of H, or as phosphate by dissolving it in dil. HCl and adding a sol. phosphate. The presence of AcONH_4 does not interfere in the method. (2) *As rose-colored MnS.* The rose-colored MnS obtained in the 1st part of the above method usually is so dense that it is readily sepd. by filtration. Hence it is not necessary to wait till it has changed to the green variety, except when the supernatant liquid is turbid, which happens when the pptn. is too fast. Completely to prevent the formation of green MnS , 0.5-1 g. of $\text{NH}_4\text{OH.HCl}$ is added to the soln. before pptn. The detn. is finished in the same manner as above. Numerous detns. proved the exactness of these methods. H. M. GORDIN.

Micro-electroanalysis. E. H. RIESENFELD AND H. F. MÖLLER. *Z. Elektrochem.* 21, 137-43(1915); cf. Heinze, C. A. 8, 2322.—Based on exptl. data reported in detail, the authors have worked out methods for the micro-electroanalytical detn. of Cu, Ag, and Hg. A content of 5 mg. per l. can be detd. with an error of about 0.5%. This relatively large error is due to the inability to obtain electrodes of const. wt. (the wt. of the Pt electrodes used varied within above limits, owing to variation in the gas charge (Gasbeladung); perhaps also to oxide and hydride formation). Other sources of error, such as impurities in the electrolyte addition, incompleteness of pptn., spongy deposits, and change in deposit after electrolysis, were obviated. The following conditions are recommended:

	Cu.	Ag.	Hg.
Electrolyte addition.....	10 cc. 2NHNO ₃	2 cc. 2NHNO ₃ & 1 cc. alc.	2 cc. 2NHNO ₃
Temp.....	90°	50-60°	0°
Current.....	2 v., 10 milli-amp.	1.35 v., 4 milli-amp.	3 v., 10 milli-amp.
Minimum time.....	2 hrs.	6 hrs.	6 hrs.

F. W. SMITHER.

New method for volumetric determination of nickel. GINO ZUCCARI. Padova. *Ann. chim. applicata* 3, 277-9(1915); cf. Zuccari, *C. A.* 9, 771.—Dissolve 74.482 or 50.771 g. Na nitroprusside in a l. H₂O. The 1st soln. will ppt. 0.01467 g. and the 2nd 0.01 g. Ni per cc. The titrating soln. is added from a buret to the Ni soln. which is constantly stirred with a glass rod till the ppt. assumes an ashy color in the decolorized liquid, a drop of which is filtered and tested with Na₂S. A black color indicates excess of Ni. The end point is reached when a non-permanent light violet color is obtained. The following precautions should be observed: (1) Start the Ni soln. at, or conc. to, a strength of 1-1.5%; (2) agitate thoroughly, especially towards the end; (3) use for the test fine and not too porous filter paper, as otherwise the Na₂S acts on the Ni nitroprusside passing through, and the Na nitroprusside reformed gives the violet test; (4) confirm the end point by another test 5 min. later; (5) titrate upon decidedly acid solns. This method is applicable to the common Ni salts, even in presence of Fe⁺⁺, Zn, Sn, Al, Pb, Mn. Ni nitroprusside is insol. in acids, and becomes dark green on drying, turning gray again on moistening, or on exposure to the air. It is very sol. in NH₄OH with which, however, it does not give the blue color of Ni-NH₄ salts, but instead, a yellowish brown. It turns lemon yellow with KOH, and dissolves in KCN. Co nitroprusside is red, and insol. in acids. It does not dissolve in KOH or NH₄OH. The latter changes it to dark brown, but it becomes lighter after a few minutes. Thus NH₄OH will sep. the Co from Ni nitroprusside. The Co salt not being sufficiently insol. the nitroprusside method is not delicate enough when applied to Co.

S. LEVY.

Application of a new reaction of copper, cobalt and nickel. GIUSEPPE MALATESTA AND ETTORE DI NOLA. Milan. *Boll. chim. farm.* 52, 819-23, 855-60(1913).—Uhlenhuth's reagent consists of 0.5 g. 1,2-diaminoanthraquinone-3-sulfonic acid in 500 cc. H₂O with the addition of 40 cc. NaOH soln. (40° Bé.). This reagent (red in color) gives a blue coloration with solns. of Cu salts when the reagent is not added in sufficient amt. to produce a violet coloration (due to blending of the red and blue colors); the soln. in which a blue coloration has been produced exhibits greenish fluorescence in reflected light. When a soln. of a salt such as NH₄Cl, NH₄NO₃, or MgCl₂ is added to the Cu salt soln. (either before or after addition of the reagent) a red color is obtained instead of the usual blue coloration; NaCl has no effect on the color reaction. When the Cu salt soln. (after addition of the reagent) is dild. with considerable H₂O the blue color is replaced by a red coloration. Aq. solns. of Co salts also give a blue coloration (and blue ppt. if concn. is sufficiently great) with the reagent; the reaction is sufficiently sensitive for the detection of 0.00002 g. Co in 1 cc. Addition of NH₄OH increases the intensity of color so that 0.000002 g. Co in 1 cc. may be detected; the sensitiveness of the reaction with Cu salts is not sensibly affected by the addition of NH₄OH. The coloration of a Co salt soln. is not changed by diln. with H₂O after addition of the reagent. The coloration due to a Co salt is not altered when NH₄Cl is added, so that this distinction, as well as the different behavior on diln. with H₂O, may serve to differentiate Co and Cu. NaCl has no influence on the coloration due to Co salts. Ni salts also give a blue ppt. with the reagent, the reaction being sufficiently sensitive to detect

0.0002 g. Ni in 1 cc.; contrary to the action of the Co and Cu ppts., the Ni ppt. flocculates readily. Addition of a small amt. of dil. NH_4OH soln. (5% soln., $d = 0.98$) increases the intensity of the coloration so that 0.00005 g. Ni in 1 cc. may be detected; a considerable excess of NH_4OH soln. (a vol. equal to that of the liquid to be tested) added subsequent to the addition of the reagent causes the blue coloration to become red. The latter phenomenon furnishes a means of differentiating Ni from Co and Cu. The influence of electrolytes, such as NH_4 , Mg and Al salts, on the coloration produced by Cu salts and the reagent may be nullified by the addition of a sufficient amt. of dil. NaOH soln.; a blue coloration which has been changed to red by addition of NH_4Cl may thus be restored and the application of the test may, therefore, be extended to solns. which already contain electrolytes which influence the coloration. Co may be detected in glass, smalt or porcelain, for instance, by treating a small portion of the pulverized material with a mixt. of HF and H_2SO_4 (or fusing with Na_2CO_3 and K_2CO_3), evapg. and dissolving the residue in aqua regia (or dissolving the fused mass in HCl), evapg. to dryness on a H_2O bath, dissolving the residue in H_2O , adding a little NH_4OH and an excess of dil. NaOH soln., filtering and adding several drops of the reagent to the filtrate. Several drops of dil. NaOH soln. are added to another portion of the filtrate; intensification of the blue coloration (or appearance of the latter, if not already present) shows that an insufficient amt. of NaOH soln. was originally added. Co, Cu and Ni may then be differentiated by the means previously mentioned. Metals may be quickly tested by placing on them a drop of HCl or HNO_3 , absorbing the acid liquid with a strip of filter paper, rendering the absorbed liquid alk. with 1 or more drops of dil. NaOH soln. and testing with 1 drop of a modified Uhlenhuth soln. (0.5 g. 1,2-diaminoanthraquinone-3-sulfonic acid, 100 cc. conc. NH_4OH soln., 360 cc. H_2O , 40 cc. of 40° Bé. NaOH soln.) proposed by M. and N. The reactions employed for differentiating Ni, Co and Cu have the same value when applied to a soln. absorbed by bibulous paper. Cu, for instance, may be readily detected when present in minute amt. in alloys of Pb, Sn and Sb. A drop of the alk. modified reagent of M. and N. gives an intense blue coloration when placed upon a plate of Cu or Co, so that the test may be applied direct without previous soln. in acid; a drop of the reagent placed upon a plate of pure Ni gives a scarcely perceptible coloration. The tests for differentiating Cu, Co and Ni may be applied direct to the liquid upon the metal object or this liquid may be either removed by a jet of H_2O or absorbed by bibulous paper before applying the differentiating tests. The coloration produced by a drop of the reagent upon a Ni object is so slight that this test has no value in the presence of Co and Cu. The foregoing tests are of especial value in case it is desired to investigate the comp. of objects such as jewelry, etc., in which procedure by soln., etc., is to be avoided; the distribution of Cu and Co (and Ni in certain instances) in the object under exam. may be detd. by applying drops of the reagent to various portions of the surface. H. S. PAINE.

New reaction of vanadium. VICENTE GARCÍA RODEJA. Univ. Valladolid. *Anales soc. españ. fis. quim.* 12, 305-9(1914).—Acid solns. of vanadates of the alk. metals give with "cupferron" (the NH_4 salt of nitrosophenylhydroxylamine) a dark red ppt. which flocculates to a spongy mass when agitated; this reaction is quite sensitive and a reddish coloration instead of ppt. appears when the content of V is less than 0.01 mg. per cc. The ppt. (and especially the coloration) disappears rapidly by boiling and slowly by prolonged contact with air at ordinary temp., just as in the case of the corresponding ppts. of other metals (Fe, Cu, etc., although the ppt. produced by Ti salts is more stable in the presence of air). The ppt. is sol. in alk. solns. and is slightly sol. in H_2O (this may be shown by washing the ppt. with H_2O and acidulating the filtrate, whereupon a reddish coloration appears). The products of oxidation of cupferron cause the pptn. of V to be incomplete; this is shown by the fact that the pro-

portion of V pptd. from a H_2SO_4 soln. of NH_4 vanadate decreased progressively with the increase in the time which had elapsed since the prepn. of the cupferron soln. Analogous results were obtained with a HCl soln. of NH_4 vanadate; the incomplete pptn. of V is due to the solvent action of the products of oxidation of cupferron which increase as the latter soln. is kept. Cupferron may be kept unchanged in a closed vessel containing a few pieces of $(\text{NH}_4)_2\text{CO}_3$, thus creating a NH_3 atm. By means of cupferron it is possible to obtain a reddish coloration when V (NH_4 vanadate in a soln. containing an equivalent amt. of H_2SO_4) is present in the proportion of 0.000001 g. in 1 cc.; this coloration is transitory and slow in appearing and finally changes to green, while the cupferron is oxidized in acid soln. If more than 0.000001 g. V per cc. is present the coloration appears within 1 min. (with gentle shaking). If more than 0.00001 g. V per cc. is present a brick red ppt. is obtained instead of a red coloration, while in the case of 0.000005 g. V per cc. the fine particles producing the coloration may be flocculated by sufficient agitation; this ppt. may be kept unchanged for a considerable period. The above test for V is more sensitive than most of the others which have been proposed. The red color produced by the action of conc. acids and vanadates, and especially the blue coloration produced with KCNS , is not obtained when V is present in a proportion less than 0.00005 g. per cc. The rose coloration produced by the action of H_2O_2 on vanadates in acid soln. is more sensitive than the preceding tests but is less sensitive than the reaction given by cupferron, since the coloration is scarcely perceptible when the V content is 0.000005 g. per cc.

H. S. PAINE.

Separation of vanadium and phosphorus with cupferron. VICENTE, GARCÍA RODRÍGA. Univ. Valladolid. *Anales soc. españ. fis. quim.* 12, 379-82 (1914).—The pptn. of V by cupferron is not quant. when V is present as the vanadic salt, even though a freshly prepd. soln. of cupferron is used (cf. preceding abstr.); the loss amounts to 0.7-1.9%. When V is present as the vanadyl salt cupferron in acid soln. produces a greenish brown ppt. which changes to reddish brown and flocculates to a spongy mass; the pptn. of V is quant. even when the cupferron soln. employed has been altered by standing after being prepd. Since, in most analytical detns., V is usually present as a vanadate of an alk. metal, it should be reduced to the vanadyl salt (V_2O_4 compd.) before pptg. with cupferron. The following procedure is proposed: Take a sufficient amt. of the neutralized alk. metal vanadate soln. to contain 0.2-1.0 g. V, add 5 cc. H_2SO_4 (dild. 1:5 with H_2O) and an excess of satd. SO_2 soln. (to reduce V_2O_5 to V_2O_4), boil and expel SO_2 with a current of CO_2 . Allow the soln. to cool, complete the vol. to 50 cc. and ppt. with a 5% cupferron soln.; add the latter slowly with const. stirring until several drops produce a white ppt. (nitrosophenylhydroxylamine, which is liberated when the cupferron comes in contact with an acid medium). Then add 2-3 cc. more of the cupferron soln., filter and wash rapidly with acidulated H_2O (the filtrate becomes turbid owing to oxidation of cupferron); dry the ppt. for a while at 90° , calcine until all organic substance is destroyed and weigh as V_2O_5 . The following procedure for sepg. V and P possesses about the same degree of accuracy as that recommended by Treadwell and is much more rapid. Acidulate the soln. under exam. with H_2SO_4 , add a satd. SO_2 soln., boil and expel excess SO_2 with CO_2 ; after cooling ppt. the V with cupferron as indicated above and weigh as V_2O_5 . The filtrate is evapd. on a H_2O bath, H_2SO_4 is expelled and the products of decomp. of cupferron are eliminated as much as possible; the residue is dissolved in acidulated H_2O and P is pptd. as NH_4Mg phosphate (Schmitz procedure). P may be detd. directly in the filtrate with greater rapidity and nearly the same degree of accuracy; add approx. 20 cc. satd. NH_4Cl soln. to 150 cc. of the filtrate and an excess of magnesia mixt. and follow the Schmitz procedure.

H. S. PAINE.

Battery assay of copper. W. B. PRICE, et al. *J. Ind. Eng. Chem.* 7, 546-7 (1915).

—Report of the sub-committee on the analysis of non-ferrous alloys of the Div. of Industrial Chemists and Chem. Engineers of the Am. Chem. Soc. The methods are substantially those of Heath (*Trans. Am. Inst. Mining Eng.* 27, 390-400(1897); they have been checked and elaborated. They apply to electrolytic and low resistance lake Cu. Four modifications, to be used according to compn., are given for low grade or casting Cu.

ISADOR MILLER.

Results of some coöperative work on the determination of sulfur in pyrites; some observations on details of manipulation, sources of error and on barium sulfate as precipitant under different conditions. H. C. MOORE. *J. Ind. Eng. Chem.* 7, 634-6 (1915).—Results obtained in 17 different laboratories on 2 samples are given. The method of Allen and Bishop gives better agreement in the results than that of Lunge. The sources of error in the Lunge method are (1) loss of S by volatilization, (2) loss of S in the residue due to incomplete oxidation, (3) loss due to the presence of NH_4 salts and (4) the pptn. of CaSO_4 .

ISADOR MILLER.

Note on sodium peroxide method for sulfur. E. ROE. *Chem. Analyst* 13, 4 (1915).—The Na_2O_2 method has been applied to difficultly fusible ores.

H. M. LANCASTER.

Analysis of spelter. W. B. PRICE, *et al.* *J. Ind. Eng. Chem.* 7, 547-8(1915).—Report of sub-committee on the analysis of non-ferrous alloys of the Div. Industrial Chemists and Chem. Engineers of the Am. Chem. Soc. The methods of analysis are those of Elliott and Storer (*Mem. Am. Acad. Arts and Sci.* 8, I, May 20, 1860) and Price (*C. A.* 3, 992), whose work has been checked and elaborated by the members of the committee.

ISADOR MILLER.

Determination of copper sulfate in commercial copper vitriol. GEORG INCZE. Budapest. *Z. anal. Chem.* 54, 252-5(1915).—The method consists in reducing the Cu and pptg. as CuCNS by addition of excess of a standard $\text{Na}_2\text{S}_2\text{O}_3$ soln. (19.878 g. per l.) containing 8 g. NH_4CNS per l., and titrating the excess $\text{Na}_2\text{S}_2\text{O}_3$ with I soln. (1.0178 g. per l.), using starch. Fe does not interfere.

GEORGE W. MOREY.

The determination of arsenic in slag lead and lead shot by hypophosphorous acid. L. BRANDT. *Z. öffentl. Chem.* 31, 66-71(1915).—A record of the exptl. work, with tabulated results, which lead to the conclusion that the pptn. of elementary As by means of hypophosphorous acid as variously given in metal analyses can be advantageously employed in the detn. of this element in slag lead and in lead shot. H. A. LEPPER.

Assay of gold-bearing cyanide solution. D. M. LEVY AND H. JONES. Inst. Min. and Met.; *Bull.* 128.—Transfer 453.6 cc. ($1/2000$ ton) of the soln. to be assayed to a 1250 cc. flask and add 15 cc. silver soln. (5 cc. for poor solns. and wash waters). The silver soln. is made by dissolving 36 grains AgNO_3 in water, adding NaCN till ppt. just dissolves, and diluting to 2500 cc. Now add 10 cc. NaCN (10% soln.) and then 5 cc. of Na_2PbO_2 (to 65 g. Pb(OAc)_2 in water add NaOH soln. till ppt. just dissolves, then dil. to 2500 cc.) and shake. Add 20 g. Zn shavings and boil gently for 30 min., filter at once through a 9 in. paper, rejecting the clear filtrate. To the residual Zn shavings add a little (about 20 cc.) water, then 70 cc. com. HCl . After complete soln. of the Zn, pour through same filter, wash both flask and filter thoroughly, transfer wet to an assay crucible, place in furnace till carbonized, withdraw from furnace and add the following flux: Pb_3O_4 12.5 g., $\text{Na}_2\text{B}_4\text{O}_7$ 22.5 g., Na_2CO_3 12.5 g., NaCl 2.0 g., flour 2.0 g., powdered glass 2.0 g., KNO_3 2.0 g. Replace in furnace and run down in the usual manner (20 to 30 min.). Cupel the button in a magnesite cupel, roll the bead and part in the usual way.

E. G. R. ARDAGH.

Method of making mineralogical analysis of sand. C. W. TOMLINSON. *Bull. Am. Inst. Mining Eng.* 1915, 947-56.—The samples analyzed weighed 290-340 g.

By the method 4 samples can be analyzed simultaneously in 33 working hrs. (1) *Sizing*. Use nest of sieves, 10, 20, 40 and 100 mesh. (2) *Weighing of sizes*. If any group amounts to less than 1% of the whole, it may be neglected in the analysis. (3) *Preparation of heavy solution*. An excellent classification of the sand which passes the 20-mesh sieve may be made by means of heavy solns. A soln. of d. 2.9 will sep. practically all the dark silicate minerals from the others. The most satisfactory soln. to use is potassium mercury iodide in H_2O . Details of manipulation and discussion of results obtained with heavy solns. are given. (4) *Hand sorting*. This is done with the material which passes 20 mesh. (5) *Weighing of separates*. (6) *Microscopic analysis of heavy solution separates*. A good hand lens is sufficient for this purpose, and a black sheet with a square pattern in white makes a satisfactory background for quant. detn. (7) *Computation of analyses*. From the above detns. the % comp. is given as "igneous rocks, shale group, quartz group, dolomite group, feldspar, heavy minerals, and not examined." Tables of results of detns. and sample reports are given.

E. W. BOUGHTON.

Notes on the practical testing of working cyanide solutions. E. H. CROGHAN. *J. Chem. Met. Soc. S. Africa* 15, 271-6(1915).—In testing a working soln. the usual procedure is to add a little KI, titrate 50 cc. with standard $AgNO_3$ (6.253 g. per l.; 1 cc. = 0.01%) to turbidity for "free cyanide," then without filtering, to add phenolphthalein and det. "protective alkalinity" with standard acid. On another 50 cc. total cyanide is detd. by adding excess of NaOH containing KI and titrating with standard $AgNO_3$. Clennell's method (Chemistry of Cyanide Solutions) reverses the order of the tests. "Total cyanide" is detd. in the same manner. To another 50 cc. add about 0.2 cc. excess of $AgNO_3$, then a slight excess of $K_4Fe(CN)_6$ followed by phenolphthalein, and det. "protective alkalinity." To a third 50 cc. add the amt. of acid indicated, then 5 drops KI and titrate with $AgNO_3$ for "free cyanide." In the $AgNO_3$ titrations some take the end point as the appearance of a *white* turbidity; others continue the addition to the appearance of a *yellow* tinge. A table is given of results of the above tests on 22 working solns. In the ordinary method for "free cyanide" the white end point agrees pretty closely with the *yellow* end point in Clennell's method, while the *yellow* end point gives very nearly the "total cyanide," especially in weak solns. But carrying the addition of $AgNO_3$ in the ordinary method to the *yellow* end point reduces materially the amt. of "protective alkali" indicated. For "protective alkalinity" Clennell's method gives a result falling between those obtained with *white* or with *yellow* end point.

E. WALLER.

Reduction of copper oxide in alcohol vapor in reducing sugar determinations and copper analysis. A. WEDDERBURN. *J. Ind. Eng. Chem.* 7, 610-1(1915).—Collect Cu_2O on an alundum filtering crucible using Spencer's filtering funnels with suction. Wash thoroughly with hot H_2O followed by alc. Heat to redness to destroy org. matter and allow to cool until redness just begins to disappear and then immerse in an atm. of alc. vapor as follows: Place a pipe-stem or silica tripod in a 400 cc. beaker (metal) and put in strong alc. so as to cover the bottom for 1 cm. and cover the beaker with a watch glass. Heat the alc. to boiling and continue heating until the vapors begin to condense on the cover glass. Now place the hot crucible on tripod and replace cover glass. If the crucible be too hot, the alc. will ignite. Allow the alc. to continue to boil for a moment and then remove the source of heat. The crucible is kept in the covered beaker until it is cooled to a temp. a little above that of the alc. vapor (time, 3-4 min.). Remove and cool in a desiccator. The reduction to metallic Cu is almost instantaneous and complete.

ISADOR MILLER.

Quantitative determination of phosphine. H. RECKLEBEN. *Leipzig. Z. anal. Chem.* 54, 241-52(1915).—A comparison of the value of various solns. for the absorption

of PH_3 from H-PH_3 mixtures. The following give good results, and the amt. PH_3 can be detd. directly without intermediate absorption: 0.5 N I-KI soln., HClO soln., HBrO soln., concd. KIO_3 soln., 0.1 N AgNO_3 soln., and both Hg^+ and Hg^{++} salt solns. The following reagents also give as good results and in some cases a more rapid absorption: 0.16 N Cl soln. (too strong may cause explosion), satd. Br soln., acidified 0.2 N KBr-KBrO_3 soln., ammoniacal AgCl soln., acidified CuCl soln., acidified 0.5 N KMnO_4 soln.; with each of these a second absorbent is necessary to remove gas taken up from the soln. (Cl , Br , NH_3 , HCl , or O , resp.). Other reagents ($\text{K}_2\text{Cr}_2\text{O}_7$, FeCl_3 , CuSO_4 , Fehling soln., H_2SO_4 , HCl , etc.) tried did not give good results. G. W. M.

Determination of nitrogen according to Kjeldahl. ORTO NOLTE. Göttingen. *Z. anal. Chem.* 54, 259-62(1915).—In the detn. of N in organic substances by the Kjeldahl method, addition of sugar was found to be without influence on the result with some easily decomposable substances, i. e., aniline sulfate, betaine hydrochloride, $\text{K}_4\text{Fe}(\text{CN})_6$, hippuric acid, pyrrole, mustard oil, AgCNS , Me_3NHCl ; it caused a slight loss of N in some more difficultly decomposable substances, i. e., acetanilide, antipyrine, uric acid, caffeine, AgCN ; and gave much better results with some other decomposable substances, i. e., $(\text{C}_6\text{H}_5)_2\text{NH}$, methylindole, pyridine hydrochloride, Me_2NBr .

GEORGE W. MORREY.

The determination of selenium in organic compounds. H. BAUER. *Ber.* 48, 507-8(1915).—Heat 0.2-0.3 g. of the material with fuming HNO_3 in a sealed tube for 5 hrs. at 250° . In some cases longer heating is necessary. Transfer the contents of the tube to a 1 l. round-bottom Jena flask, washing out the tube with the smallest possible amt. of H_2O . Add 100 cc. of concd. HCl and some glass beads. Heat under a reflux condenser until no more nitrous fumes are noticeable and the liquid is colorless. This will require 1-3 hrs. Filter into a beaker, add 3 g. Na_2SO_3 and heat on the water bath until the Se has settled as a black ppt. If the soln. does not smell of SO_2 , add more Na_2SO_3 . Filter off the pptd. Se on a Gooch crucible, wash, dry at 110 - 120° and weigh.

E. W. BOUGHTON.

Bromine method of estimating phenol. W. VERSFELD. *Analyst* 40, 281-3 (1915).—V. recommends the following method: Place a portion of the soln. containing about 0.05 g. of phenol in a glass-stoppered flask of 500 to 1000 cc. capacity, and dil. with about 50 cc. water. Add 5 cc. strong HCl and 100 cc. hypobromite soln. (prepd. by satg. 100 cc. 0.5 N NaOH with Br water, boiling until quite colorless and dilg. to 1 l.), shake the flask well and allow to stand 15 min. Raise the stopper sufficiently to pour in about 20 cc. KI soln. (10%), shake the flask again, let stand for 5 min., dil. to 300 or 400 cc., and titrate with 0.1 N $\text{Na}_2\text{S}_2\text{O}_3$, using filtered starch as indicator. A control is carried out in the same way. The difference in cc. between control and test multiplied by 0.156746 = % phenol if 1 cc. was used. The $\text{Na}_2\text{S}_2\text{O}_3$ is standardized by adding 20 cc. 0.1 N $\text{K}_2\text{Cr}_2\text{O}_7$ to a mixt. of 10 cc. KI (10%) and 5 cc. strong HCl , and titrating the I liberated. Br water containing KBr is fairly permanent and may be used instead of the hypobromite soln.

P. B. DUNBAR.

The determination of methyl alcohol in the presence of ethyl alcohol. W. A. R. WILKS. Sudan Govt. Wellcome Tropical Research Labs., Khartoum, Chemical Section, *Bull.* 1, Oct., 1914.—An investigation of the standard method of detg. MeOH in presence of EtOH by weighing the CO_2 produced on oxidizing the MeOH by H_2SO_4 + $\text{K}_2\text{Cr}_2\text{O}_7$ (Thorpe and Holmes, *J. Chem. Soc.* 85, 1(1904)) led to the conclusion that the correction of 0.01 g. CO_2 for each g. EtOH present is not a constant. By using less H_2SO_4 , or adding borax to lessen the intensity of the reaction the correction factor may be decreased but never becomes a constant. W. recommends the following procedure by which the correction factor is reduced to 0.0040: Dissolve 30 g. $\text{K}_2\text{Cr}_2\text{O}_7$ in 150 cc. water, cool in a freezing mixt. paying no attention to the sepn. of $\text{K}_2\text{Cr}_2\text{O}_7$ crystals,

add 50 cc. of this aqueous alc. mixt., and then in small quantities at a time run in 20 cc. H_2SO_4 in 20 cc. H_2O , the acid mixt. having been first thoroughly cooled in ice and salt. The other usual details of procedure are presumably unchanged.

E. G. R. ARDAGH.

Detection of methyl alcohol in ethyl alcohol. UMBERTO PAZIENTI. Padova. *Ann. chim. applicata* 3, 279-81 (1915).—Most methods are based on oxidation of the 2 alcs. by appropriate means, fractionating the products and testing the different fractions. Schryver detects HCHO in the liquid without fractionating. But his test (a red color produced by the HCHO on adding to 10 cc. of the liquid containing it 2 cc. of 1% phenylhydrazine hydrochloride recently prepd. and filtered, and 1 cc. of a freshly made 5% $\text{K}_3\text{Fe}(\text{Cn})_6$ soln. and 5 cc. concd. HCl) loses its power when considerable quantities of HCHO are present. P. suggests the following modification: Dil. 5 cc. of the sample to 50 cc., put into a 250 cc. flask containing 3 g. $\text{Na}_2\text{S}_2\text{O}_8$ and 10 cc. 20% H_2SO_4 , close the flask with a ground-glass stopper carrying a tube joined to a reflux condenser. Bring to a boil, and when it begins to distil, collect in fractions of about 2 cc. By testing the 5th fraction with Schryver's reagent 0.001 part MeOH may be detected. Treating the distillate directly without fractionating, there may be detected 4% MeOH in the EtOH . If the color is not distinct, it is well to repeat the reaction upon the distillate more or less dild. with H_2O .

S. LEVY.

Tube for rapid distillation of ammonia (POZZI-ESCOT) 1. Testing ores for the cyanide process (CROOK) 9. Indicator stopper for distillations (FERRARO) 1.

8. MINERALOGICAL AND GEOLOGICAL CHEMISTRY.

EDGAR T. WHERRY.

Solubility of magnesium carbonate in natural waters. ROGER C. WELLS. *J. Am. Chem. Soc.* 37, 1704-7 (1915).—Under atmospheric conditions it appears possible to attain practically the same equil. state in a soln. satd. with $\text{MgCO}_3 \cdot 3\text{H}_2\text{O}$, whether one starts with a soln. contg. an excess of $\text{Mg}(\text{HCO}_3)_2$ or with pure trihydrate and H_2O , but adjustment occurs very slowly. The soln. finally contains 0.36 g. Mg and 1.01 g. CO_2 per l. at 20° . The solubility of magnesite is much smaller, 0.02 g. Mg and 0.07 g. CO_2 per l. Certain natural waters exposed to the atm. appear to be supersatd. with respect to magnesite, but none approaches very closely the satn. point of $\text{MgCO}_3 \cdot 3\text{H}_2\text{O}$.

E. B. MILLARD.

Corundum: its occurrence, distribution, exploitation, and uses. A. E. BARLOW. *Canada Dept. of Mines Memoir* 57, 316 pp. (1915).—Aluminium is an essential constituent of all important rocks except sandstones and limestones, and because of its affinity for O, it is always found in nature in combination. Corundum-bearing rocks are widely distributed. Evidence points to the fact that all the deposits of corundum which are commercially valuable are primary crystns. from igneous magmas containing an excess of Al, confirming the results of Morozewicz (1889). The corundiferous rocks of eastern Ontario are of syenitic, dioritic, and gabbroic type and appearance. The feldspathic constituent varies from micropertthite to bytownite; nepheline and scapolite often accompany or replace the feldspars. The nepheline- and related alkaline-syenites with which the principal occurrences of corundum are associated show an extreme and rapid variation in comp. No other class of rocks show an equally great diversity of types within such short distances. The normal phase is a rock composed almost wholly of feldspar, chiefly a micropertthite, prevailing albitic. All the rocks in the corundum-bearing syenitic complex are differentiation products of one highly aluminous magma.

These rocks are usually very poor in Fe-Mg constituents and differ from the great majority of the occurrences of similar rocks in that the augite, which is usually present, is replaced by biotite or hornblende or both. The Ontario occurrences of corundum show clearly its development as a primary constituent from a highly aluminous silicate magma as one of the first products of crystn. Chem. analysis shows that the occurrences conform closely to the law of Morozewicz: that the development of corundum in the magma is dependent on the ratio of the Al_2O_3 to the sum of the other bases. In the neighborhood of belts of corundum-bearing rocks the limestones have been thoroughly metamorphosed and rendered cryst. and impure by the secondary development of silicates. 42 mineral species have been recognized among the products due to the direct action of the magmatic waters accompanying the intrusion of the Laurentian granite batholiths. Amphibolites have originated in 3 entirely different ways: (1) from the metamorphism and recrystn. of sediments; (2) by alteration of igneous intrusions and (3) by the metamorphic action exerted by the granite batholiths on the limestones through which they cut. A remarkable similarity was found in the chem. comp. of the corundum-bearing rocks occurring in such widely separated localities as Canada and Russia. Muscovite seems to have resulted from the alteration of corundum, this change being connected with some phase of pneumatolytic or vein action which immediately preceded the complete solidification of the enclosing rock from the molten magma. Corundum is one of the most unalterable of substances when subjected to ordinary processes of weathering. A detailed statement (107 pp.) of the distribution of corundum is given; it includes all the known deposits of the mineral occurring in amts. of economic and geological importance. The list shows that it is quite universally and plentifully distributed. A chapter on the production of artificial corundum as well as one on the mining and milling of corundum together with a compilation of statistics concerning the mineral is included. A complete bibliography of Canadian corundum is given.

R. L. SIBLEY.

The chemical composition of some minerals. I. FERRUCCIO ZAMBONINI. Univ. Turin. *Atti accad. sci. fis. nat. Napoli* [2] 16, 25 (1914).—On the basis of his own and other mineral analyses Z. concludes that the minerals of the nepheline group (except the chloride-sulfates and carbonate-silicates, which are characteristic of the cancrinite subgroup) contain the following individuals: $K_2Al_2Si_2O_8$, $Na_2Al_2Si_2O_8$, $CaAl_2Si_2O_8$, Na_2SiO_3 , and $NaAlO_2$. Similarly the constituents of augite (monoclinic pyroxene) were found to be $R^{II}SiO_3$, $R^{II}R^{III}_2O_4$ and $R^{II}R^{III}_2(SiO_3)_4$ in which $R^{II} = Ca, Mg, Fe, Mn$, and Na ; $R^{III} = Al, Fe^{III}$ and Cr^{III} . The rhombic pyroxenes (enstatite, hypersthene) consist of metasilicates of di- and trivalent elements and of an aluminate. The triclinic pyroxene babingtonite was found to be a polymorph of enstatite-hypersthene; Ca, which is of secondary importance in the latter, occurs in larger amts. in the former. Triangular diagrams are given for the individual minerals.

E. J. WITZEMANN.

Nephelite crystals from Monte Ferru, Sardinia. H. S. WASHINGTON AND H. E. MERWIN. *Geophys. Lab. J. Wash. Acad.* 5, 389-91 (1915).—Nephelite crystals occurring in miarolitic cavities in trachytic phonolite (described by W., *C. A.* 9, 1734) have the unusually high value $\epsilon = 0.841$ and the low values $\epsilon = 1.529$, $\omega = 1.532-3$. The comp., detd. on less than 0.2 g. and corrected for 7.51% insol. augite and titanite inclusions, is SiO_2 43.34, Al_2O_3 33.45, Fe_2O_3 2.60, CaO 0.87, Na_2O 16.28, K_2O 3.46, sum 99.99%, the corresponding mol. ratio being $SiO_2:Al_2O_3:Na_2O = 2.26:1:0.99$.

E. T. W.

Artificial crystals of gypsum. C. PERRIER. Univ. Turin. *Atti accad. Lincei* 24, I, 159-63 (1915).—Limestone kept for 2 yrs. in an $FeSO_4$ soln. was gradually converted into gypsum. Because of the slowness of the process the gypsum crystals were obtained in a large variety of forms, measurements of which are given.

E. J. WITZEMANN.

The monticellite-like mineral in meteorites and oldhamite as a meteoric constituent. GEORGE P. MERRILL. U. S. Nat. Mus. *Proc. Nat. Acad.* 1, 302-8(1915).—A colorless, biaxial, weakly birefringent mineral, first noted in chondritic meteorites by Tschermak in 1883, and referred by him doubtfully to monticellite, has been further examd. Its *ns.*, detd. by F. E. Wright, are $\alpha = 1.623$ and $\beta = 1.627$, birefringence less than 0.005. The only terrestrial mineral with these properties is francolite, $(\text{CaF})_2\text{-Ca}_3(\text{PO}_4)_2\text{-CaCO}_3 + \text{H}_2\text{O}$, although this is optically — while the unknown mineral is +. Microchem. tests showed that the mineral dissolves readily in acids, especially HNO_3 , and in the soln. Ca and P, but no other constituent, could be detected. After removing the metallic portion and H_2O -sol. constituents of a sample of the Alfianello meteorite, dil. HCl extd. 0.344% CaO and 0.08% P_2O_5 , which is a much higher ratio of Ca:P than in francolite. This mineral has been noted in at least 16 meteorites, and supposed occurrences of apatite in meteorites are probably the same mineral, which may be relegated doubtfully to francolite. To detect oldhamite (CaS) in meteorites powd. samples were b. in H_2O and tested qualitatively for Ca. Positive reactions were obtained in 19 cases, doubtful in 1 and negative in 3. While the presence of a sol. Ca compd. does not necessarily indicate the presence of oldhamite, the liberation of H_2S in some of these cases makes its presence more certain. Oldhamite is therefore to be regarded as a fairly common constituent of meteorites, although it may be irregularly distributed in a given fall, and may not be recognized because of alteration or loss during grinding of sections.

E. T. W.

To what extent is chalcocite a primary, and to what extent a secondary mineral in ore deposits? L. C. GRAYTON, J. D. IRVING, T. T. READ, F. L. RANSOME, W. LINDGREN AND J. F. KEMP. *Trans. Am. Inst. Mining Eng.* 48, 194-200(1915).—The chief problems, as stated by G., are to distinguish primary and secondary chalcocite and to determine the conditions under which secondary chalcocite is formed, especially the relation of the process to the ground water level. I., describing expts. of H. V. Winchell, points out that pyrite immersed in CuSO_4 soln. remains bright, but, if SO_2 is added, the pyrite becomes thickly coated with dense gray chalcocite. Read suggests that SO_2 is really an oxidizing rather than a reducing agent, because of the presence of so much O in it [apparently confusing quantity with quality. ABSTR.]. G. points out that the reaction between pyrite and CuSO_4 without SO_2 , though exhibiting no measurable progress in a few weeks, may advance to an important degree in the course of a short time measured in geologic units. By agitation and increasing the temps. it is possible to hasten such reactions, and the reaction has actually yielded chalcocite in the absence of SO_2 under such exptl. conditions. As no oxidation can take place without corresponding reduction, whether the formation of a given mineral is to be classified as either depends on the point of view. Sooty chalcocite, often considered as a criterion of the secondary nature of the mineral, is really decomposing and disintegrating material. Certain chalcocites previously described as primary have been found to contain bornite nuclei in such arrangement as to indicate their secondary character. Ransome confirms G.'s views as to the nature of sooty chalcocite. L. points out that primary chalcocite in fine crystals formerly occurred at Bristol, Ct., and K. calls attention to the occurrence of crystd. bornite in the same region.

E. T. W.

Geology and mineral deposits of the National Mining District, Nevada. W. LINDGREN. U. S. Geol. Survey, *Bull.* 601, 58 pp.(1915).—The principal point of interest in this district is the wonderfully rich shoot of the National mine. The veins of the district are essentially Ag veins of moderate tenor, but the very rich vein mentioned has furnished over \$3,000,000 in Au, which occurred as electrum, containing about 50% Ag. The origin of this Au remains a mystery, but the mineralization of the veins

seems to have been due to deposition by hot ascending waters during a thermal epoch following the eruption of rhyolite near which the veins are chiefly found. Stibnite and cinnabar have been noted in the quartz, but pyrite is scarce. Some marcasite has been deposited as a secondary mineral. R. C. WELLS.

Structure of the Cuyuna iron ore district of Minnesota. CHARLES A. CHENEY, JR. Madison, Wis. *Eng. Mining J.* 99, 1113-5(1915).—The principal factors in detg. the location of ore bodies in this district have been: on the north range, drag folding; on the south range, the original chem. comp., the degree of metamorphism, and the effects of preëxisting topography. The absence of greenalite, an Fe silicate present in the Biwabik formation of the Mesabi district, does not necessarily indicate that the Fe formations of the 2 regions are distinct; since pptn. of Fe as silicate or carbonate depends on the relative amts. of CO_2 present, the absence of the silicate in the Cuyuna region may merely indicate a difference in conditions of contemporaneous deposition of the same formation. E. T. W.

Mineralogical and petrographical investigations in the valley of the "Chisone" (Alpi Cozie). An interesting variety of gneiss from Prali. EMANUELE GRILL. Florence. *Atti accad. Lincei*, 24, I, 251-5(1915).—The rock has the appearance of quartzite, but the presence of a considerable amt. of alk. feldspar and mica characterize it as true gneiss, which G. calls a "microcrystalline muscovitic microclinal gneiss." E. J. WITZEMANN.

Manganese concretions in Mesozoic deep-sea deposits of Borneo, Timor and Rotti, their significance and mode of formation. E. A. F. MOLENGRAAF. *Verslag K. Akad. Wetenschappen* 23, 1058-73(1915).—Concretions of Mn oxides are found at the bottom of all oceans and are characteristic of abyssal deposits. The analysis of various specimens shows them to consist of about 60% MnO_2 , 10% MnO with varying amts. of Na_2O , CaO , BaO , CoO , Fe_2O_3 , Al_2O_3 and SiO_2 . The various places on land where these concretions have been found are listed, and their probable mode of formation is discussed at length. L. H. ADAMS.

Relation between chemical constitution and crystal structure (GROTH) 2. Simple gliding in lithium sulfate monohydrate (JOHNSEN) 2. Artificial translations in magnesium sulfate (JOHNSEN) 2. Hydrates (JOHNSEN) 6.

9. METALLURGY AND METALLOGRAPHY.

WILLIAM BRADY, WILLIAM T. HALL.

Some aspects of the iron and steel industry in Europe. Bur. of Foreign and Domestic Commerce, *Special Consular Rep.* No. 71, 48 pages. R. S. McBRIDE.

The production of chromic iron ore in 1914. J. S. DILLER. U. S. Geol. Survey, *Separate from Mineral Resources of U. S. 1914*, Part I, 15 pp.—Statistical. R. S. McBRIDE.

The recovery of secondary metals in 1914. J. P. DUNLOP. U. S. Geol. Survey, *Separate from Mineral Resources of U. S. 1914*, Part I, 9 pp.—Statistical. Cf. C. A. 8, 2331. R. S. McBRIDE.

Advance statement of the production of copper in the United States in 1914. B. S. BUTLER. U. S. Geol. Survey, *Unnumbered leaflet*, Apr. 5, 1915, 4 pp.—Statistical summary of domestic and foreign production of primary and secondary copper including data on "bluestone" and import and export figures. R. S. McBRIDE.

The production of lead in the United States in 1914. C. E. SIEBENTHAL. U. S. Geol. Survey, *Preliminary Report*, Apr. 2, 1915, 1 large sheet.—Statistical summaries of imports, exports, production, refinery output, market price, etc. Cf. C. A. 9, 1024. R. S. McBRIDE.

Mining and milling of lead and zinc ores in the Wisconsin district, Wisconsin. CLARENCE A. WRIGHT. U. S. Bur. Mines, *Tech. Paper* 95, 39 pp.—Descriptive of the zinc and lead mining districts, the ore deposits and their field relations. R. S. McB.

Vapor pressure of arsenic trioxide. H. V. WELSH AND L. H. DUSEHAK. U. S. Bur. of Mines, *Tech. Paper* No. 81, 21 pp. (1915).—A knowledge of the vapor pressure of As_2O_3 is necessary for the proper design and management of equipment for its condensation, e. g., from metallurgical smoke. By the air satn. method of Regnault and Magnus, the v. p. of As_2O_3 was found to range from 0.000266 mm. at 110° to 89.1 mm. at 300° , corresponding to 0.000386 lbs. to 1441 lbs. of the oxide per 1000 cu. ft. gas. The "total heat of sublimation" decreases from 27,390 g. cal. (15°), at 110° , to 26,500 g. cal., at 290° , the "inner heat of sublimation" from 27170 g. cal., at 110° , to 25,380, at 290° . The probable error, both in this and the v. p. detns., is $\pm 1\%$. The m. p. of octahedral oxide is provisionally fixed at $251^\circ \pm 1^\circ$, that of the monoclinic variety at 313° . The latter is stable above 100° . Rather rich arsenical dust from the main flue of a Cu smelter showed a v. p. of about half that of the same amt. of pure material, either because the oxide was present in the monoclinic form, in solid soln. or in chem. combination with other constituents of the dust. W. B. J.

Smelting storage-battery sediment. W. C. SMITH. *Eng. Mining J.* 100, 18 (1915).—As a result of expts. that are outlined and briefly discussed the following procedure is recommended: Add 75 lbs. or less to each charge; wet charge thoroughly; heat sediment in roasting furnace or kettle until it turns yellow (to convert PbO_2 into PbO and O) and then charge into furnace as Pb ore. F. W. SMITHER.

Concentration of gold in bottoms in the copper converter. H. F. COLLINS. *Met. Chem. Eng.* 13, 446-7 (1915).—The method, devised for recovering the Au in converter Cu not rich enough to warrant electrolytic refining, depends on the incomplete oxidation of white metal to "pimple" metal and "bottoms," and sepn. of the latter before completing the oxidation. It has been adapted to 3-ton, acid-lined converters. The success of the operation depends on not losing too much time in skimming and not adding too much scrap after skimming, so that the reduced Cu is at a temp. above the m. p. of the pimple metal. It is necessary to hit the point of "white metal" with considerable nicety before the final skimming prior to commencing the blowing for bottoms. In practice it is easy to recover 70% of the Au originally existing in the charge in the form of bottoms, amounting to 9% of the total wt. of converter Cu produced, and 25 times as rich. F. W. SMITHER.

The testing of ores for the cyanide process. WELTON J. CROOK. *Chem. Eng.* 21, 256-7 (1915).—C. describes simple quant. tests to det. the "soluble" and "latent" acidity of an ore by titrating with standard $H_2C_2O_4$ and NaOH solns. By means of such tests the proper amt. of alkali necessary to neutralize the "cyanicides" present may be detd. Cyanicides are described as substances which decompose active cyanides, forming compds. which are not solvents of Au and Ag. L. A. TOUZALIN.

Preferential flotation. O. C. RALSTON. *Mining Sci. Press* 110, 980-4 (1915).—A review (largely a patent compilation) of proposed or operating preferential flotation processes. L. A. TOUZALIN.

Flotation tests on ores from Bisbee and Cobalt. H. J. FRENCH. *School of Mines Quart.* 36, 57-67 (1914).—Every ore capable of concn. by this method has its own set of optimum conditions. It seems probable that many of the points developed in the

expts. detailed are to some extent applicable in many other cases. Trials were made as to the kind of oil, its amt., the presence and proportion of acid, time of agitation, temp., and size of the particles. The conclusions were that the best in these cases is pine tar oil (sp. gr. approx. 0.98) with addition of 0.3% concd. H_2SO_4 reckoned on the wt. of the H_2O in the pulp, and agitation for at least 10 min. at a temp. of 65° . Material of 100- to 150-mesh worked satisfactorily. When coarser than 65-mesh the process was unserviceable. Agitating and skimming and again agitating and skimming without adding more oil was more effective than one agitation and skimming, using more oil at once.

E. WALLER.

Cyanidation of low-grade sulfide ores in Colorado. I. H. C. PARMELEE. *Met. Chem. Eng.* 13, 421-5(1915), cuts.—Conditions in Clear Creek and Gilpin counties, the location and construction of the Argo mill and the difficult problems presented are discussed and results of 18 months' operation reported in detail. A flow sheet shows the operations to be as follows: stamping with 1050 lbs. stamp in cyanide soln., primary concn. to remove Pb, Fe and Cu sulfides, regrinding the sand tailing in a tube-mill, agitation, secondary concn. to remove the sulfides unlocked in regrinding, thickening, filtration and pptn. on Zn. The tests conducted at the Argo mill indicate that the concentrates can be profitably cyanided, but at present the mill is not equipped for the work. The Ag recovery probably would not exceed 60%, but the Au extn. would be satisfactory. The value of the Au recovered as bullion would exceed its value in the form of concentrate, and the difference would be more than the cost of treatment. The residue from cyanide treatment would still form a low-grade shipping product. Balancing all the factors involved, the net result of cyaniding concentrates and shipping the residue to the smelter would show an increased profit as compared with the present practice of shipping direct. The successful operation of a custom cyanide mill like the Argo depends on exhaustive preliminary tests, both chem. and physical; attention to numerous details; a careful balancing of causes and effects to secure the most economical av. conditions; and an assured steady ore supply. (Cf. Pearce, C. A. 9, 192.)

F. W. SMITHER.

Notes on Homestake metallurgy. A. J. CLARK. *Bull. Am. Inst. Min. Eng.* 1915, 1381-1400.—Changes and comments on the method already described (C. A. 7, 960) are noted. The ore is exceptionally heavy, av. sp. gr. 3. Hornblende crystals make it difficult to crush, but aid in leaching. Inside amalgamation is practiced. The amalgam is retorted in oil-fired retorts 3 times per month, the bullion being melted in coke-fired furnaces. In cyaniding, protective alkali has been practically eliminated, only enough CaO being added to neutralize the ore. The "strong" soln. is strengthened in accordance with the detn. on the weak soln. to keep it up to its best working strength. The sand is leached in vats; at intervals air is forced into the false bottom, below the filter canvas. About 75 cu. ft. of O is absorbed to a ton of ore, before its reducing action is corrected. Air followed by a water wash shows $\text{Ca}_2\text{S}_2\text{O}_7$ in the effluent. Air followed by cyanide shows thiocyanate at first, and free cyanide does not appear for some time. After extn. the sand shows no oxidation. The slimes are treated in Merrill presses with double cloths—alternate leaching and aerating. Efficient extn. seems to depend more upon the vol. of the soln. passed through than upon its strength or period of contact. The working strength is detd. by the ability to ppt. the effluent. Pptn. is by Zn dust. Double cloths are used in filtering, the outer one being burned when the press is cleaned and the ashes sent to the refinery, so washing of cloths is eliminated. Treatment with acid is advocated as causing less danger of stack losses, insuring fluid slags, and requiring less time. Low grade ppt. is briquetted and charged in the blast furnaces. High grade is cupelled directly. E. WALLER.

Smelting methods at Magistral, Durango, Mex. R. W. BISSELL. *School of*

Mines Quart. 36, 22-9(1914).—The output of the group of mines is of 4 different kinds: (1) Quartz pyrite (about $\frac{1}{4}$ pyrite); (2) basic (in which these proportions are practically reversed); (3) red ore (siliceous, containing 25% Fe_2O_3 , and 20% calcite); (4) spar ore (a little more than half calcite and about 10% pyrite). All contain Cu, Au and Ag. Most of the Cu is in the basic ore, most of the Au in the quartz pyrite. Av. content of Cu is 0.9%, of Au 0.56 oz., of Ag 0.25 oz. Treatment is a partial pyritic smelting operation in steel water-jacket blast furnaces 40 X 168 in., the product being a mat containing the values; 15 or 16 tons are concd. to 1 ton mat, carrying 15 to 18% Cu, and \$160 to \$180 in precious metals. Cu recovery is 84.7%, Au recovery 89%. The coke charge varies; at times it has been as low as 5%, but the average is nearer 12%. Operations have been suspended because of political troubles. E. WALLER.

The British Columbia Copper Co.'s smelter, Greenwood, B. C. F. K. BRUNTON. *Bull. Am. Inst. Min. Eng.* 1915, 1401-18.—The plant has successfully smelted the lowest grade Cu ore in America, having an av. content 0.85% Cu. By mixt. of the sulfide ores, and addition of a low grade siliceous Au ore, mats containing 30-45% Cu were obtained. Treating this in converters yielded blister Cu carrying about 7 oz. Au and 30 oz. Ag per ton. Details are given of construction, power, labor, expenses, etc. E. WALLER.

Powdered coal as fuel for metallurgical furnaces. ANON. *Rass. min.* 42, 109-10 (1915).—A brief review. CHAS. A. ROULLER.

Oil-fired metallurgical and shop furnaces. F. B. DUNN. *Elec. Power and Gas* 34, 297, 317(1915); cf. *C. A.* 9, 523, 1389.—A brief review of furnaces for these purposes designed for oil firing. Designs are given for small smelting, refining and annealing furnaces. Data on one furnace at a rolling mill showed the consumption of oil per ton of Fe to be 35-47 gal. and the waste heat was sufficient to furnish steam for the engines to drive the rolls. Low pressure air has been found to be the best atomizing agent. The Riverall blast furnace using oil as fuel is described. A 50-ton smelter at Tropic, Cal., has been successfully demonstrated. The operation of the Dow oil smelting furnace is also described. Data on 3 furnaces located in different parts of the country show that it produces economically a better grade of pig than coke furnaces.

W. E. RUDER.

Influence of impurities on zinc. C. C. FREEMAN. *Monthly J. Chamber of Mines of West Australia*, Feb., 1915; *Engineering Mining J.* 99, 990(1915).—Although in many parts of the world Zn dust is to a large extent replacing shavings as a precipitant for precious metals from cyanide solns., the shavings are still almost universally used in Australia. In small mills the relatively low cost of the installation necessary for pptn. by Zn shavings would outweigh any advantages that would accrue from the use of Zn dust as the precipitant, and in the case of the larger plants which are already equipped with efficient units of the former type, it is a matter of expt. and calcn. to det. whether or not the advantages claimed for Zn-dust pptn. warrant a change to the latter system. Most of the English Zn smelters aim at the production of spelter suitable for making a good quality of brass, for which purpose little Pb is permissible, and such spelter cannot be conveniently rolled. Many of the Continental works treat Zn ores and concentrates containing appreciable amts. of Pb, and the resulting spelter, after refining, usually contains from 1 to 1.5% of Pb. The rolling qualities of spelter are affected to a marked degree by the impurities present. Moderate amts. of Pb render Zn malleable and ductile; amts. up to 1.5% permit good rolling. With more than 1.5% Pb, Zn becomes tender; and although it can be successfully rolled when it contains 3% of Pb, the sheets are very tender and liable to crack. Fe reduces the malleability of Zn and makes it harder and more brittle; up to 0.125% Fe is not injurious, but above this the bad effects become apparent; over 0.2% Fe seriously interferes with rolling.

If much ZnO is present the spelter will become brittle and difficult to work. Cd up to 15% does not interfere with rolling, while Cu, Sn and As render Zn hard and brittle. At ordinary temps. Zn is quite brittle, between 100° and 150° it becomes malleable and ductile, and above 150° it again becomes brittle, and at 200° can be reduced to a powder by pounding. The relatively coarse cryst. structure of cast Zn is destroyed by rolling or hammering, and the d. of the wrought metal is about 7.25, compared with 7.05 when cast. Wrought Zn heated to between 100° and 150° retains its malleability and ductility after cooling. The methods in use for producing Zn shavings and Zn ribbon are briefly discussed.

F. W. SMITHER.

Microscopic examination of steel. ANON. U. S. Ordnance Department Document No. 1961(1915); illus.—As a guide for ordnance inspectors, a clear, concise explanation is given of the important characteristics of steel, including its thermal and mechanical treatment, its structural compn., the impurities likely to be present and the common defects. The cause of failures that are likely to occur in service are discussed in detail, especially with reference to the following typical examples of which photographs are shown: 10-in. rifle, crack in tube caused by a fold in forging; 14-in. gun lever, fracture due to improper heat treatment, the photomicrograph showing segregated ferrite and an abundance of slag; 12-in. gun, fracture due to a zone of streaked metal and slag in the original ingot.

JULIAN S. GRAVELEY.

The hardening of metals. R. HADFIELD. *Trans. Faraday Soc.* 10, 207-11(1915).—The opening address before the Faraday Soc., Nov. 23, 1914, in a general discussion on the hardening of metals. A specimen of ancient Indian steel was shown which contained 0.7% C with low Si, S, P and Mn. The steel was soft and of pearlitic structure when found, but it was possible to harden it exactly as in the case of a piece of modern steel.

W. T. HALL.

The hardening of metals by quenching. C. A. EDWARDS. *Trans. Faraday Soc.* 10, 248-50(1915).—The theory advanced by Carpenter and Edwards (*C. A.* 8, 3000) that in the operation of quenching the normal heat of the carbide, or other similar change, is retained in the rapidly cooled material and, when the heat change is suppressed in this way, very severe internal strains are produced in the material as is evidenced by an exceedingly large number of twin lamellae, is defended with particular reference to the criticisms of Rosenhain and the views of Humfrey and of Desch.

W. T. H.

The hardening of steel. J. O. ARNOLD. *Trans. Faraday Soc.* 10, 272-4(1915).—The theory is explained according to which the hardness of steel is assumed to be due merely to the inherent nature of certain chem. compds. such as hardenite, $21\text{Fe}_3\text{C}$. For the alloy steels, definite chem. compds. such as V-hardenite and W-hardenite are assumed.

W. T. H.

The hardening of metals. G. T. BEILBY. *Trans. Faraday Soc.* 10, 212-5(1915).—The amorphous theory, which accounts for the hardness of steel, is explained.

W. T. H.

The hardening of steel. R. HADFIELD, *et al.* *Trans. Faraday Soc.* 10, 275-93 (1915).—A discussion of the papers by Hadfield, Edwards, Arnold and Beilby (cf. preceding abstracts), Cohen (*C. A.* 8, 2295; 9, 1565), Humfrey (*C. A.* 9, 436), Desch (*C. A.* 9, 437), McCance (*C. A.* 8, 2998, 3773) and Howe (*C. A.* 9, 589). HADFIELD feels that the most important question to study is that relating to the combinations between Fe and C and has offered, through the Iron and Steel Institute, a prize of £200 for the best paper representing a general study of the carbides of Fe and in Fe alloys. J. E. STREAD points out the similarity between C and P in producing hardness, when in a solid soln. Twinning of itself is no indication of hardness. He also believes that more emphasis

should be laid upon the condition of the C. Ni steel with apparently the same structure under the microscope may be either hard or soft. A. McCANCE calls attention to the fact that hardness may be produced by pressure without permanent deformation and indicates the difficulties involved in explaining the magnetic properties of strained α and strained γ -Fe. Has it been shown that the amorphous state is actually harder than the crystalline state of the same substance at the same temp.? T. TURNER points out that the hardness of pure metals is proportional to the d. $\div$ at. wt., which indicates that hardness is due to molecular structure and anything that brings the mols. nearer together will produce hardness. He prefers to explain nearly all the changes that take place in various steels as due to soln. or pptn. of carbides and as the solid solns. vary in character and conc. different degrees of hardness result. W. H. HATFIELD shows that the amorphous theory does not entirely account for the hardness of steel. He believes that the hardness of quenched steel is due to the inherent hardness of the solid soln. which is trapped by the quenching. The so-called amorphous phase, whether in cold-worked metals or in quenched metals is "ultramicroscopic." W. ROSENHAIN points out that the twinning theory, as advanced by Carpenter and Edwards, rests on two separate assumptions which are opposed rather than supported by exptl. evidence. He regards the amorphous theory as probably offering the best working hypothesis at present and points out the similarity between it and the β -Fe theory and suggests that " β -Fe was buried too soon." T. G. Elliot, F. J. Brislee, T. K. Rose, G. T. Beilby and C. A. Edwards also took part in the discussion and H. L. Heathcote showed some simple devices for testing hardness. W. T. HALL.

Hardness tests made with a hand apparatus. F. TURPIN. *Rev. métal.* 12, 104-12 (1915).—A hand app. is described, consisting essentially of a steel sphere of 10 mm. diam. mounted at the end of a percussor within a hollow cylinder, so arranged that, on striking the percussor a sharp blow with a hammer, an imprint is made on the metal to be tested and also upon a ring of standard metal which is placed between the percussor and the steel sphere. The degree of hardness is detd. by measuring the diams. of the respective imprints and comparing these in an empirical formula with Brinell's scale of hardness. For ease of comparison, a slide rule has also been devised. The standard metal consists of a cylinder of steel 16 mm. diam. and 10 mm. high, well annealed so as to ensure as perfect homogeneity as possible. The slide rule is so constructed as to read off directly the (indentation) hardness number on the lower scale and the resistance in kg. per sq. mm. of section on the upper scale. An especial celluloid rule for measuring the diam. of the imprint is described. A discussion and résumé of the errors in measurement made with this instrument are given. The mean error of 250 tests controlled with Brinell's test was less than 6 kg. per sq. mm.

L. T. FAIRHALL.

The thermomagnetic study of steel. S. W. J. SMITH. *Imperial College Sci. Proc. Phys. Soc. London* 25, 77-81 (1913).—In the case of a simple ferromagnetic substance, magnetizing fields can generally be found in which the permeability variation with temp. is comparatively small except near the critical temp. In such fields there is a very clearly marked peak in the permeability-temp. curve. The peak is exhibited by cementite and in a particular steel (0.85 C) was sharply marked at 210°. It is suggested that the % C in steel could be detd. by some such thermomagnetic method.

PAUL D. FOOTE.

Thermomagnetic study of the eutectoid transition point of carbon steels. S. W. J. SMITH AND J. GUILD. *Trans. Roy. Soc. London (A)* 215, 177-204 (1915); cf. *Proc. Phys. Soc. London* 24, 62-9, 342-9 (1911) and preceding abstr.—The steels contd. from 0.15 to 1.53% C, about 0.2% Mn, 0.15% Si, and traces of S and P. Intensity of magnetization has been measured for all the specimens over the temp. range 670-800°.

In all of the steels a sudden loss of magnetization begins at the same temp. This accords with the view that the eutectoid patches detected by the microscope have always the same compn., and it suggests that this const. temp. is the true transition temp. between the eutectoid and the homogeneous soln. But when a very gradual heating was employed, a lower transition temp. was obtained in one specimen. The cooling curves show that the rapid return of magnetism in the eutectoid was no longer at a const. temp. except perhaps in the hyper-eutectoid steels. In the hypo-eutectoid steels the temp. of rapid return appears to become continuously lower as the % C falls. Methods are given for eliminating hysteresis in strong fields. A thermomagnetic method of estg. the % compn. of the eutectoid was outlined, but it could not be applied to steels rich in C. The effect of diffusion and the possible effect of pressure are discussed, and evidence of the relative unimportance of diffusion in low-C steels was presented. An hypothesis as to the mode of crystn. based on the assumption that the surface energy between the solid soln. and Fe is greater than that between it and the carbide has been worked out. The lag in pptn. of the eutectoid would be terminated by the crystn. of some of the Fe which it contains, but the sudden pptn. of Fe would increase temporarily to a very high value the concn. of the carbide in soln. in its immediate neighborhood and the crystn. of one constituent would induce the appearance of the other.

E. B. MILLARD.

Measurement of the temperature coefficient of Young's modulus for metallic wires, with special application to nickel. E. P. HARRISON. *Calcutta. Proc. Phys. Soc. London* 27, 8-38(1914).—Young's modulus for Ni decreases slowly with increasing temp., the relation being parabolic up to 300°. An anomalous change in the temp. coeff. of the modulus occurs at the same temp. as the magnetic, thermoelec., resistance and expansion crit. points, *i. e.* 365 to 425°. When the temp. is const. and elastic after-effects are absent or corrected for, load-elongation graphs are linear, showing (a) that no appreciable irreversible effects are produced on loading and then unloading, (b) that the elastic temp. coeff. is the same for all loads used. The value $\alpha d\alpha/dT$, where α is the coeff. of expansion under tension T , is deduced from the thermal coeff. of Young's modulus.

PAUL D. FOOTE.

The elastic strength of metals. FRANK C. THOMPSON. *Sheffield Univ. Trans. Faraday Soc.* May 11, 1915 (13 pp.) (*advance proof*).—When 2 similar plates are sepd. by a film of liquid which wets them, the force which holds them together is $2AT \div d$ dynes where A is the area of the plate, T is the surface tension of the liquid, and d is the thickness of the film. Ordinarily the pressure is derived from that of the atmosphere but in the case of the amorphous cement surrounding the crystals of a metal, the pressure arises from the vectorial forces of crystallization. Such attractions may attain very considerable magnitudes and the strength of the junctions, and therefore of a metal, may be regarded as being due to these attractions between all adjacent faces in the mass. Since the attraction between the crystals is inversely proportional to the distance between them, the very thinness of the films is the source of their greatest strength. Acting on this assumption, the effect of strain on metals is explained and the theory is applied not only qualitatively but quantitatively in an exptl. study of the elastic limit, max. stress and elongation of Cu, Zn, Sb, Ni, Pb, Sn, Ag, annealed Fe, normalized Fe and Fe which has been quenched and tempered. The effect of temp. on the mechanical properties of metals and the elec. cond. is also interpreted in the light of the amorphous cement theory. As regards the actual thickness of the film of amorphous cement, it is probably nearly within the range of microscopic vision, *i. e.*, not far from 10^{-8} cm.

W. T. HALL.

Observations relative to the annealing of metals. G. MÉKER. *Rev. metal.* 12, 101-3(1915).—Expts. show that in order to obtain properly annealed pieces of steel

or other metals having a sound surface, it is best to grease the pieces with a lubricating substance containing only hydrocarbons or natural fats without mineral matter. Lubricants containing fixed salts impart a rough surface to the metal in the process of annealing.

L. T. FAIRHALL.

Cerium-magnesium alloys. RUDOLF VOGEL. Göttingen. *Z. anorg. Chem.* 91, 277-98(1915).—Alloys of Ce and Mg were prepd. by heating the 2 metals in C tubes; the considerable difficulty encountered in obtaining homogeneous melts because of the great difference in d. of the 2 components was overcome by use of an iron stirrer, and by repeated fusions. The following compds. are formed: Ce_2Mg , m. 632° , decomp. on cooling to 497° into Ce and CeMg ; CeMg , m. 738° , hardness almost 5, strongly pyrophoric, burns violently on heating, stable in air, less rapidly acted on by dil. acids than Ce; CeMg_2 , m. 780° , hardness 4, brittle, not pyrophoric, more stable than CeMg ; CeMg_3 , decomp. at 622° and 91% Mg, forming CeMg_2 + melt, hardness 3, brittle, breaks up on standing some weeks, probably due to transition into a polymorphous form, more stable than CeMg_3 . Ce m. 840° ; the Ce- Ce_2Mg eutectic and the Ce_2Mg - CeMg eutectic are both at about 632° and near Ce_2Mg in compn. CeMg and CeMg_3 are miscible in the solid state between the limits 50-62% Mg, with a temp. minimum in the m. p. curve at 54% Mg and 700° . The CeMg_2 -Mg eutectic is at 585° and 93% Mg; Mg m. 661° .

GEORGE W. MORREY.

The behavior of vanadium toward silicon, nickel, copper and silver, and the behavior of boron toward nickel. HANS GIEBELHAUSEN. Göttingen. *Z. anorg. Chem.* 91, 251-62(1915).—Some fusion curves in binary systems have been detd. and supplemented by microscopical exam. In the system V-Si, which was followed from 0 to 60% V, the compd. VSi_2 , m. 1655° , is formed; the Si- VSi_2 eutectic is at 1411° and 5 wt. % V. No indication of miscibility in the solid state was observed; the alloys are brittle, and the compd. VSi_2 scratches Si. In the region 0-36% V, Ni and V form solid solns. with a point of minimum temp. at 1326° and 21% V. The alloys increase in hardness up to 12% V, after which the hardness remains sensibly const.; addition of V also lowers the magnetic critical temp. of the Ni. In the systems Cu-V and Ag-V two liquid layers are formed, each of which consists practically of a pure component. In the system Ni-B the compds. obtained were Ni_2B , m. 1225° , Ni_3B_2 , m. about 1160° (read from curve), which exists in 2 forms with inversion temp. at 1050° , and Ni_2B_3 . The Ni- Ni_2B eutectic is at 4 wt. % B, 1125° ; the Ni_2B -NiB eutectic is at about 1080° 12.5 wt. % B (read from curve). Cooling curves of melts containing Ni_2B_3 as primary phase show several breaks, probably due to the above inversion taking place sluggishly and incompletely. The fusion curve rises rapidly on addition of B to the compd. NiB, and was only followed to a little over 18% B and about 1240° ; in this region mixed crystals of NiB and Ni_2B_3 separate; they unmix at 965° . The thermal data for this system are not given, so exact information is not available. B is not dissolved appreciably by Cu, Ag, Ti, Bi, Pb or Sn at 1500 - 1600° , nor does boiling Zn affect it; molten Al dissolves noticeable amts. of B, and molten Mn and Cr at least 10-20%. CaF_2 and BaF_2 dissolve B, which gives, on cooling, well formed crystals; B and CdF_2 at 1000° to 1200° react energetically with evolution of BF_3 and Cd. G. W. MORREY.

Tests on the combined bending and torsional strength of cast iron. TSURUZO MATSUMURA and GENJIRO HAMABE. *Mem. Coll. Engineering, Kyoto Imp. Univ.* [2] 1, 47-53(1915).

W. T. H.

The influence of wire drawing on the properties of mild steel wire. HERMANN ALTPETER. *Stahl u. Eisen* 35, 362-73(1915).—The structure of the cross sections of wire in the various stages of drawing down from 13.85 mm. confirmed the researches of Heyn on the appearance of the ferrite grains. The solubility of the unannealed wire in 1% H_2SO_4 was found to increase with the reduction in cross section. Tests

with the Shore scleroscope showed that the hardness of a cross section increased from the edge to the center. Logarithmic plots of the breaking loads of hard-drawn and annealed wired, resp., showed that the points fell on parallel lines. This was also true of the results obtained in breaking the wire by bending. These curves have practical value in that having detd. one value the other figures for a given wire may be predicted.

CARLE R. HAYWARD.

Influence of nickel on the mechanical properties of copper. W. STAHL. *Metal* u. *Ers* 3, 179(1915).—Ni has been shown to be sol. in Cu in all proportions. Cu with about 10% Ni has high tensile strength accompanied by high ductility and reduction of area. It withstands heat well.

CARLE R. HAYWARD.

Prevention of rapid corrosion of galvanizing pans. C. DIEGEL. *Z. Ver. deut. Ing.* 59, 362-3(1915).—A series of expts. was conducted to det. the cause of rapid corrosion of galvanizing pans. The results indicate that irregular structure increases the solubility of Fe in Zn. High C content does not increase solubility; in superheated baths it decreases it appreciably. Differences in P content from 0.025 to 0.09% do not noticeably affect the solubility at the usual temp. of the Zn bath; in superheated baths a high P content acts unfavorably. Increasing the Si content appreciably increases the solubility of the Fe. The temp. of the bath exerts a greater influence on the solubility than all the above causes. The Fe dissolved in a unit time at 500° may be 9 times and at 530° 30 times the solubility at temps. below 490°. If the Zn bath is retained at a temp. of 500° and more, a quick destruction of the pan must result. Rapid corrosion is in general due to the use of baths at too high a temp. or to repeated heating and cooling.

H. R. GUNDLACH.

Methods for determining the galvanizing process and the thickness of the zinc coating of galvanized iron objects. O. BAUER. *Mitt. kgl. Materialprüfungsamt.* 32, 448-74(1914); through *Chem. Zentr.* 1915, I, 811-2.—The galvanizing processes and the metallographic characteristics of the different products are briefly discussed. B. gives a method for differentiating hot or fire galvanizing and electrolytic galvanizing based on the difficult dissolving of Fe in dil. H_2SO_4 containing As_2O_3 , while Zn, as well as fire galvanized objects, owing to the intermediate Fe-Zn alloy layer, readily dissolve with vigorous evolution of H. Such a layer is not present in electrolytic galvanized Fe. Two % H_2SO_4 containing 2 g. of As_2O_3 per l. is used for the test. On treating the galvanized object with $As_2O_3-H_2SO_4$ the Zn is dissolved in a few seconds (the end of reaction being sharply indicated by cessation of H evolution), and the object immediately removed from the soln. If the soln. contains Fe, it is from the Zn coating or the Fe-alloy layer which forms in fire galvanizing; at the same time any Pb present in the Zn used adheres partly to the test piece and seps. partly as flocks in the soln. in the case of fired objects. With electrolytic objects the soln. is clear, free from Fe and no Pb seps. out. The amt. of the Zn coating may be detd. by loss in wt. Since the soln. of the Zn in the $As_2O_3-H_2SO_4$ can be masked by the reduced As, a soln. of NH_4NO_3 (200 g. per l.) is recommended for use instead; in this case some Pb remains as a spongy residue adhering loosely to the Fe or in flocks in the soln.

F. W. SMITHER.

Protection of metal structures. FREDERIC H. FAY. *Proc. Eng. Soc. Western Penn.* 31, 115-222(1915).—Paper and symposium. F. limits the subject to the corrosion of the metal work of bridges, and enumerates as the principal causes, (1) exposure to locomotive gases, (2) exposure to sea water, (3) exposure to surface water leaking through bridge floors, and (4) over-stress of the metal by which corrosion has been hastened. He discusses the merits of paints, wooden ceilings, sheet lead coverings, asphalt coatings, and concrete as means of protection. A complete bibliography on the subject of corrosion of metals is included.

H. L. OLIN.

Drop forgings. ARTHUR STUBBS. *Iron Coal Trades Rev.* 90, 722-3 (1915).—A general discussion giving physical properties and chem. compns. of the various steels used in automobile manuf. H. I. OLIN.

Reduced iron. ADOLPH ZEIFLE. *North Dakota Special Bull.* 3, No. 8, 124-7 (1914).—Analyses of 61 samples of reduced iron are given. R. C. ROARK.

Practical testing of working cyanide solutions (CROGHAN) 7.

U. S., 1,142,821, June 15. H. LAVERS. Concentrating ores containing lead zinc sulfides by flotation of the crushed ore in an aq. soln. of Na_2CO_3 , 22 lbs., $\text{Na}_2\text{Cr}_2\text{O}_7$, 6 lbs., eucalyptus oil 8 oz., and kerosene 8 oz. per ton of ore, at about 54° . A flotation product high in Zn and a residue high in Pb are obtained.

U. S., 1,142,822, June 15. J. W. LITTLEFORD. Separating metallic values from colloidal silica of ore slimes. An emulsion of pine oil 32, soap 9 and H_2O 59 parts is added to the ore pulp to coagulate the colloidal silica and the coagulated gang is then sepd. from the metallic constituents by settling or treatment on concentrating tables.

U. S., 1,142,838, June 15. M. A. NEELAND. Hot-blast stove for metallurgical furnaces.

U. S., 1,143,215, June 15. C. W. LUMMIS. Apparatus for pouring molten metal into ingot molds.

U. S., 1,143,225, June 15. L. A. PLATT. Pure rolled zinc is used for forming the wearing faces of pump valves, the fibers of the Zn extending parallel to the wearing face. The Zn may be alloyed with Pb if a softer material is desired.

U. S., 1,143,438, June 15. H. M. RIDGE. Furnace for drying or roasting crushed ores. See Brit., 23,763, 1913 (C. A. 8, 1262).

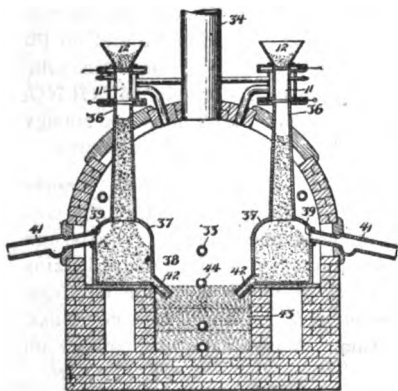
U. S., 1,143,690, June 22. J. C. DAVIS. Open-hearth furnace with flaring walls at the end providing space for large flues. The total cross-section or area of the flues is greater than the area of the furnace where it discharges into the flues. This permits sufficient expansion of the exhaust gases to avoid destructive heating of the flue walls.

U. S., 1,143,797, June 22. G. S. A. APPELQVIST and E. O. E. TYDEN. Separating constituents of powdered ores by repeated treatment with oil vapor and agitation with H_2O .

U. S., 1,143,922, June 22. R. SKEMP and W. GIBSON, SR. Coating iron or steel with zinc. The articles to be coated, e. g., sheets, are introduced into an open bath of molten Zn and withdrawn through its surface while a stream of dry CO_2 or combustion gases is forced around the articles as they come from the bath to prevent oxidation of the coating as it solidifies.

U. S., 1,144,034, June 22. F. GIOLITTI. Preventing piping in casting steel ingots. See Can., 154,419 (C. A. 8, 1733).

U. S., 1,144,036, June 22. J. M. HYDE. Zinc-smelting furnace. A charge of ore and reducing material is fed from the hoppers 12 to the retorts 37 placed within the furnace. Molten slag passes out through the pipes 42 and the volatilized Zn is led off through the pipes 41 extending through the furnace walls.



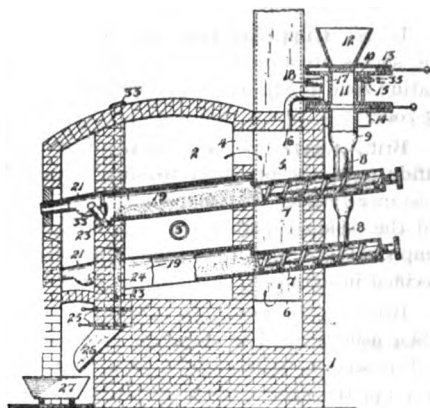
A body of molten slag is maintained around the outlets 42 to prevent the escape of gases from the retorts.

U. S., 1,144,037, June 22. J. M. HYDE. **Continuous smelting of zinc ores.** A charge of ore mixed with reducing agent is supplied from the hopper 12 through the conduit 11 (which is heated by combustion gases) to the tubular retorts 19. The Zn is volatilized through the pipes 21. Cf. C. A. 9, 51.

U. S., 1,144,053, June 22. H. PAPER. **Continuously-working furnace for smelting ores, e. g., of Fe and Zn.**

U. S., 1,144,054, June 22. H. PAPER. **Furnace for continuously reducing ores.**

U. S., 1,144,066, June 22. A. REITZHEIM. **Working zinc retorts so as to prevent accumulation of drossy residues in them.** The charge of ore and reducing agent is passed downwardly through a vertical retort in segregated bodies supported on pistons of refractory material. Gases are permitted to escape from one side of the piston to the other through vents and the Zn vapor passes off to condensers. Cf. C. A. 8, 2868, 3287.



U. S., 1,144,106, June 22. C. F. BURGESS. **Sheet iron is rendered resistant to rusting by thin layers of Fe-Ni alloy embedded in the Fe.**

U. S., 1,144,256, June 22. A. P. SCOTT. **Nearly pure iron is made by melting Fe with purifying agents or fluxes such as usually employed for removing C, Mn, P, Si and S, tapping or pouring the molten metal into a ladle and allowing it to stand for about 4 min. in the ladle before teeming, to permit the slag to sep. This sepn. is facilitated by rotating the ladle to agitate its contents.**

U. S., 1,144,402, June 29. C. S. VADNER. **Iron and other metals are extracted from slag dumps and other low grade materials by treating the finely divided material while moist with SO_2 (e. g., by showering through smelter gases), leaching, partly neutralizing the soln. and passing air through it to ppt. the Fe, completing the neutralization with CaCO_3 and continuing the passage of air until the pptn. is complete. Chlorides may be used to facilitate the extn. and metals other than Fe may be recovered by use of H_2S or any other suitable pptg. agents.**

U. S., 1,144,480, June 29. G. E. KINGSLEY. **Complex sulfide ores of lead, zinc, etc., are immersed in dil. HNO_3 not stronger than 5% and heated to 80° to form nitrate and free S. The various metals in soln. are recovered from the soln. thus formed in any usual manner.**

U. S., 1,144,481, June 29. E. LANGGUTH. **Sulfide ores of silver, zinc, lead and iron are treated with molten ZnCl_2 to form chlorides of Ag, Zn, Pb and Fe. Sufficient Zn to reduce the Ag and part of the Pb is added and the molten mass is poured into H_2O . The unreduced Pb dissolves and the residue is sepd. from the soln. while it is still warm and the soln. is treated with Zn to recover the Pb, as a spongy ppt. The soln. is then treated with ZnO and air to ppt. the Fe and regenerate ZnCl_2 .**

U. S., 1,144,523, June 29. J. C. BENEKER. **Coating iron with lead. The cleaned Fe is dipped in a molten bath of Pb containing about 0.5% of Zn and 1% or less of Cd, using ZnCl_2 as a flux.**

U. S., 1,144,524, June 29. J. C. BENEKER. Coating iron with lead by dipping into molten Pb containing 3-13% Sb and 0.2-1% Cd. A flux of ZnCl_2 is used.

U. S., 1,144,854, June 29. W. P. LASS. Apparatus for filtering ore slimes, etc., comprizing a series of filter leaves mounted vertically and parallel with each other within a horizontal cylindrical drum.

U. S., 1,144,884, June 29. G. A. WHITE. Heat-treating rolled steel sheets. The sheets are annealed by passing different portions successively through a narrow heating zone at $870-1250^\circ$ and cooling the heated portions as they pass out of the heating zone.

Brit., 4,937, Feb. 25, 1914. F. W. HIGHFIELD. In the reduction of complex sulfide ores, the ore after roasting is mixed with a reducing agent and heated in a resistance furnace with a reducing atm. to volatilize the Zn. The Pb is then run off, and the residual mat is further heated to enable a silicious slag to be formed; decomposition of the mat may then be promoted by the action of a d. c. The furnace is specified in detail.

Brit., 4,938, Feb. 25, 1914. H. L. SULMAN and MINERALS SEPN., LTD. The H_2SO_4 usually used in flotation processes of ore concentration such as the agitation froth process is replaced by a small amt. of a silicofluoride. HF may be added to the ore pulp, the bases present resulting in the production of silicofluoride. Cf. C. A. 9, 1298.

Brit., 5,089, Feb. 27, 1914. N. K. TURNBULL. Construction and operation of a galvanizing bath in which Zn is superimposed on a heavier metal, such as Pb, and is wholly heated thereby.

Brit., 5,356, Mar. 2, 1914. E. THAULOW. A flux for welding and soldering aluminium. See U. S., 1,139,923 (C. A. 9, 1742).

Brit., 5,856, Mar. 7, 1914. MINERALS SEPN. and DE BAVAY'S PROCESSES AUSTRALIA PROPRIETARY, LTD. In concentrating ores, sulfide ores, including concentrates, tailings, slimes, and other products containing metallic sulfides, are sepd. from gang by a froth-flotation process by submitting the ore, etc., to agitation and aeration with or without a frothing agent in H_2O containing in soln. an alk. substance such as Na_2CO_3 , preferably at $120-130^\circ\text{F}$. When a frothing agent is used, it is preferably other than a fatty acid. The products may be re-treated with or without the addition of fresh quantities of the substances referred to. Cf. C. A. 9, 52, 782.

Brit., 5,875, Mar. 7, 1914. EICKWORTH & STURM GRS. In a continuous reheating furnace, the cool zone is divided into an upper and lower part by a partition or hearth extending throughout its length but not reaching into the hot zone. The flames, etc., from the burner fill the hot zone and are then divided between the 2 parts of the cool zone, the proportions being detd. by the independently controlled dampers in the 2 outlets.

Fr., 467,583, Jan. 22, 1914. W. H. WHITE. Hardening copper by heating it to redness or whiteness, plunging it for a short time into a hardening bath of milk of lime with additions of vegetable exts., and then hammering it.

Fr., 468,853, Feb. 24, 1914. W. A. MCADAMS. A malleable aluminium alloy consists of Al 80, Ag 4, Cd 8, and Sn 8; a bronze substitute is made from Al, Ag, Cu; a metal for rolling is made from Al, Ag, Cd, Ti; a black metal is made from Al, Ag, Cu, Ti, and a cast metal from Al, Ag, Cu, Zn. Cf. C. A. 8, 3005; 9, 2054.

Ger., 280,788, Jan. 31, 1914. H. ECKARDT. Regenerative furnace for smelting operations, with tar-oil firing.

Ger., 281,635, Oct. 3, 1912. J. KICH. Hardening}copper.

Ger., 281,817, Apr. 7, 1914. Addition to 266,533 (C. A. 8, 1562). F. KRUPP AKT.-GESS. Reheating furnace with regenerative firing, heated with gas of low heating value.

Ger., 281,978, Oct. 9, 1913. IFÖ, OFENBAUGES. M. B. H. A tilting crucible melting furnace with preheating chamber.

Ger., 282,114, Apr. 10, 1913. Addition to 257,299 (C. A. 7, 2377). C. K. HÄFNER. Anti-rust treatment of cast sheet iron for manufacture into tools. According to the principal process, the materials used to prevent the action of rust, besides graphite, were Fe_2O_3 and MnO_3 , as well as other substances yielding O. Instead of Fe oxides, or in addition thereto, the oxides of Cu, Ni and Co may be used. These oxides are converted, with acids or alkalis, into a paste in order that they may be applied. Upon burning, the graphite and the other carboniferous materials act first upon the oxides of Cu, Ni, and Co to reduce them, whereupon the resulting metals penetrate deeply into the molten layer of Fe formed at the same time. By the oxidizing action of the MnO_3 the metals formed at first are reconverted into oxides and, either by themselves or in conjunction with Fe_2O_3 , and the MnO resulting from the reduction of the MnO_3 , constitute a protective coating.

Ger., 282,131, Oct. 8, 1913. F. LANGGUTH. Separating the sulfur compounds of lead and zinc from other ores. By the known flotation process, only the sepn. of the ores from the gang can be effected, not the sepn. of the several kinds of ore. This process is dependent upon the observation that the various ores, especially after the addition of oil, behave differently towards aq. ZnCl_2 soln. acidified with HCl. The sulfides of Zn and Pb do not float in this soln., while the other ores have the same property of flotation as in solns. free from ZnCl_2 . Therefore, after sepn. in the known manner from the gang, the ores are treated with ZnCl_2 soln. containing HCl, whereupon the S compds. of Pb and Zn settle, while the other ores rise and are thus sepd. The process can be repeated in treating the particles which have floated off in order to sep. the Zn and Pb particles carried over mechanically. Preferably, a soln. of 2% or more of ZnCl_2 is used. Instead of the HCl, other acids which do not decompose the ZnCl_2 may be employed. Impure ZnCl_2 solns., containing NaCl, CaCl_2 , FeCl_3 , etc., may be employed also. Cf. U. S., 1,144,481 (*supra*).

Ger., 282,137, June 18, 1913. AKTIEBOLAGET GRONDÄLS PATENTER. Agglomerating fine ore (Fe ore) by mixing it with somewhat more coal than corresponds to the equation $25\text{Fe}_2\text{O}_3 + 72\text{C} = 75\text{Fe} + 44\text{CO} + 28\text{CO}_2$, i. e., with somewhat more than 0.205 part by wt. of C to 1 part of Fe. The moistened ore-coal mixt. is charged into a converter upon the floor of which rests a layer of coal. After the charging, the material is packed solid and perforated so that canals, regularly spaced, lead to the layer of coal. After the combustion of the coal has been started, a slow current of air is conducted through the layer of coal for the purpose of producing gas rich in CO which passes through the canals and reduces the ore mixt. in the walls of the canal to FeO, which slags readily with the SiO_2 in the ore mixt. and coats the walls of the canals with a layer of slag which prevents the penetration of the CO_2 in the hot gas into the ore mixed with coal. The current of air is then increased and the temp. is thereby increased. In the sealed ore mixt. an energetic reduction takes place under these conditions. In order to facilitate the slag formation on the surface of the perforations, a readily fusible dressing may be applied.

Ger., 282,228, May 29, 1913. E. DREVES. Sealing the upper from the lower portions of a tunnel furnace for heating and chem. treating ores and the like.

Ger., 282,328, Dec. 4, 1913. A. LANG. Mfg. rust-proof articles from aluminium and heavy metals, by applying to the exposed parts a layer of oxide or sulfide which is

not attacked by dil. acids or alkalis (PbS , Cr_2S_3 , etc.). *E. g.*, if a vessel is made of Al and Ni, the Al is oxidized in the known manner and the Ni portion is converted superficially into NiS. By warming these layers become denser, and may be manipulated further. The oxides and sulfides of other metals can be used also.

Ger., 282,509, July 31, 1912. GES. ZUR AUSBEUTUNG VON CHEM. UND TECH. ERFINDUNGEN v. J. T. WESTERMANN. A lining for crucibles, furnaces, and the like, for m. metals, consists of a mixt. of graphite, Al Mg hydrosilicate, and Al powder, with an addition of pure asphalt dissolved in turpentine, petroleum, or the like, of wood tar, H_2O , or other liquids. The dressing can be applied repeatedly, as required. The Al powder is added as a strong reducing agent. The addition of asphalt soln. and wood tar serves to keep out moisture. About 45% graphite, 45% Al Mg hydrosilicate, and 10% Al powder, with a 10–20% asphalt-turpentine soln. or asphalt-petroleum soln., or pure H_2O as binder.

Ger., 282,600, Aug. 30, 1912. J. P. DOANIDES. Mfg. articles from lead slag.

10. ORGANIC CHEMISTRY.

C. A. ROUILLER.

Synthesis of benzo- γ -pyrones and flavones. I. SERGE JACOBSON AND BRO-JENDRANATH GHOSH. *J. Chem. Soc.* 107, 424–34 (1915).—By condensing phenols in the cold with $\text{MeC}(\text{OH})\text{:C}(\text{CH}_3\text{Ph})\text{CO}_2\text{Et}$, in the presence of sufficient H_2SO_4 , J. and G. prepd. benzo- γ -pyrones, all of which developed marked bluish or greenish fluorescence in concd. H_2SO_4 . The crude pyrones were usually contaminated with methylindenecarboxylic acid, which was removed by dissolving the mixt. in dil. NaOH and reprecip. the pyrone by means of CO_2 . The following γ -pyrones and their derivs. have been synthesized: 7-Hydroxy-3-benzyl-2-methylbenzo- γ -pyrone (A),
 $\text{HOC}_6\text{H}_4\text{.O.CMe:C}(\text{CH}_3\text{Ph}).\text{CO}_2\text{.}^1\text{H}_2\text{O}$ (derived from resorcinol), yellowish needles

from EtOH, m. 186° ; acetate (B), silky needles, m. 168° ; benzoate, long needles, m. 150° ; methyl ether, needles from AcOH, m. 119° ; ethyl ether, thin needles from EtOH, m. 145° ; both ethers develop fluorescence in concd. H_2SO_4 . If resorcinol and $\text{MeC}(\text{OH})\text{:C}(\text{CH}_3\text{Ph})\text{CO}_2\text{Et}$ are condensed in the presence of comparatively small amts. of H_2SO_4 , 7-hydroxy-3-m-hydroxyphenoxy-3-benzyl-2-methylbenzo- γ -pyrone, yellow prisms, m. 224° , is formed instead of (A) but yields (B) on acetylation. When decompd. with alkali, (A) yielded $\text{Ac}(\text{CH}_2)_2\text{Ph}$ (identified by means of its semicarbazone, m. 142°) and β -resorcylic acid, m. $202\text{--}3^\circ$. The thio derivative of (A), $\text{HSC}_6\text{H}_4\text{.O.CMe:C}(\text{CH}_3\text{Ph}).\text{CS}$,

brick-red prisms, m. 198° (decompn.), was synthesized by fusing (A) with P_2S_5 . 3-Benzyl-2,7-dimethylbenzo- γ -pyrone (derived from *m*-cresol), needles, m. 117° , probably identical with the "coumarin" described by Fries and Klostermann (*Ann.* 362, 27). On attempting to prep. a compd. m. 87° (described by Fries) from *m*-cresol and $\text{MeC}(\text{OH})\text{:C}(\text{Et})\text{CO}_2\text{Et}$, J. and G. obtained an additive compound, $\text{C}_{20}\text{H}_{20}\text{O}_3$, m. 130° . 3-Benzyl-2-methyl-1,4, α -naphthapyrone (from α -naphthol), yellow needles from EtOH, m. 187° , is converted, on hydrolysis with alkali, into $\text{Ac}(\text{CH}_2)_2\text{Ph}$ and 1-naphthol-2-carboxylic acid (cf. Schmidt and Burkard, *Ber.* 20, 2699), whose acetate m. 143° . 7,8-Dihydroxy-3-benzyl-2-methylbenzo- γ -pyrone (from pyrogallol), m. 185° ; acetate, prisms, m. 172° ; benzoate, needles, m. 184° . 7-Hydroxy-3-benzyl-2,5-dimethylbenzo- γ -pyrone, needles from AcOH, m. $177\text{--}8^\circ$; acetate, needles, m. 169° ; benzoate, m. $119\text{--}20^\circ$. 5,7-Dihydroxy-3-benzyl-2-methylbenzo- γ -pyrone, needles from AcOH, m. $218\text{--}9^\circ$; acetate, silky needles, m. 154° .

LOUIS E. WISE.

Conversion of racemic acid into a mixture of racemic and *d*-tartaric acids by means of *l*-malic acid. ALEXANDER MCKENZIE. Univ. Coll. Dundee. *J. Chem. Soc.* 107, 440-3(1915).—In an attempt to resolve a *dl*-acid by combining it with a *different* optically active acid, McK. neutralized 1 mol. of pure *dl*-tartaric acid with aq. KOH and added 1 mol. *l*-malic acid. The cryst. product which sepd. was *slightly but distinctly d-rotatory* and consisted of a mixt. of *dl*-KH tartrate and *d*-KH tartrate. In control expts. in which *dl*-KH tartrate was crystd. from H₂O, without addition of *l*-malic acid, the $[\alpha]_D$ of the product was invariably $\approx 0^\circ$. Van't Hoff's idea regarding the possibility of activating an inactive compd. by crystg. it from an active solvent has apparently been experimentally realized.

LOUIS E. WISE.

Configuration of the stereoisomeric diphenylsuccinic acids. HENRY WREN AND CHARLES J. STILL. Municipal Tech. Inst., Belfast. *J. Chem. Soc.* 107, 444-51(1915).— α -Diphenylsuccinic acid (A), m. 183° , and, after resolidification, rem. $220-1^\circ$ (cf. Franchimont, *Ber.* 5, 1050; Reimer, *Ibid* 14, 1802, *et al.*), was conveniently prepd. by the following method: Powdered EtONa (containing 8 g. Na) was suspended in 49.2 g. PhCH₂CO₂Et in 100 cc. Et₂O and to the mixt. were gradually added 38.1 g. I in 200 cc. Et₂O. After standing at room temp. for several hrs., Na₂S₂O₃ was added to the soln. to remove the excess of I, the flocculent Et β -diphenylsuccinate removed by filtration, the filtrate extd. with Et₂O, and the ext. dried, evapd. and finally heated under reduced pressure to remove unchanged PhCH₂CO₂Et. The residue was hydrolyzed with aq. alc. KOH, the EtOH removed by evapn. and the soln. filtered. The Ba salt of (A), pptd. from the filtrate, yielded 18.8 g. (A) upon acidification. By the repeated fractional crystn. of its brucine salt, (A) was resolved into its 2 optically active components: the *d*-isomer, microneedles, m. to a pasty liquid $179-80^\circ$, resolidifying and rem. $212-4^\circ$, $[\alpha]_D^{15}$ in acetone 397.3° , $[\alpha]_D^{15}$ in EtOH 369.5° , $[\alpha]_D^{15}$ in MeOH 369.2° , in AcOEt 403° ; *l*-isomer, m. $176-7^\circ$, resolidifying and rem. $211.5-14^\circ$, $[\alpha]_D^{15}$ -368.9° . β -Diphenylsuccinic acid (C) m. $229-30^\circ$, $[\alpha]_D \approx 0^\circ$ (cf. Chalanay and Knoevenagel, *Ber.* 25, 285; Reimer, *et al.*), prepd. from its Et ester (B) by hydrolysis with aq. HCl in sealed tubes or from diphenylsuccinonitrile by hydrolysis, could not be resolved into its optically active components. (A) is therefore the *dl*-mixt. and (C) the *meso* acid.

LOUIS E. WISE.

Formation of dialkyloxyanilines in reduction processes. EUSTACE E. TURNER. Goldsmith's Coll., London. *J. Chem. Soc.* 107, 469-74(1915).—2-Nitroresorcinol di-Et ether, pale green needles, m. 106.5° (cf. de Pay, *Ber.* 39, 2723 (1906), footnote), formed by heating a mixt. of 10 g. 2-nitroresorcinol and 20 g. EtBr in EtOH with 7.2 g. KOH in 24 cc. H₂O, in a closed vessel for 6 hrs., was reduced by Sn and HCl to 2-aminoresorcinol diethyl ether (A), needles from petroleum, m. 57° . The hydrochloride and chloroplatinate, reddish yellow needles, were prepd. from (A). The diazo deriv. of (A) coupled with β -naphthol gives rise to 2,6-diethoxybenzeneazo- β -naphthol, red plates with a green reflex from glacial AcOH, m. 104° . Evidently the so-called "2-aminoresorcinol di-Et ether," m. 124° , described by Pukall (*Ber.* 20, 1136) is another compd., probably [4,3,5-H₃N(EtO)₂C₆H₃] (its formation being due to a benzidine rearrangement). Kauffmann (*C. A.* 2, 272) in reducing 2-nitroresorcinol di-Me ether always obtained a mixt. of the corresponding NH₂ deriv. (B) and a Cl-containing product (C). While the purification of (B) presented no difficulties, (C) which was present always in small amt., tended to form very stable mixed crystals with (B), which m. 36° and contained 54.8% C and 5.97% H. The sepn. of (B) and (C) was effected by distg. the mixt. under 15 mm., (B) distg. completely at 140° and leaving pure (C) as residue. (C) was shown to be a chloro-2-aminoresorcinol dimethyl ether, needles, m. 50° , whose hydrochloride may be readily diazotized and coupled with β -naphthol, forming a hydroxyazo compd. The chloroplatinate of (C) forms rosettes of needles.

The hydrochloride of (B) forms long needles; the chloroplatinate nearly colorless needles, becoming orange-yellow on exposure to light. When the diazo deriv. of (B) was treated with a large quantity of 50% H_2SO_4 and K_2SO_4 and distd. in a current of superheated steam, a product (D), probably pyrogallol di-Me ether, was obtained. On treatment with CrO_3 in glacial AcOH , (D) yielded cerulignone, which gave the "corn flower" blue coloration with concd. H_2SO_4 .

LOUIS E. WISE.

Action of aldehydes on the Grignard reagent. II. JOSEPH MARSHALL. Leeds. *J. Chem. Soc.* 107, 509-23 (1915); cf. *C. A.* 8, 1957.—A new explanation of Sabatier and Murat's results (*C. A.* 8, 1088) is offered. Instead of obtaining Ph_2CHOH in quantity by the action of BzH and PhMgBr , S. and M. obtained largely $(\text{Ph}_2\text{CH})_2$, together with smaller amts. of BzPh and Ph_2CH_2 . M. has shown that in the formation of PhMgBr from PhBr , a certain amt. of Mg always remains undissolved, hence when an "equimol." amt. of BzH is added to the Grignard reagent, there is in reality an excess of BzH present, which may react further with the addition product $\text{Ph}_2\text{CHOMgBr}$, to form a compd. which on hydrolysis yields some BzPh . H , which is also liberated during the reaction owing to the soln. of the excess of Mg , reduces $\text{Ph}_2\text{CHOMgBr}$ or Ph_2CHOH to $(\text{Ph}_2\text{CH})_2$ or to Ph_2CH_2 . When the excess of Mg was removed from the Grignard reagent and the true equimol. amt. of BzH was used, 55% of Ph_2CHOH was obtained. PhMgBr , containing an excess of Mg , when acted upon by BzPh , did not lead to the formation of $(\text{Ph}_2\text{C})_2$ but yielded solely Ph_2COH (in 60% yield). When < 1 mol. BzH acted upon $p\text{-MeC}_6\text{H}_4\text{MgI}$ (A), the chief product was $p\text{-MeC}_6\text{H}_4\text{CPhOH}$. If 2 mols. BzH were used in the reaction, PhCH_2OH and $p\text{-MeC}_6\text{H}_4\text{Bz}$ were formed. p -Ditolyl was formed in considerable quantity in both reactions. The reaction between BzH and MeMgI (previously reported) was repeated and the reaction products more carefully examd. 2 fractions were obtained: (a) b_{18} below 150° , yielding largely PhAc , and (b), b_{18} $200\text{--}25^\circ$, yielding PhCH:CHBz (obtained in the form of the hydrochloride, m. 112°) and Bz_2CH_2 , m. $80\text{--}1^\circ$ (readily converted into 1,3-diphenylisooxazole, m. 141°). A reaction mixt. containing 1.5 mols. BzH and 1 mol. EtMgBr in Et_2O , after being gently heated for 24 hrs., sepd. into 2 layers. The upper Et_2O layer yielded only small amts. of BzH ; the lower viscous layer was sepd. into 2 fractions: (c), b_{18} $90\text{--}155^\circ$, and (d), $b_{18}(?)$ $160\text{--}240^\circ$. (c) yielded largely PhCH_2OH and BzH and a mixt. of PhCH_2EtOH and BzEt . (d) yielded solely Bz_2CHMe , m. $84\text{--}5^\circ$ (cf. Abell, *ibid* 79, 929), which was readily converted into N:PhC.CMe:CPh.NH , m. 233° ,

by the action of N_2H_4 ; into 1,3,5-triphenyl-4-methylpyrazole, silky needles, m. 125° , by the action of PhNHNH_2 ; into 3,5-diphenyl-4-methylisooxazole, plates, m. 127° , by the action HONH_2HCl ; and into bromodibenzoylthane, prisms, m. 65° , by the action of Br in CCl_4 . 1.5 mols. BzH acting upon 1 mol. of PrMgI yielded principally Bz_2CHEt , m. 87° (cf. Auger, *Ann. chim. phys.* [6] 22, 351), which could be converted into bromodibenzoylpropane, Bz_2CEtBr , hexagons, m. 52° ; 1,3,5-triphenyl-4-ethylpyrazole, needles, m. $84\text{--}5^\circ$; and 1,3-diphenyl-2-ethylisooxazole, needles, m. 93° . A similar reaction with iso- PrMgI yielded a mixt. of iso- PrPhCHOH , iso- PrBz and an unidentified substance, m. 110° . BzH reacting with PhCH_2MgBr (which invariably contains a large excess of uncombined Mg and which must, therefore, be treated with $<$ an equimol. amt. of BzH) gave rise to a mixt. from which only the component of highest b. p., dibenzoylphenylmethane, needles, m. 149° , was isolated. The following derivs. of this compd. were prepd.: 1,3,4,5-tetraphenylpyrazole, needles, m. 167° ; bromodibenzoylphenylmethane, prisms, m. 147° ; dibenzoylphenylmethane oxime, needles, m. 153° , which when heated above its m. p. is converted into 3,4,5-triphenylisooxazole, needles, m. 212° . BzH acting upon Me_2CHMgI yielded chiefly PhCH:CHAc , identified by its conversion into the oxime, m. 116° , and into the phenylhydrazone, m. 156° ,

which readily forms 1,5-diphenyl-3-methylpyrazoline, needles, m. 114° , to whose pure solns. (which are not fluorescent) may be imparted a vivid magenta color upon the addition of traces of NaNO_2 . 4 mols. of AcH reacting with PhCHEtMgBr yielded largely BzMe , some impure MeCH:CHBz(?) , and BzCH_2Ac , m. $59-60^{\circ}$, characterized by the formation of its deriv., phenylmethyloxazole, m. $68-9^{\circ}$. AcH reacting with iso-PrMgI gave rise to AcMe , iso-PrOH and a small amt. of impure ethylideneacetone, yielding 1-phenyl-3,5-dimethylpyrazoline when treated with PhNHNH_2 . In an expt. in which BzH was allowed to react with $\text{Ph}_2\text{CMeMgBr}$, Ph_2CMeOH and BzCH_2 were the only products formed. BzMe reacting with Ph_2CHMgBr yielded some compd., which on hydrolysis regenerated nearly all of the BzMe together with some benzhydryl ether, m. 110° . AcOEt and PhCHMeMgI gave rise to PhMeCH-OAc , b₁₆, $105-8^{\circ}$. Similarly Ph_2CHMgBr and AcOEt yield Ph_2CHOAc . Numerous equations are given to explain the mechanism of some of the above reactions.

LOUIS E. WISE.

Dihydric alcohols obtained by the reduction of substituted dihydroresorcinols. ARTHUR W. CROSSLEY AND NORA RENOUF. Kings Coll., London. *J. Chem. Soc.* 107, 602-10(1915).—By reducing dimethyldihydroresorcinol in EtOH with Na , C . and R . obtained a mixt. of 1,1-dimethylcyclohexane-3,5-diol (*A*) (cf. Zelinskii and Uspenskii, *C. A.* 7, 3600), nacreous scales, m. 147° (66-8% yield) and 1,1-dimethylcyclohexan-3-ol, b₁₆ $102-3^{\circ}$ (7-10%); *o*-nitrobenzoate, flat needles, m. 62° . Dibenzoate of (*A*) needles, m. $135-6^{\circ}$. By heating slightly more than 1 mol. of $\text{AcCH}_3\text{CO}_2\text{Et}$ with 1 mol. EtONa in EtOH and adding 1 mol. Et crotonate to the mixt., heating on a H_2O bath for 7 hrs., dissolving the residue in H_2O , removing the EtOH by evapn., adding 2 mols. KOH , dilg. the soln. so as to contain 10% alkali, heating in an open flask, acidifying and finally boiling until the evolution of CO_2 had ceased (to insure decompn. of the corresponding resorcylic acid), C . and R . obtained a 67% yield of methylidihydroresorcinol, m. (after crystn. from AcOEt) 128° , which upon reduction with Na in EtOH yielded a mixt. of crude 1-methylcyclohexane-3,5-diol (*B*) and 1-methylcyclohexan-3-ol (the latter being sepd. by steam distn.); *o*-nitrobenzoate, rhombs, m. 54° . Pure (*B*) obtained in 43% yield by repeated Et_2O extns. of the crude product, crystd. from the Et_2O exts. in rhombs, m. $74-5^{\circ}$, and from AcOEt in needles. Its *dibenzoate*, hexagonal plates, m. 81° . The Et_2O mother liquor from (*B*) yielded a very small amt. of an isomeric diol(?), nacreous flattened needles, m. 143.5° . 1,1,2-Trimethylcyclohexane-3,5-diol, flat needles, m. 150° ; *dibenzoate*, needles, m. 97° , was obtained in 70% yield by the reduction of trimethyldihydroresorcinol. Trimethylhexan-3-ol, a by-product of the above reaction, was identified by means of its *o*-nitrobenzoate, m. 114° (cf. *C. A.* 5, 3559). By a similar reaction, 40% of the theoretical yield of 1-isopropylcyclohexane-3,5-diol, flat needles (*C*), m. 124° , was obtained, after repeated Et_2O extn. of the crude product. The volatile by-product, 1-isopropylcyclohexan-3-ol (*o*-nitrobenzoate, m. $48-9^{\circ}$) was sepd. from (*C*) by distn. with steam. *Dibenzoate* of (*C*), needles, m. 84° . By the usual reduction of phenyldihydroresorcinol (cf. Vorländer, *Ber.* 27, 2054), a mixt. of 1-phenylcyclohexane-3,5-diol, leaflets from AcOEt , m. 160° (*D*) (cf. Knoevenagel, *Ann.* 289, 167) and 1-phenylcyclohexan-3-ol, needles from light petroleum, m. 81° , sepd. from (*D*) by steam distn. The Et_2O mother liquors from which (*D*) had been crystd. in the process of purification on evapn. yielded an isomeric (*cis?*)-1-phenylcyclohexane-3,5-diol (*E*), scaly needles from AcOEt or H_2O , m. 134° , whose *dibenzoate*, silky needles from EtOH , m. 117° , regenerated (*E*) quant. on hydrolysis with alc. KOH . (*D*) yields a *dibenzoate*, needles from abs. EtOH , m. poorly $110-27^{\circ}$, and containing 0.5 mol. of EtOH which could not be removed by heating to 100° or by keeping *in vacuo*. The *dibenzoate* regenerated (*D*) quant. when sapond. with alc. KOH .

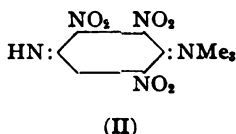
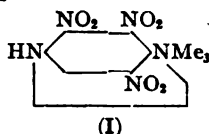
LOUIS E. WISE.

Alkylated *p*-phenylenediamines and derivatives. Quinoneimide-ammonium compounds. RAPHAEL MELDOLA AND WILLIAM F. HOLLELY. City and Guilds Tech. Coll., Finsbury. *J. Chem. Soc.* 107, 610-22 (1915).—The main object of the research was to prep. quinoneimide-ammonium compds. with special reference to derivs. of the type $p\text{-HN:C}_6\text{H}_4\text{:Nabc}$ (in which *a*, *b* and *c* are different radicals) which should be resolvable into optically active isomers. M. and H.'s results are as yet inconclusive. In the present paper they describe the prepn. and properties of the parent alkylated *p*-phenylenediamines and their derivs. The synthesis of *p*-methylethylaminoacetanilide (A), $\text{EtMeNC}_6\text{H}_4\text{NHAc}$, silky needles, m. 92° , may be outlined as follows:

$\text{PhNMeEt.HCl} \xrightarrow{\text{NaNO}_2} p\text{-NO deriv.} \xrightarrow{\text{Sn + HCl}} p\text{-NH}_2 \text{ deriv.} \xrightarrow{\text{Ac}_2\text{O}} \text{(A)}$. At ordinary temp. but more rapidly on heating, (A) adds alkyl iodides (excepting iso-PrI) to form quaternary NH_4 iodides, cryst. H_2O -sol. products which dissociate readily on attempted recrystn. from H_2O or EtOH, and which on treatment with Ag_2O form alk. syrups which rapidly absorb CO_2 from the air, giving rise to uncrystallizable carbonates. *Methylethylpropyl-4-acetaminophenylammonium iodide* (B) and the corresponding *allyl iodide* were especially studied. Acid hydrolyzing agents readily remove the Ac group with the formation of corresponding quaternary NH_4 salts, but attempts to form quinoneimide- NH_4 compds. and their NO_2 derivs. were unsuccessful. The hydrolysis of (B) with HBr lead to the formation of a *dibromide*, $4\text{-HBr.H}_2\text{NC}_6\text{H}_4\text{-NBrMeEtPr}$, colorless tablets. (A) in cold glacial AcOH, when treated with fuming HNO_3 yielded *3,5-dinitro-1-acetaminophenyl-4-methylnitrosoamine* (C), $(\text{ONMe})(\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{NHAc}$, colorless prisms, tablets, or scales, m. $152\text{--}3^\circ$. When boiled with abs. PhOH (C) loses its NO group and passes into *3,5-dinitro-4-methylamino-1-acetanilide* (D), $(\text{O}_2\text{N})_2(\text{MeNH})\text{C}_6\text{H}_3\text{NHAc}$, or more probably possessing the "inner salt"

structure $\text{AcHN} \begin{array}{c} \text{NO}_2 \\ \diagup \quad \diagdown \\ \text{C}_6\text{H}_3 \\ \diagdown \quad \diagup \\ \text{:N-O} \\ \vdots \\ \text{O} \end{array} \text{:NMe}$, scarlet needles, m. $196\text{--}7^\circ$, which in turn passes

into *3,5-dinitromethyl-*p*-phenylenediamine* (*3,5-dinitro-4-methylaminoaniline*), $(\text{O}_2\text{N})_2(\text{MeHN})\text{C}_6\text{H}_3\text{NH}_2$ (or the corresponding "inner salt" structure), dark purple needles with green reflex, m. $186\text{--}7^\circ$, whose diazo deriv. is readily decompd. with EtOH with the formation of *2,6-(O}_2\text{N})_2\text{C}_6\text{H}_3\text{NHMe}* (E), orange needles, m. $106\text{--}7^\circ$ (cf. Bamberger, *Ber.* 30, 1257). (E) was also obtained directly from (C), by heating the latter with alc. HCl. The *nitroso derivative* of (E), needles, m. $115\text{--}6^\circ$. Fuming HNO_3 acted further upon (C) with the formation of a corresponding *nitroamine*, $4,3,5\text{-(O}_2\text{NMeN)-}(\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{NHAc}$, needles, m. $183\text{--}4^\circ$, passing into (D) when heated with PhOH, giving the Franchimont-Bamberger reaction with $\alpha\text{-C}_{10}\text{H}_7\text{NH}_2$ and Zn and being reconverted into (C) by treatment with H_2SO_4 (Reverdin's reaction). By a method analogous to that used in the synthesis of (A), M. and H. prepd. $p\text{-Me}_3\text{NC}_6\text{H}_4\text{NHAc}$ (F), needles, m. $132\text{--}3^\circ$ (Beilstein, IV, 588, gives 130°), which combines readily with MeI, forming the *methiodide* (G), prisms readily dissociating on attempted recrystn., which when treated with Ag_2O formed the *free base* which quickly absorbs CO_2 but which yielded a *picrate*, $\text{AcHNC}_6\text{H}_4\text{NMe}_3\text{OC}_6\text{H}_3(\text{NO}_2)_3$, yellow scales, m. $206\text{--}8^\circ$, and a *ferrocyanide*, $[\text{AcHNC}_6\text{H}_4\text{NMe}_3]_2\text{H}_2\text{Fe}(\text{CN})_6 \cdot 2\text{H}_2\text{O}$, which does not lose its H_2O at 100° . (G) when treated with AgNO_3 formed a *nitrate*, $\text{HNAC}_6\text{H}_4\text{NMe}_3\text{NO}_3$, flat needles, decomp. over a wide temp. range, reaching finally 225° , which could be nitrated in a cold mixt. of fuming HNO_3 and concd. H_2SO_4 , the appearance of a yellow deposit indicating the completion of the reaction. The product was shown to be *2,3,5-trinitro-4-trimethylammonium-1-benzoquinoneimide* (H), whose structure is probably represented by either (I) or (II), golden-yellow scales from EtOH, decomp. $200\text{--}20^\circ$.



(H) is probably the first true quinoneimide- NH_4 deriv. synthesized. Its properties have not been fully detd. and no derivs. have been prepd. It is unstable and its acid solns. when heated decomp. with gas evolution and the formation of an unidentified compd. volatile with steam. (H) dissolves in HCl forming a colorless soln. from which (H) can be regenerated on treatment with alkali. When nitrated (F) also yields (C). When allowed to react with HNO_3 , (F) forms a compound (containing 19.3% N, and apparently not a nitrosoamine), stumpy red prisms, m. $132-3^\circ$. On methylation $4\text{-O}_2\text{NC}_6\text{H}_4\text{NHCH}_2\text{Ph}$ yielded *benzylmethyl-p-nitroaniline*, silky yellow needles, m. $68-9^\circ$, which does not form quaternary NH_4 derivs. but which on reduction with Sn and HCl yields the corresponding *benzylmethyl-p-phenylenediamine* (I), whose *acetyl derivative*, slender needles, m. $110-1^\circ$, forms no quaternary NH_4 iodides, but on nitration gives rise to (C). A *disulfo* derivative of (I), $4\text{-(MeC}_6\text{H}_4\text{SO}_2)_2\text{NC}_6\text{H}_4\text{N-MeCH}_2\text{Ph}$, scales, m. 217° , was also prepd.

LOUIS E. WISE.

Walden Inversion. I. Influence of the solvent on the sign of the product in the conversion of phenylchloroacetic acid to phenylaminoacetic acid. GEORGE SENTER and HARRY G. K. DREW. Birkbeck Coll., London. *J. Chem. Soc.* 107, 638-42 (1915). —*d*- $\text{PhCHClCO}_2\text{H}$ was prepd. from mandelic acid and PCl_5 (cf. Bischoff and Walden, *Ann.* 279, 122) and resolved by means of its morphine salt (cf. McKenzie and Clough, *C. A.* 2, 2236). The isomers, crystd. from petroleum, m. 61° , $[\alpha]_D^{16}$ (3% PhH soln.) $\pm 185^\circ$. The influence of solvents on the reaction between NH_3 and these isomers was investigated. H_2O and MeCN were chosen as solvents since they form homogeneous solns. with the NH_4 salt and excess of NH_3 . In aq. soln. the reaction is attended by considerable racemization and the resulting $\text{PhCH}(\text{NH}_2)\text{CO}_2\text{H}$ always has the *opposite* sign to that of the $\text{PhCHClCO}_2\text{H}$ taken. A soln. of 0.75 g. *l*- $\text{PhCHClCO}_2\text{H}$ in 15 cc. H_2O was satd. with NH_3 and kept in a sealed Jena glass tube at 9° for 19 days. 2 crops of $\text{PhCH}(\text{NH}_2)\text{CO}_2\text{H}$ were isolated: 1st crop (0.25 g.), $[\alpha]_D^{16}$ 83.5° ; 2nd crop (0.02 g.), $[\alpha]_D^{16}$ 135.5° . (The pure *d*- and *l*- NH_2 acids have $[\alpha]_D^{16} \pm 157.9^\circ$). With MeCN as solvent, the reaction is also attended by appreciable racemization, but the sign of the resulting active NH_2 acid is invariably the same as that of the original Cl acid. The proportion of active NH_2 acid formed in MeCN appears to be practically independent of the temp. at which the reaction is carried out, being about the same at 9° as at 52° . 4 g. *l*-Cl acid in 70 cc. MeCN were satd. with dry NH_3 and kept for 24 hrs. at 52° . The product, after washing with a small amt. of H_2O to remove NH_4 salts, yielded 2 crops of crystals: 1st crop (2.25 g.), $[\alpha]_D^{16}$ (in 0.984 N HCl) -8.7° ; 2nd crop (0.2 g.), $[\alpha]_D^{16}$ -67° . An expt. carried out in MeCN, in which the *d*-Cl acid was used, yielded (in the 2nd crop) a product containing about 80% of *d*- NH_2 acid.

LOUIS E. WISE.

Salicylates. Lead and copper salicylates. W. O. DE CONINCK. *Bull. soc. chim.* 17, 164-7 (1915); cf. *C. A.* 9, 2058.—By gradually adding PbCO_3 to aq. $o\text{-HOC}_6\text{H}_4\text{CO}_2\text{H}$, kept at $70-5^\circ$, and allowing the mixt. to cool slowly, de C. obtained a *lead salicylate*, $(o\text{-HOC}_6\text{H}_4\text{CO}_2)_2\text{Pb} \cdot 2\text{H}_2\text{O}$ (A). Cahours (ref. not given) has described a monohydrate. When (A) is treated with NH_4OH , it is *not* converted into the pure basic salt $(\text{C}_6\text{H}_4\text{O}_3)_2\text{Pb}_3\text{PbO}$, which other investigators (not named) claim is produced when NH_4OH acts upon Pb salicylate. Instead, a mixt. of unidentified basic salts was obtained. In attempting to prep. the basic salicylate $\text{O.C}_6\text{H}_4\text{CO.O.Pb}$ (B), by gradually

heating (A) with PbO, de C. obtained a mixt. of (B) and smaller amts. of a Pb hydroxyisophthalate (no formula given). By treating a Ca salicylate soln. with an equivalent amt. of CuSO_4 , a normal *copper salicylate*, with 2 H_2O , was prepd. (Previous investigators have reported a tetrahydrate; ref. not given.) When heated with H_2O , EtOH, or even with Et_2O (at their resp. b. ps.?) (C) is converted into $\text{O.C}_6\text{H}_4\text{CO.O.Cu}$

and $o\text{-HOC}_6\text{H}_4\text{CO}_2\text{H}$. de C. bases the following general conclusions in part on the results of his previous investigations on Ba, Cd, Hg, Ca, Sr salicylates. Normal salicylates of divalent metals (M'') are apparently complexes of the basic salt and the free acid: $[(\text{O.C}_6\text{H}_4\text{CO.O.M}'')(\text{HOC}_6\text{H}_4\text{CO}_2\text{H})]$, which may be stable, decomp. only at

fairly high temps. into $\text{O.C}_6\text{H}_4\text{CO.O.M}''$, PhOH and CO_2 , or unstable, as in the case

of (C), decomp. very readily into the free acid and the basic salt. LOUIS E. WISE.

Dehydration and esterification of cyclohexanol and *p*-methylcyclohexanol by means of oxalic acid. A. JUÉRY. Boucicaut Hosp. *Bull. soc. chim.* 17, 167-75 (1915).—J. finds that the best conditions for dehydrating the cyclohexanols are obtained when 1 mol. of the hexanol is heated with 3 mols. of $(\text{CO}_2\text{H})_2$, *p*-methylcyclohexanol (A) yielding 50-5% of *p*-methylcyclohexene (B) and cyclohexanol (C) yielding 70-5% of cyclohexene (D). Unchanged (A) and (C) were the only other reaction products recovered. If <3 mols. of $(\text{CO}_2\text{H})_2$ are used, normal oxalates may also be formed. Thus, 1 mol. of (A), when heated with 1 mol. of $(\text{CO}_2\text{H})_2$, yielded roughly 25% of (B) and 25% of a mixt. of 2 isomeric *p*-methylcyclohexyl oxalates (E), needles, m. 98° , b₂₇ $192-3^\circ$, and (F), oil, b₁₈ $198-9^\circ$, d₄ 1.044, possessing an aromatic odor and failing to cryst. in ice- CaCl_2 mixt. When 0.5 mol. $(\text{CO}_2\text{H})_2$ is heated for 12 hrs. with 1 mol. of (A), very little dehydration takes place, but the yield of esters increases. Ordinarily the ester mixt. obtained above contains 33% of (E) and 66% of (F). Both (E) and (F) on sapon. with dil. NaOH yield (A), readily identified by means of its phenylurethan, m. 125° . 1 mol. of (C) when heated with 0.25 mol. of $(\text{CO}_2\text{H})_2$ yields largely unchanged (C), practically no (D) and a very appreciable amt. of *cyclohexyl oxalate*, needles, m. 45° , b₁₈ $190-1^\circ$. No isomeric liquid oxalate was obtained in this case.

LOUIS E. WISE.

Aspirin. II. Formation of aspirin. D. E. TSAKALOTOS AND S. HORSCH. Univ. Athens. *Bull. soc. chim.* 17, 186-90 (1915); cf. C. A. 9, 787.—T. and H. have detd. the rate of formation of aspirin from Ac_2O and $o\text{-HOC}_6\text{H}_4\text{CO}_2\text{H}$ in PhH, at 25° , 30° , and 50° . The course of the reaction, which is of the 2nd order, was followed by detg. the change in acidity of the mixt., by titrating aliquot portions with 0.02 N $\text{Ba}(\text{OH})_2$ at frequent intervals. The velocity const. K was detd. by the solution of the equation: $[\log a_t + \log (a_0 - a_f) - \log a_0 - \log (a_t - a_f)]/a_f t = 0.4343 K$, where a_0 = the initial titer of the mixt. in terms of 0.02 N alkali, a_t = titer at the end of a time interval t , and a_f = the titer at equil. The following mean values for K were found at 25° , 30° , and 50° , resp.: 0.000148, 0.000246, 0.00115. The increase in the rate of formation of aspirin with rising temp. reaches its limit at 90° , above which aspirin itself undergoes decompn. with the formation of Ac_2O and $o\text{-HOC}_6\text{H}_4\text{CO}_2\text{C}_6\text{H}_4\text{CO}_2\text{H}$.

LOUIS E. WISE.

Nitration of dimethyl-*m*-phenetidine. FRÉDÉRIC REVERDIN. Univ. Geneva. *Bull. soc. chim.* 17, 190-6 (1915).—*m*- $\text{EtOC}_6\text{H}_4\text{NMe}_2$ (A), b. 256° , was obtained in 86% yield, by the action of Me_2SO , on $\text{EtOC}_6\text{H}_4\text{NH}_2$. 2 g. (A) in 20 cc. Ac_2O , when treated with 10 cc. HNO_3 (d. 1.52) at room temp., yielded 4,6-dinitro-3-methylnitroamino-1-ethoxybenzene (B), $(\text{O}_2\text{N.NMe})(\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{OEt}$, colorless prisms, m. $137-8^\circ$, which, when heated on a H_2O bath with alc. KOH and the resulting product decompd. with HCl, yielded

3,4,6-(MeHN)(O₂N)₂C₆H₃OH, m. 182° (cf. *Ibid* [4] 3, 126). When heated at 70° until fumes were evolved, a mixt. of 3 cc. of (A) in 25 cc. AcOH and 10 cc. HNO₃ (d. 1.4) yielded 4,6-dinitro-3-nitrosomethylamino-1-ethoxybenzene (C), nearly colorless needles, m. 113-4°. If the above reaction is allowed to proceed at about 12°, and the mixt. poured into H₂O as soon as the evolution of brown fumes is noted, 4,6-dinitro-3-dimethylamino-1-ethoxybenzene (D), yellow needles, m. 172°, and small amts. of (C) are obtained. (C) in Ac₂O was converted into (B), on treatment with HNO₃ (d. 1.5) on the H₂O bath. When heated with boiling, fairly concd. HCl for an hr., (C) is converted in 4,6-dinitro-3-monomethylamino-1-ethoxybenzene, yellow needles, m. 210°, also formed by heating (B) with PhOH. R. also prepd. (from dimethylanisidine) 4,6-dinitro-3-methylnitrosoamino-1-methoxybenzene, lemon-colored needles, m. (poorly) about 115°, by a reaction similar to the one giving rise to (C), but carried out at 45°.

LOUIS E. WISE

Molecular rearrangements of triphenylmethane derivatives. J. STIEGLITZ WITH ISABELLE VOSBURGH, AGNES F. MORGAN, BERT A. STAGNER AND JAMES K. KUHN SENIOR. Univ. Chicago. *Proc. Nat. Acad. Sci.* 1, 196-210(1915); cf. *C. A.* 8, 1276, 3785.—The following rearrangements are recorded: Ph₃CNHBBr to Ph₃C:NPh (a) in the presence of NaOH, Ca(OH)₂ or MeONa. (p-ClC₆H₄)₂PhCNHCl to a mixt. of (ClC₆H₄)₂C:NPh and (ClC₆H₄)PhC:NC₆H₄Cl; (BrC₆H₄)(ClC₆H₄)PhCNHCl underwent a similar change. Ph₃CNCl₂ to (a) with explosive violence under the influence of heat alone. (Ph₃CNMeCl is not rearranged either by bases or heat.) Ph₃CNMeOH, previously described as rearranging only slightly, to Ph₃C(OH)NMePh (or its chloride) by the action of PCl₅ on the Et₂O soln. ClC₆H₄Ph₃CNMeOH to a mixt. of Ph₃C(OH)N-MeC₆H₄Cl and ClC₆H₄PhC(OH)NMePh. Ph₃CN₂ to (a) when heated at high temp.; ClC₆H₄Ph₃CN₂ to mixt. of ClC₆H₄PhC:NPh and Ph₃C:NC₆H₄Cl. Ph₃CNHNH₂ could not be rearranged by either acids or ZnCl₂, while (Ph₃CNH), under the influence of ZnCl₂ gave a product from which PhNH₂ was obtained, indicating that a rearrangement had taken place; this behavior, corresponding to that of NH₂OH derivs., is the 1st such rearrangement to be observed in the (NH₂)₂ series. The above changes are used by S. as further support for his theory that such rearrangements are to be explained by a consideration of the electron valencies and the great tendency of the unstable Cl⁺ and OH⁺ to go over into their common stable negative forms. This paper, which contains only brief exptl. data, is apparently a preliminary report.

NORMAN A. SHEPARD.

Constitution of organic compounds in relation to their absorption of light. E. C. C. BALY. Liverpool. *J. Soc. Chem. Ind.* 34, 393-9(1915); cf. *C. A.* 9, 1577.—Exptl. evidence, in the nature of absorption curves, is here introduced to support B.'s theory that color change, or change in absorption of light, is due not to a change in structure, but to an opening up of the mol. fields of force. The curves for PhOH in neutral and in alk. soln. are given, showing an absorption of different wave lengths in the different solvents. According to B., 3 different stages of the opening up of the force field of PhOH are to be considered, with powers of absorbing wave lengths of approx. 2900, 2720 and 2400, resp., as shown by the absorption bands. The curves for diphenyl-violic acid and some of its salts are included to explain the wide variation in color of these salts; curves for p-nitroaniline and p-nitrophenol in different solvents are also given.

NORMAN A. SHEPARD.

Action of nitrous acid on the amines. PANCHANAN NEOGI. Rajshahi, India. *Chem. News* 111, 255(1915); cf. *C. A.* 8, 3024; see also *C. A.* 6, 593; 7, 338, 2925.

NORMAN A. SHEPARD.

Difflavone group. I. Difflavone. HUGH RYAN AND PAULINE O'NEILL. Univ. Coll., Dublin. *Proc. Roy. Irish Acad.* 32, 48-56(1915).—Difflavone may be synthesized

by two methods from diacetoresorcinol (a). 2.0 g. (a) di-Me ether (b), prepd. by the action of Me_2SO_4 on (a) in the presence of KOH, condenses readily with 2 cc. BzH when warmed for a short time in 25 cc. alc. with 1 cc. 50% NaOH, forming *o,o*-dibenzylidenediacetoresorcinol dimethyl ether, $1,5,2,4\text{-C}_6\text{H}_2(\text{OMe})_2(\text{COCH:CHPh})_2$ (c), light yellow prisms from C_6H_6 , insol. in dil. KOH, m. $156\text{--}7^\circ$. (c) may be demethylated by HI, but the product is oily; boiled in $\text{C}_6\text{H}_5\text{Me}_2$ with AlCl_3 , *o,o*-dibenzylidenediacetoresorcinol (*o,o*-dihydroxydichalcone) (d) is formed, but the yield is poor. (d) seps. in yellow cubes, m. $196\text{--}8^\circ$; it may also be prepd. by allowing (a) to stand with BzH in very dil. NaOH for 5 weeks. 1.0 g. (c) in 10 cc. CHCl_3 with 0.85 g. Br, sepd., on addition of alc., the *dihydroxydichalcone dimethyl ether tetrabromide*, $\text{C}_6\text{H}_2(\text{OMe})_2(\text{COCHBrCHBrPh})_2$ (e), prisms from MePh, m. $185\text{--}6^\circ$ (decompn.). Heated in $\text{C}_6\text{H}_5\text{Me}_2$ with AlCl_3 , (e) did not give diflavone. *Dihydroxydichalcone diacetate tetrabromide*, $\text{C}_6\text{H}_2(\text{OAc})_2(\text{COCHBrCHBrPh})_2$ (f) is formed on boiling 1.0 g. (d) with 1.0 g. AcONa and 10 cc. Ac_2O , pouring into H_2O , sepg. the oil, after washing in Et_2O with Na_2CO_3 , and then adding 0.8 g. Br to the CHCl_3 soln. at ordinary temp.; it seps. from MePh in needles, m. $176\text{--}8^\circ$. 0.5 g. (f), dissolved in 7.8 cc. 0.5 *N* alc. KOH, sepd. *diflavone* $\text{O.CPh:CH.CO.C}_6\text{H}_2\text{CO.CH:CPh.O}$ (g), on short warming, faintly yellow needles

from MePh. It was not quite pure, being contaminated with a little dibenzylidenedicoumarone; it was obtained in purer condition by the following method: 10.0 g. (b) condensed with 100 cc. BzOMe in the presence of 4.2 g. Na gave 5.0 g. *dibenzoylaceto*resorcinol dimethyl ether, $\text{C}_6\text{H}_2(\text{OMe})_2(\text{COCH}_2\text{Bz})_2$ (h), light yellow plates from C_6H_6 , sol. in aq. KOH, m. $200\text{--}1^\circ$. While (h) is not affected by boiling with HI (d. 1.5), it is converted on heating 1 hr. at 135° with HI (d. 1.7) into *2-benzoylacetato-3-methoxyflavone*, $\text{MeO(BzCH}_2\text{CO)C}_6\text{H}_2\text{CO.CH:CPh.O}$ (i), faintly yellow prisms, m. 238° .

Heated for 5 hrs. with HI (d. 1.7) under the same conditions, (h) gives (g), yellow needles, softens 275° , m. $281\text{--}2^\circ$; sol. in concd. H_2SO_4 with a faint yellow color and brilliant blue fluorescence. Neither of the above methods of prepn. is as smooth as in the monoflavone series.

NORMAN A. SHEPARD.

Condensation of aldehydes with β -diketones. HUGH RYAN AND J. M. DUNLEA. Univ. Coll., Dublin. *Proc. Roy. Irish Acad.* 32, 57-64(1915); cf. *C. A.* 9, 75.

NORMAN A. SHEPARD.

Betaines and quaternary salts. ALBERT B. WEINHAGEN. Kgl. Sächs. Tech. Hochschule, Dresden. *Separate*, 55 pp.—The behavior of several heterocyclic bases of the type of pyridine (a) and quinoline (b) toward $\text{PhCHClCO}_2\text{H}$ (c) was investigated with the expectation of forming new betaine derivs. While (b) added (c) normally and (a) also gave an addition product, in the latter case CO_2 was evolved and no betaine was obtained. The same behavior was noted with $\text{MeCHClCO}_2\text{H}$ and (a). The action of (c) on different derivs. of both these bases was then studied; $\alpha\text{-C}_6\text{H}_4\text{NMe}$ (d) did not react at all, while $\alpha\text{-C}_6\text{H}_4\text{NMe}$ (e) behaved like (a). $2,4,6\text{-C}_6\text{H}_2\text{NMe}_3$ (f) did not add directly, nor was CO_2 evolved, but HCl was removed from (c) with the formation of (f)-HCl. The non-formation of addition products in the cases of (d) and (f) may be due to steric hindrance according to W. since both *o*-positions to the N are occupied. To further support this view, he finds that neither (d) nor (f) gives addition products with $\text{O}_2\text{NC}_6\text{H}_4\text{CH}_2\text{Cl}$. The fact that (f) is a very much stronger base than any of the other bases employed is proposed to explain its behavior in removing HCl from the α -halogen acid. In these reactions the components were usually heated together at 100° without solvents for 2-3 hrs., the base being in slight excess. Where no cryst. product sepd., the excess of base was distd. with steam and the addition product then pptd. and identified by means of some double salt. *Benzylpyridinium*

chloroaurate, from (a) and (c), yellow needles, m. 107-9°. (b) and (c) gave *quinoline-phenylbetaine hydrochloride*, $\text{C}_{10}\text{H}_7\text{CHPhCO}_2\text{H}$; the salts are all unstable in hot H_2O ; *chloromercurate*, pptd. cold, shrinks 56°, m. 140°; *perchlorate*, bright orange, m. 120° (decompn.); the dichromate, chloroplatinate and -aurate are all unstable. (e) with (c) evolved CO_2 with the formation of *benzyl- α -picolinium chloride*; *chloroaurate*, m. 133-4°; *chloroplatinate*, fine flesh-colored crystals from H_2O , m. 212-3°; *dichromate*, oil, crysts. on standing, m. 129°; *chloromercurate*, oil. Collidine-HCl, obtained from (f) and (c) and previously described by Möhler as having no m. point, partially m. 55-7°, solidifies, darkens 240° and finally m. 266-8° (decompn.). Nicotine (g) heated with (c) gave *monobenzylnicotininium chloride*, $\text{C}_{10}\text{H}_{14}\text{N}_2\text{C}_7\text{H}_7\text{Cl}$ (h), which was identified through its *chloroplatinate*, pink crystals, m. 236° (decompn.); *chloroaurate*, m. 178° (decompn.) and seps. Au on boiling with H_2O ; NH_4 picrate ppts. a *picrate*, $\text{C}_{10}\text{H}_{14}\text{N}_2\text{C}_7\text{H}_7\text{C}_6\text{H}_3(\text{NO}_2)_3\text{O}$, as an oil, crysts. on standing. It partially decomps. 99°, m. 122°. For comparison the behavior of PhCH_2Cl (i) toward (g) was investigated. With 2 mols. (i) a hygroscopic product was formed, whose salts analyzed for dibenzylnicotininium chloride; *chloroaurate*, m. 170-83° (decompn.), is decompd. by hot H_2O ; *chloroplatinate*, shrivels 205°, m. 211° (decompn.); *picrate*, $\text{C}_{10}\text{H}_{14}\text{N}_2(\text{C}_7\text{H}_7)_2\text{C}_6\text{H}_3(\text{NO}_2)_3\text{O}$, m. 122° (cf. Ber. 25, 1433). One mol. each of (g) and (i) gave (h). (a) heated with $\text{MeCHClCO}_2\text{H}$ gave ethylpyridinium chloride, with the evolution of CO_2 ; *chloroaurate*, m. 190° (decompn.). *o*-Nitrobenzylpyridinium chloride, from *o*- $\text{NO}_2\text{C}_6\text{H}_4\text{CH}_2\text{Cl}$ (j) and (a), previously prepd. by Lellmann and Pekrun (Ann. 259, 57), gave a *chloromercurate*, colorless plates, m. 145°; *dichromate*, m. 172°; *perchlorate*, $\text{C}_{15}\text{H}_{11}\text{N}_2\text{O}_3\text{ClO}_4\text{H}_2\text{O}$, m. 154°; *chloroplatinate*, m. 223°, decomps. 228°; *picrate*, needles from H_2O , m. 148°. (j) forms *o*-nitrobenzyl- α -picolinium chloride with (e), pptd. from alc. by Et_2O , m. 115°; *chloroaurate*, small crystals from H_2O , m. 132-3°. *o*-Nitrobenzylquinolinium chloride; *dichromate*, chars 190-200°. *o*-Nitrobenzylnicotininium chloride; *chloroplatinate*, m. 227-9°; *chloroaurate*, m. 192-4° (decompn.); *dichromate*, m. 110°. *m*-Nitrobenzylpyridinium chloride, $(\text{C}_6\text{H}_5\text{NCICH}_2\text{C}_6\text{H}_4\text{NO}_2)_2\cdot 3\text{H}_2\text{O}$, fine leaves, m. 97-9°; *chloromercurate*, needles, m. 117-9°; *dichromate*, m. 189° (decompn.); *perchlorate*, needles, m. 142°; *picrate*, yellow needles, m. 142°; *chloroplatinate*, m. 213-5°. *m*-Nitrobenzyl- α -picolinium chloride, pptd. from alc. by Et_2O , fine needles, m. 118°; *chloroaurate*, small yellow crystals, m. 159°. *m*-Nitrobenzylquinolinium chloride; *dichromate*, m. 190° (decompn.). *m*-Nitrobenzylnicotininium chloride; *chloroplatinate*, m. 204-5° (decompn.); *chloroaurate*, m. 185° (decompn.) and seps. Au when suspended in cold H_2O . *p*-Nitrobenzylpyridinium chloride, $(\text{C}_6\text{H}_5\text{NCICH}_2\text{C}_6\text{H}_4\text{NO}_2)_2\cdot 3\text{H}_2\text{O}$, m. 64-6°; *chloromercurate*, needles or plates from H_2O , m. 137°; *perchlorate*, needles from H_2O , m. 131°; *dichromate*, m. 73-5°; *picrate*, yellow needles, m. 171°; *chloroplatinate*, leaves from H_2O , m. 210-1° (decompn.). *p*-Nitrobenzylnicotininium chloride; *chloroaurate*, m. 80° (decompn.); *chloroplatinate*, m. 223°. *p*-Nitrobenzyl- α -picolinium chloride, hygroscopic yellow crystals, decomps. in the air; *chloroaurate*, m. 159°, is decompd. by long boiling with H_2O ; *chloroplatinate*, needles, m. 217°; *chloromercurate*, clusters of needles, m. 139-40°. *p*-Nitrobenzylquinolinium chloride; *dichromate*, m. 176°. (f) heated with a small excess of PhCHO for 3 hrs. is converted into 2,4-dimethyl-6-benzalpyridine, yellow oil, which cannot be distd. without decompn.; *chloromercurate*, $\text{Me}_2(\text{CH}:\text{CHPh})\text{C}_6\text{H}_2\text{N}\cdot\text{HCl}\cdot\text{HgCl}_2$, green, m. 226°; *chloroplatinate*, $(\text{C}_{15}\text{H}_{15}\text{N}\cdot\text{HCl})_2\text{PtCl}_4\cdot\text{H}_2\text{O}$, yellow powder, m. 236-8°. MeCHO and $\text{NO}_2\text{C}_6\text{H}_4\text{CHO}$ do not condense with (f), while CCl_3CHO apparently forms an extremely unstable substance (cf. Ann. 265, 208). Basic collidine *chloromercurate*, $\text{C}_8\text{H}_{11}\text{N}\cdot\text{HgCl}_2$, m. 155°; collidine *perchlorate*, m. 233°. Cautiously heated with concd. HNO_3 , pyridinebetaine (k) is converted into pyridinebetaine nitrate (J. prakt. Chem. 43, 280); heated for 4-5 hrs. with concd. HNO_3 at 180° in a closed tube, (a) is obtained. (k) heated at 250° with P + HI also gave (a). Sn + HCl also failed to reduce (k). In an attempt to prep. α,α' -tetramethylpyrrolidine (l) from $(\text{HOCMe}_2$

$(CH_3)_2$, $ZnCl_2 \cdot NH_3$ was used, heating at 200° for 2 hrs.; the amt. of (I) was very small, for another compd. accompanied it, which was probably α, α' -tetramethyltetramethylene oxide, $CH_3 \cdot CMe_2 \cdot O \cdot CMe_2 \cdot CH_3$.

NORMAN A. SHEPARD.

Preparation of methylamine. II. S. ISONO. *J. Pharm. Soc. Japan* 1915, No. 397, 209; cf. *Ibid* 1911, No. 356, 678.— $MeNH_2$ is formed in 60% yield on heating $NH_4CH_2SO_3H$ (a) at 180 – 190° . The melt is dissolved in H_2O , the soln. filtered from S, made alk. with NaOH and then distd. into HCl. The HCl soln. is evapd. to dryness and the $MeNH_2 \cdot HCl$ extd. with abs. alc. This amine is also obtained, in the form of $MeNH_2SO_3H$, when a concd. soln. of $HOCH_2SO_3NH_4$ is heated with NH_4HSO_4 at 145 – 50° . (a) is also formed and is considered as the primary product of the reaction. (a) was isolated in two distinct cryst. forms: hexagonal prisms, m. 192 – 3° , previously described (cf. *Chem. Zentr.* 1905, I, 990), and groups of rhombic leaves, m. 182 – 3° . In a finely pulverized state, both forms m. 177 – 8° . When either $(CH_3)_3N_4$ or a mixt. of HCHO and NH_4Cl are shaken with Pt black and H_2 , Me_3N is chiefly formed (60%), with a little $MeNH_2$ and Me_2NH (together about 10%).

NORMAN A. SHEPARD.

Preparation of formic and oxalic acids. SHOSAE MON KEIMATSU AND BUNJI IKEDA. *J. Pharm. Soc. Japan*, 1915, No. 399, 499.— HCO_2Na is formed in 79% yield when CO acts on 1 part each of pulverized NaOH and MgO at high temp., even when the gas is not applied under pressure. NaOH-MgO has the advantage over soda-lime that it does not cake at high temps., thus allowing the interruption of the process at will, a thing impossible in the soda-lime process, where the stirring must be continuous. After complete absorption of the CO, it is only necessary to treat with H_2O , filter from the MgO, and evap. to dryness. Where $(CO_2H)_2$ is to be prepd. from this product, crude NaOH may be used in prepg. the HCO_2Na , but the MgO must be first removed, for with the HCO_2Na -MgO mixt. the formation of $(CO_2H)_2$ is very incomplete.

NORMAN A. SHEPARD.

Commercial chrysarobin. ROBERT EDER. *Zurich. Arch. Pharm.* 253, 1–32 (1915).—The investigation was confined to expts. with oxidation products of chrysarobin (A). Fifty g. Merck's (A) triturated with a little 1% NaOH was washed into a cylinder with 1000 cc. of the same soln. Air was then passed through the mixt. some hrs. at the ordinary temp., whereby a large part of (A) dissolved with a deep red color. The presence of H_2O_2 could be detected in the liquid. The mixt. was next filtered and the insol. portion again treated with fresh 1% NaOH and air, followed by filtration as before. This procedure was continued until only faintly reddish caustic liquors resulted. The sol. portion of oxidized (A) proved to be frangula emodin (about 0.2%) and methoxylated chrysophanic acid (about 32%), of which some 29% consisted of emodin mono-Me ether and 71% chrysophanic acid. Triacetylemodin m. 197° . That portion of oxidized (A) insol. in cold 1% NaOH consisted of 28% dark violet to brownish amorphous secondary oxidation products and 18% dehydroemodinanthranol

mono-Me ether (B), $HO \cdot C_6H_3 \cdot \begin{array}{c} \diagup C \\ \diagdown O \end{array} \cdot C_6HMe(OMe)OH$, isolated by acidifying

the insol. portion of oxidized (A) and subsequent washing and triturating with 10% Na_2CO_3 , evapg. to dryness on the steam bath and extg. the residue with C_6H_6 . On concn., the orange-yellow C_6H_6 soln. yielded (B), as light yellow felted needles darkening 230 – 45° , m. 250 – 6° to a shiny black green mass, sol. in 230 parts boiling C_6H_6 and 350 parts boiling AcOH, very slightly sol. in alc., ligroin and C_6H_6 , somewhat more so in acetone, easily sol. in cold concd. H_2SO_4 with orange-red color, which is unaffected by the addition of $B(OH)_3$, but on standing, or more quickly on warming, becomes green.

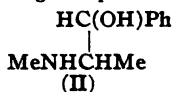
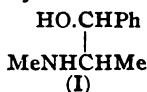
Solns. of (B) in C_6H_5N , $PhNH_2$, $PhNO_2$ also become green. HI converts (B) into emodinanthranol, nascent H ($Zn + AcOH$) into emodinanthranol mono-Me ether, m. $186-7^\circ$, $BzCl$ into a dibenzoate. Tutin and Clewer's statement to the effect that (B) darkens in soln. could not be verified. It is unaffected by Me_2SO_4 as well as hot concd. aq. NH_3 ; insol. in cold 1-2% $NaOH$, sol. in cold 5% $NaOH$ with yellow color, gradually becoming brown in contact with the air. Emodinanthranol mono-Me ether, likewise insol. in 1% $NaOH$, assimilates O on treatment with air in alk. suspension, passing thereby into emodin mono-Me ether, sol. in the alk. liquid with a red color. On similar treatment, (B) remains unchanged but is oxidized by CrO_3 to emodin mono-Me ether. The dibenzoate of (B), $C_{30}H_{30}O_6$, forms aggregates of needles from $C_6H_6 + benzine$, sinters 182° , softens 185° and remains thus without melting up to 210° , easily sol. in alc., C_6H_6 and $AcOH$, only slightly so in Et_2O , ligroin and petr. ether; reduced by Zn and boiling $AcOH$ to the emodinanthranol mono-Me ether dibenzoate, which, however, could not be prepd. in cryst. form; converted into dibenzoylmodin mono-Me ether by CrO_3 in $AcOH$, faintly yellow felted needles, m. 228° . Attempts to convert (B) into dehydroemodinanthranol by means of demethylation were unsuccessful. From the fact that (B) is a normal constituent of (A) and unaffected by air oxidation in 1-2% $NaOH$, it is found in the non-oxidized portion sep'd. by filtration. The original (A) likewise contains emodin, emodin mono-Me ether and chrysophanic acid as such or perhaps in partly reduced form as easily oxidizable anthranols. Finally, other unidentified substances very likely occur in minute quantity in the original material and later appear as dark amorphous products after the alk. treatment with air. The substances, chrysophanic acid Me ether and chrysarobol, reported by Hesse as being constituents of (A), were not found in the products of oxidation. The presence of dichrysarobin Me ether reported by Jowett and Potter is questioned. W. O. E.

2-Hydroxy-3-methoxybenzaldehyde. E. RUPP AND K. LINCK. Univ. Koenigsberg. *Arch. Pharm.* **253**, 33-41 (1915).—The aldehyde (a) recrystd. from ligroin forms bright greenish yellow needles m. $44-5^\circ$, dissolves in alk. carbonates and caustic alkalis with an intense yellow color and imparts an intense coloration to animal tissue. *Oxime*, needles, m. 121° . *Asine*, $[HO(MeO)C_6H_3CH:N]_3$, yellow needles, m. 196° . *Anilide*, $HO(MeO)C_6H_3CH:NPh$, orange needles, m. 84° . *Phenylhydrazone*, yellow needles, m. 128° . *2,3-Dimethoxybenzaldehyde*, from (a), Me_2SO_4 and $NaOH$, needles, m. $54-5^\circ$. *2-Benzoyloxy-3-methoxybenzaldehyde*, needles, m. 90° . *2-Benzsulfuryloxy-3-methoxybenzaldehyde* (b), $PhSO_3(MeO)C_6H_3CHO$, leaflets, m. 121° . *Acetoxymethoxybenzaldiacetate*, $AcO(MeO)C_6H_3CH(OAc)_2$, light yellow crystals, m. 83° , from (a) and a large excess of Ac_2O and a few drops of concd. H_2SO_4 . There is also formed in much smaller quantity an insol. compd. m. 236° , which, however, constitutes the chief product when the principal reacting substances are employed in equimol. proportions. *5-Nitro-2-hydroxy-3-methoxybenzaldehyde*, by the action of 65% HNO_3 , bright yellow needles, m. 142° . *5-Bromo-2-hydroxy-3-methoxybenzaldehyde*, yellow needles, m. 127° . Toward oxidizing agents, (a) shows great stability; if reacting at all it is usually through the OH group. *2,3-Hydroxymethoxybenzoic acid*, by the action of $KMnO_4$ on (b) in the presence of $MgSO_4$ and subsequent sapon. of the resulting *benzsulfuryloxymethoxybenzoic acid* (leaflets, m. 195°) with 3% $NaOH$, leaflets, m. 148° . *Silver salt*, white ppt. *Methyl ester*, crystals, m. $67-8^\circ$. On fusion with KOH , (a) yields quant. at about 215° the acid above. With Et_2O and $AcONa$ at $180-200^\circ$, (a) gives as the main product *2-hydroxy-3-methoxy- β -phenylacrylic lactone*, $MeOC_6H_3CH:CH.CO.O$, needles,

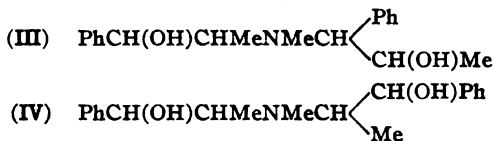
m. 89° . Na-Hg converts the lactone into *2-hydroxy-3-methoxy- β -phenylpropionic lactone*, needles, m. 107° . The *dibromo derivative*, $C_{10}H_5O_2Br_2$, satiny needles, m. 165° .

W. O. E.

Ephedrine and pseudoephedrine. ERNST SCHMIDT. Univ. Marburg. *Arch. Pharm.* **253**, 52-61 (1915).—I. **Phenylmethaminopropane.** According to a previously enunciated assumption and in harmony also with views entertained by Gadammer, the reversibility of the reaction involved in the change of ephedrine (I) into pseudo-

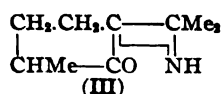
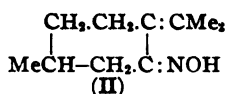
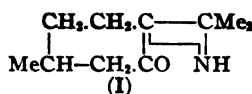


ephedrine (II) is conditioned upon a mol. rearrangement. This view finds further substantiation in the behavior of phenylmethaminopropane toward HCl. The hydrochloride $\text{C}_{10}\text{H}_{15}\text{N} \cdot \text{HCl}$ of this slightly *d*-rotatory base (from either ephedrine or pseudoephedrine) becomes stable after heating with 10 vols. 25% HCl 12 hrs. in a tube at H_2O bath temp., leaflets or plates from boiling acetone, m. 172° , $[\alpha]_D^{25} 17.8^\circ$ (0.2766 g. in 25 cc. H_2O); chloroplatinate, large reddish yellow needles from dil. HCl, m. $208-9^\circ$; aurate, large shiny needles from dil. HCl, m. 126° . II. **Methylephedrine methohydroxide.** Former expts. demonstrated that this compd. (a) on distn. suffers decompn. in accordance with the equation: $\text{PhCH(OH)CHMeNMe}_2\text{OH} = \text{NMe}_3 + \text{C}_9\text{H}_{10}\text{O} + \text{H}_2\text{O}$. The product, $\text{C}_9\text{H}_{10}\text{O}$, proved to be a mixt. of EtBz and phenylpropylene oxide, most of the latter, however, taking up H_2O with the formation of phenylpropylene glycol. On taking up the investigation anew, Eberhard found that even at the ordinary temp. (a) in aq. soln. yields some methylephedrine according to the equation: (a) = $\text{MeOH} + \text{PhCH(OH)CHMeNMe}_2$, while distn. of the aq. soln. favors the reaction in much greater degree. Under the influence of aq. vapor, methylephedrine thereupon passes into ephedrine and MeOH : $\text{PhCH(OH)CHMeNMe}_2 + \text{H}_2\text{O} = \text{PhCH(OH)CHMeNHMe} + \text{MeOH}$. This reaction takes place also when methylephedrine is repeatedly evapd. on the H_2O bath with HCl. A portion of ephedrine thus regenerated unites with phenylpropylene oxide (formed as above) to yield the very stable addition product, $\text{C}_{11}\text{H}_{18}\text{O}_2\text{N}$, the amt. of which is very small compared with that of NMe_3 , methylephedrine and ephedrine. III. **Methylephedrine methiodide.** Eberhard studied the action of Na-Hg on the hot concd. soln. of this compd. and found that partial demethylation takes place with the formation of methylephredine and ephredine and at the same time decompn. into NMe_3 and phenylpropylene oxide, the latter product uniting for the most part with a portion of ephedrine to form the above-mentioned addition product, ephedrinephenylpropylene oxide, $\text{C}_{11}\text{H}_{18}\text{O}_2\text{N}$. It is not improbable that this compd., which was also prepd. directly from its components, is a mixt. of the isomers (III)



and (IV), for the reason that the m. p. of the H_2O -sol. hydrochloride lies between 142 and 148° . Ephedrinephenylpropylene oxide is a tertiary base containing 2 OH groups, crystg. from alc. or Et_2O in plates, m. 125° , very slightly sol. in H_2O and having an alk. reaction, stable towards 25% HCl and Na-Hg . The hydrochloride, $\text{C}_{11}\text{H}_{18}\text{O}_2\text{N} \cdot \text{HCl}$, cubical or plate-like crystals sintering $146-8^\circ$, m. $155-6^\circ$ (feeble effervescence). The aurate, $\text{C}_{11}\text{H}_{18}\text{O}_2\text{N} \cdot \text{HCl} \cdot \text{AuCl}_3$, pale yellow needles, m. $144-5^\circ$. W. O. E.

The anhydrohydroxylamino compounds of unsaturated ketones. L. FRANCESCONI AND G. SANNA. *Ist. chim. farm., Cagliari. Gazz. chim. ital.* **45**, I, 35-41 (1915).—Pulegonehydroxylamine (a) gives, by the loss of H_2O , as was shown by Semmler (*Ber.* **37**, 950), anhydropulegonehydroxylamine, to which S. assigned the formula of an NH base (I). Similarly, Harries (*Ber.* **31**, 1380) obtained an anhydro compd. from



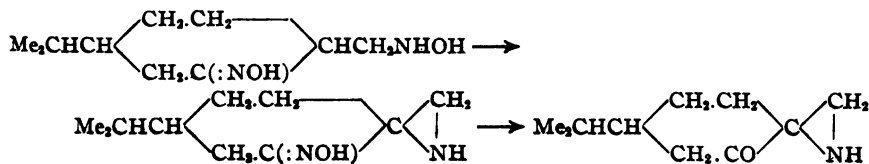
diacetonehydroxylamine which he considered to be trimethyldihydroisoxazole, $\text{NH.CMe}_2\text{CH:CMe.O}$. Since santolinone, the constitution of which is similar

to that of pulegone (*Gazz.* 44, II, 150), gives an NH base under similar conditions, it seems to be a general property of the NHOH compds. of α,β -unsatd. ketones, the double bond of which is outside of the nucleus, to give anhydro bases. Moreover, it was found that such anhydro bases may also be prepd. by H.'s method and that his isooxazole is an NH base. Likewise it was found that several NHOH compds. undergo a mol. rearrangement under the action of HCl in Et_2O to give a ketoxime. (a) was prepd. according to Bekmann's method by heating pulegone in Et_2O -EtOH with the calcd. amt. of $\text{NH}_2\text{OH.HCl} + \text{NaHCO}_3$ for 2 hrs., m. 157° . (a) treated in Et_2O with dry HCl gas gives a small amt. of the base obtained by Semmler as was shown by its index of refraction, its solubility, its odor, its picrate, etc. A secondary reaction also takes place. When the action of HCl is more prolonged the anhydro base is no longer obtained but a mixt. of oily bases, a solid and the free ketone. The pulegone was removed by distn. and the red-brown residue in EtOH sepd. crystals, m. $117-8^\circ$, which, decompd. with NaHCO_3 , gave crystals m. 157° , and finally some prismatic crystals, m. 141° , which do not reduce Fehling soln. except after treating with HCl, which does not give a NO compd. with HgO like hydroxylamines and hydroxylamino oximes, and which seems to be the normal pulegone oxime (II). This compound will be discussed further in a later paper. Camphorophorone in Et_2O -EtOH boiled with $\text{NH}_2\text{OH.HCl} + \text{NaHCO}_3$ gave camphorophoronehydroxylamine (b), m. 20° . (b) in Et_2O with HCl gas gives anhydrocamphorophoronehydroxylamine (III), an oil with the odor of conine, more sol. in cold than hot H_2O , sol. in org. solvents, reduces Fehling soln. only on heating, shows many reactions of alkaloids, does not react with HgO and is optically inactive; hydrochloride, non-cryst.; picrate, crystals with difficulty. Trimethyldihydroisoxazole has therefore by analogy not the formula given above but is an NH base, anhydrodiacetonehydroxylamine, $\text{NH.CMe}_2\text{CHAc}$. On standing with H_2O (III) goes over apparently

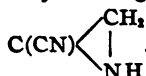
into camphorophorone oxime, m. 115° ; oxalate, m. 170° .

E. J. WITZEMANN.

The formula of santolinone. L. FRANCESCONI AND N. GRANATA. Univ. Cagliari. *Gazz. chim. ital.* 45, I, 167-81 (1915).—It was shown that α -santolinone is optically inactive through racemism (*C. A.* 9, 1040). In the proof of this the behavior of the hydroxylamine oxime and oxime with dil. acids was utilized. The action of acids on these derivs. has been used for reobtaining the ketone for the majority of hydrocyclic ketones. The NH_2OH is first eliminated from the double bond and then by hydrolysis the ketone is regenerated from the oxime. With α -santolinonehydroxylamine oxime (a), however, this action takes place quite differently and is similar to the effect on pulegonehydroxylamine. Of the simple ketones, $\text{C}_{10}\text{H}_{16}\text{O}$, the NH_2OH deriv. of pulegone alone is known. It is a bicyclic base, more sol. in cold than hot H_2O , is a weak base and its hydrochloride loses HCl easily and reduces Fehling soln. and AgNO_3 in the cold. The decompn. of (a) is gradual, thus:



and an oily imine is formed. When the intermediate imine oxime is treated further with acid, the nucleus to which the oxime group is attached is opened and a mol. of H_2O is eliminated with the formation of an anhydrohydroxylamine oxime, which has ordinary reducing powers and which is probably a nitrileimine, $CH_3:C(CHMe)_2CH_2CH_2-$



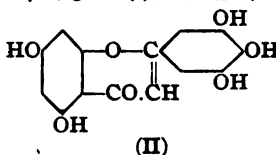
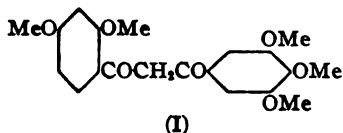
A careful comparison of the properties of the various derivs. of pulegone and those of α -santolinenone (b) confirms the similarity of these compds. and the structure previously assigned (l. c.). This structure, $Me_2CHCH \begin{array}{c} \diagup CH_2CH_2 \\ \diagdown CH_2CO \end{array} C:CH_2$,

takes into account the facts (1) that (b) gives a NH_2OH deriv. directly and must therefore have a double bond in the α,β -position with respect to the CO. (2) it gives an oxime and must have the double bond in a position which is stable to the action of alkali, as in pulegone, which gives isopulegone oxime instead. (3) The hydroxylamine oxime compd. must have the CO in the nucleus according to Harries' rule so that (b) is a ketone and not an aldehyde. (4) The NH_2OH compd. gives a colorless oxime by oxidation and must have the $NHOH$ group on a primary or secondary C atom, and since it is not eliminated directly it must be outside of the nucleus which is in accordance with the analogous behavior of the same deriv. of pulegone. (5) It does not give the NH_2OH compd. directly; so the C outside of the ring is not tertiary but secondary or primary, which agrees with (4). (a), $C_{10}H_{17}:(NOH)NHOH$, forms transparent, hexagonal prisms, m. 190° with evolution of gas and partial crystn. It m. again about 260° . In the fusion simultaneous oxidation and reduction occur and an amino oxime and a dioxime are formed. The aq. soln. reduces Fehling soln. slightly but the EtOH soln. more energetically. (a) in EtOH + Et_2O with $(CO_2H)_2$ in Et_2O ppts. slowly the oxalate of (a), m. 222° (decompn.). 0.70 g. (a) in 100 cc. of 12% KOH + BzCl sepd. the dibenzoyl derivative of (a), $C_{24}H_{28}O_4N_2 \cdot 0.5H_2O$, m. $127-9^\circ$ or, anhydrous, 134° ; sapond. by alkalis to give BzOH + (a). α -Santolinenoneaminooxime (c), $H_2NC_{10}H_{17}NOH$, and α -santolinenone dioxime (d), were obtained on heating (a). They were sepd. by treating with cold EtOH from which (d) seps. On concg. the EtOH soln. and treating with Et_2O (c) was sepd. as large crystals, m. 155° ; it forms a hydrochloride, m. 246° (decompn.), for which analytical data lie between those of the mono- and dihydrochloride. (d), $C_{10}H_{16}(NOH)_2$, m. 260° ; its dibenzoyl derivative, m. $157-8^\circ$. (a) in alc. reduces HgO and gives a dioxime identical with (d). It was thought that on treating (a) with acids the ketone or oxime would be readily obtained but the result was not so simple. 5 g. (a) + 50 cc. concd. HCl + 50 cc. H_2O were heated for 14 hrs. under a reflux condenser; the yellow soln. was concd. *in vacuo*, dissolved in Et_2O , treated with Na_2CO_3 , distd. with steam and the residue extd. with Et_2O , which sepd. prismatic crystals of what was found to be α -santolinenonenitrileimine (e), $C_{10}H_{16}N_2$. It instantly reduced Fehling soln., $NH_3 \cdot Ag_2O$ or HgO soln. in the cold. With Na phosphomolybdate it gives a green and shortly afterwards a blue coloration, which is obtained at once in the presence of NH_3 . When (e) was sepd. by treating the soln., concd. *in vacuo*, with a little H_2O , then treated with Na_2CO_3 and extd. with Et_2O , the last Et_2O exts. concd. and taken up with H_2O , α -santolinenoneiminoxime, $C_{10}H_{18}ON_2$, sepd. as small granules or cruciform crystals, m. $169-72^\circ$, reduces Fehling soln. with difficulty, but readily even in the cold if previously treated with HCl; it is not pptd. with Na phosphomolybdate nor does it give any color, but on adding NH_3 a blue coloration is produced. Its reducing powers are weaker than those of the hydroxylamine oxime or of the anhydrohydroxylamine oxime. When 3 g. (a) were heated 6 hrs. with 1 cc. of 50% HCl α -santolinenoneimine, $O:C_{10}H_{17}:NH$, was obtained as a yellow oil which in aq. soln. showed the characteristic odor of nicotine bases. Gentle warm-

ing of the cold satd. soln. even by the hand causes the liquid to become milky, the base sepg. in colorless oily drops having a d. almost the same as that of the soln. As the soln. cools the turbidity disappears and the drops redissolve. It reduces AgNO_3 , HgO and with difficulty hot Fehling soln. and shows many characteristic alkaloid reactions. The base formed by the action of acids on pulegonehydroxylamine shows similar properties.

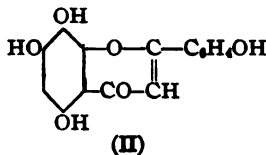
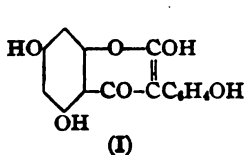
E. J. WITZEMANN.

Pentahydroxyflavone. G. BARGELLINI AND LYDIA MONTI. Univ. Rome. *Gazz. chim. ital.* 45, I, 64-9(1915).—By a method analogous to that used in the transformation of chalcones into hydrochalcones (*C. A.* 9, 447) B. and M. have tried to convert flavones into flavanones. But neither in the case of 1,3,3',4',5'-pentahydroxyflavone (II), which was mainly studied, nor with the other flavones was a positive result obtained. It is hoped that (II) may be converted into myricetin, the flavanol corresponding to (II), and its synthesis will be attempted later on by the use of trimethylgallic aldehyde. (II) was obtained by demethylating 2,3,6,3',4',5'-hexamethoxybenzoylacetophenone (I) and by the loss of 1 H_2O from the corresponding hexa-HO deriv. 2,4,6-(MeO) $_3$ - $\text{C}_6\text{H}_3\text{Ac}$ + Me trimethylgallate with metallic Na at 140° , gave (I), $\text{C}_{21}\text{H}_{24}\text{O}_8$, as white



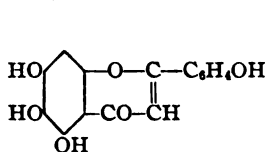
crystals from dil. EtOH, m. $102-4^\circ$, after drying at 100° m. $136-8^\circ$, sol. in EtOH, C_6H_6 and CHCl_3 , gives a red coloration with FeCl_3 and gives (II) on warming with strong HI. (II), purified by way of its Ac deriv., was obtained as a cryst. powder from dil. EtOH, contains H_2O of crystn., which is only lost completely at 110° , blackens and decomps. above 270° , insol. in C_6H_6 , acetone, Et_2O , etc., gives an orange-red soln. in NaOH, a yellow soln. in concd. H_2SO_4 , a green-brown color in FeCl_3 soln., apparently gives the tri-Me ether with $\text{MeI} + \text{KOH}$. The pentaacetyl derivative, $\text{C}_{24}\text{H}_{20}\text{O}_{12}$, sepd. as white needles from EtOH, m. $216-8^\circ$, sol. in EtOH and C_6H_6 . E. J. WITZEMANN.

Constitution and synthesis of scutellarein. G. BARGELLINI. Univ. Rome. *Gazz. chim. ital.* 45, I, 69-80(1915).—Scutellarein occurs in plants of the genera *Scutellaria*, *Galeopsis* and *Teucrium*. Goldschmidt and Zerner (*C. A.* 5, 1750) found it as $\text{C}_{21}\text{H}_{18}\text{O}_{12}$, yellow needles which in 30-40% H_2SO_4 give by hydrolysis scutellarein (a), $\text{C}_{18}\text{H}_{16}\text{O}_8$, and glucuronic acid. (a) gives yellow crystals m. about 300° (decompn.) which, heated with KOH at 200° , gives $p\text{-HOC}_6\text{H}_4\text{CO}_2\text{H}$ and a phenol that gives the pine reaction for phloroglucinol. Thus (a) seems to be 1,3,4-trihydroxyflavanol and since it is not identical with camphorol G. thought that (a) might be (I). G. and Z. were able to prep. the tetra-Ac (m. $235-7^\circ$), tri-Me ether (m. $189-90^\circ$), the acetyl tri-Me ether (m. $167-9^\circ$) and the tetra-Me ether (m. $158-60^\circ$) derivs. Heating (a) with 12% KOH gave $p\text{-HOC}_6\text{H}_4\text{Ac}$ almost quant. which shows (a) to be a flavone. The poly-OH compd. formed at the same time was thought to be 1,2,3,5- $\text{C}_6\text{H}_3(\text{OH})_4$ (b) so that (a) is thus (II) or (III). (b) gives the pine chip reaction of phloroglucinol.

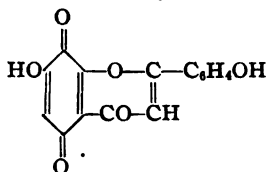


(a) gives a green color with $\text{Ba}(\text{OH})_2$. B. observed that 2,5,1,3- $\text{C}_6\text{H}_3(\text{OH})_3(\text{OMe})_2$ gives a green color with alks. and became interested in the synthesis of (a). By apply-

ing v. Kostanecki's synthesis of flavones to 2,3,4,6-(MeO)₄C₆HAc and Me anisate plus Na, B. obtained 2,3,4,6,4'-pentamethoxybenzoylacetophenone (c) which was demethylated with HI and by loss of H₂O gave the tetrahydroxyflavone which, acetylated, purified as such and, sapond., gave the flavone identical with (a). The tetra-Ac derivs. of the natural and synthetic products are identical. B. tried to obtain the derivs. in pure form but could not do so owing to the lack of material. It was shown that (a) is either (II) or (III). It is possible that both are formed but only one has been isolated.



(III)



(IV)

B. oxidized apigenin (1,3,4'-trihydroxyflavone) with CrO₃ (cf. Nierenstein-Wheldale, C. A. 6, 751) and obtained a red substance, probably an oxidation product (IV) (analogous to chryson and quercetone obtained by N. and W. from chrysin and quercetin) which he hopes to convert by acetylation to the tetrahydroxyflavone deriv. and thus det. whether (II) or (III) represent the constitution of (a). 5 g. 2,3,4,6-(MeO)₄C₆HAc + 10 g. Me anisate + 1 g. Na gradually were heated at 125-35° 15-30 mins. The product in H₂O acid with AcOH was extd. with aq. NaOH (15 g. per 400 cc.), CO₂ was passed through and a pasty red-yellow ppt. was formed. This, boiled in EtOH with animal charcoal, gave on adding H₂O, 4 g. of pure yellow crystals of (c), m. 104-6°, insol. in H₂O, sol. in C₆H₆, acetone and EtOH, gives a red color with alc. FeCl₃. 2 g. (c) + 20-25 cc. HI (d. 1.7) heated under a condenser seps. the flavone. After 2 hrs. the whole is thrown into NaHSO₃, filtered and washed. (a) thus obtained could not be recrystd. from organic solvents. 1 g. crude (a) + 2 g. NaOAc + 10 g. Ac₂O boiled 2 hrs. sepd. the tetraacetyl derivative of (a), recrystd. from AcEt as white needles, m. 235-7°. 1 g. of this sapond. by heating with 10 cc. HI sepd. the flavone which, after treating as before, was dissolved in MeOH and gave some impure yellow crystals. Better results were obtained by dissolving in AcOH and pptg. with H₂SO₄ as the sulfate which, washed on the filter, was decompd. and, recrystd. from MeOH, gave yellow laminas of (a). The tetrahydroxyflavone thus obtained showed all the characteristics of natural scutellarein as previously described by Molisch, G. and G. and Z. The sulfate is C₁₆H₁₀O₈.H₂SO₄. The formation of these salts is characteristic of colored org. substances and especially flavones containing 2 adjacent OH's in the same C₆H₄ nucleus.

E. J. WITZEMANN.

Derivatives of 1,2,3,5-tetrahydroxybenzene. G. BARGELLINI. Univ. Rome. Gazz. chim. ital. 45, I, 85-90(1915).—In continuing the earlier expts. (C. A. 5, 3806) on the C₆H₂(OH)₄ derivs. B. has prepd. some derivs. of 1,2,3,5-C₆H₂(OH)₄ in the hope that compds. of the apiole type could be obtained from these. The latter were not obtained but B. thinks compds. similar to those obtained may still occur in plants. 1,2,3,5-C₆H₂(OMe)₄ (a) (b. 270-1°, m. 47°) was obtained by converting 1,2,3-C₆H₂(OMe)₃ into dimethoxyquinone and reducing to dimethoxyquinol under conditions previously described (l. c.). This with PrCl + AlCl₃ in CS₂ gives both 2,3,4,6-tetrahydroxypropiophenone trimethyl ether (b), C₁₂H₁₆O₈, yellow prismatic crystals, m. 124-6°, sol. in alkalis, insoluble in H₂O, sol. in EtOH and C₆H₆, gives a yellow-brown color with FeCl₃, sol. in concd. H₂SO₄ with yellow coloration and warming gives a dark violet color; and 2,3,4,6-tetramethoxypropiophenone, C₁₂H₁₆O₈, white crystals, m. 55-6°, is formed from the preceding with Me₂SO₄, insol. in H₂O and alkalis, sol. in org. solvents, sol. in concd. H₂SO₄ with yellow, and, on warming, dark violet

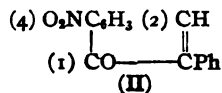
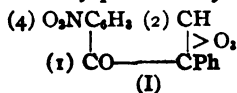
coloration. The *acetyl derivative* of (b) was obtained as white needles, m. 73-4°. (a) in CS₂ with BzCl + AlCl₃ gives both 2,3,4,6-tetrahydroxybenzophenone trimethyl ether (c), C₁₈H₁₈O₈, and 2,3,4,6-tetramethoxybenzophenone (d), C₁₇H₁₈O₆. (c) was obtained as needles from EtOH or ligroin, m. 87-9°, sol. in alkalis, gives a red-brown coloration with FeCl₃, a red, then green color with concd. H₂SO₄, which on warming is first green, then dark violet. (d) sepd. from dil. EtOH as white crystals, m. 125-6°, insol. in alkalis, concd. H₂SO₄ gives a red, then yellow soln., but on warming it is dark green. The *acetyl derivative* of (c), C₁₈H₁₈O₈, sepd. from EtOH as crystals, m. 130-2°.

E. J. WITZEMANN.

Coumarin. G. BARGELLINI AND LYDIA MONTI. Univ. Rome. *Gazz. chim. ital.* 45, I, 90-8(1915).—It is known that when persulfate acts on PhOH in alk. soln. in the cold a new OH enters the ring to give *p*-C₆H₄(OH)₂, but if the *p*-position is occupied it goes into the adjoining position. The latter was observed a number of times by B. and Aureli (*C. A.* 6, 992) with peonol. B. and M. have now studied the action of persulfates on coumarin in which the OH is combined with the CO₂H, but since in alk. soln. the lactone is opened the action is really on the alkali salt of *o*-hydroxycinnamic acid. Thus coumarin should give 2,5-(HO)₂C₆H₃CH:CHCO₂H or the corresponding coumarin (a). In the same conditions 4-methoxycoumarin (b) gives 4-methoxy-5-hydroxycoumarin (c), which is identical with the monomethyl ether of aesculetin (d), m. 184°, which was obtained by Tiemann and Will (*Ber.* 15, 2075(1882)) by partial methylation of (d). Scopoletin is also a monomethyl ether of (d) but since it is not identical with (c) it must be 4-hydroxy-5-methoxycoumarin. 5 g. coumarin in 15 cc. of 40% KOH dild. to 150 cc. + 1 g. FeSO₄ in H₂O and 15 g. powdered K₂S₂O₈ gives a red-brown soln. after 24 hrs. at room temp., which, acidified with dil. H₂SO₄, extd. with Et₂O, etc., gave (a) as yellowish needles from HCl-H₂O, m. 248-50° (decompn.); *acetyl derivative*, C₁₁H₈O₄, white needles from dil. EtOH, m. 147-8°. 1 g. (a) + 0.4 g. KOH in 25 cc. MeOH + 3 g. MeI heated for 2 hrs. gave, when thrown into H₂O, 5-methoxycoumarin, white flat needles, m. 102-3°. Umbelliferone + MeI + KOH as above gave (b), leaves from H₂O or dil. EtOH, m. 114-5°. When oxidized with persulfate, etc., as above, (b) gives (c) as yellow-white crystals from H₂O, m. 184°; the aq. soln. gives no coloration with FeCl₃; the *acetyl derivative* of (c), C₁₁H₁₀O₆, was obtained as white needles from dil. EtOH, m. 164-5°. (c) treated with MeI + KOH gave 4,5-dimethoxycoumarin as white needles, m. 142-3°.

E. J. WITZEMANN.

The constitution of phenyl-*m*-nitroindone. M. BAKUNIN AND T. ANGRISANI. Univ. Naples. *Rend. accad. sci. fis. mat. Napoli* 20, 181-4(1915); *Gazz. chim. ital.* 45, I, 160-4(1915).—Phenyl-*m*-nitroindone (a), m. 118°, was prepared from phenyl-*m*-nitrocinnamic acid, m. 195°, by the action of P₂O₅ on its CHCl₃ soln. The constitution was detd. as before (*C. A.* 7, 78) by treating it with O₃ in CHCl₃ (free from EtOH). A Siemens-Halske ozonizer (type O.T.W.3) and O₂ containing 7% O₃ were used. 3 g. (a) were used and the rose soln. became pale yellow. The soln. was turbid owing to the presence of a small amt. of a substance that m. above 300°, and which is insol. in ordinary solvents and is not changed by H₂O or Na₂CO₃. The residue from the CHCl₃ soln. gave the calcd. amt. of a syrupy mass. This, boiled with Na₂CO₃, dissolved in part and in the insol. part the substance that m. above 300° was found. The soda soln. acidified with HCl, evapd. and extd. with petr. ether, gave BzOH, m. 121°. The C₆H₅ ext. gave crystals from H₂O, m. 133-4°, which were shown to be 2,4-OHC(O₂N)-C₆H₃CO₂H (b) by oxidizing with KMnO₄ to 4-nitrophthalic acid, m. 161°. The BzOH and (b) are evidently produced by the hydrolysis of the ozonide of the indone (I) and



(a) has the constitution (II). In order to isolate the products of ozonization the product was treated with boiling H_2O . Both $BzOH$ and (b) were sepd. The compd. that m. above 300° was isolated (comp. = (a) + H_2O_2), as well as a 2nd more sol. compound, needles, m. 214° (C 57.06, and H 3.3%, which correspond closely with the comp. of the perozonide of (a)). Another compd., amorphous powder, m. 180° (not sharp), was isolated of which the comp. corresponded to the ozonide of (a) or (I). The ozonide and perozonide were not satisfactorily isolated. E. J. WITZEMANN.

The constitution of phenyl-*p*-nitroindone. M. BAKUNIN AND A. KOSSINOVA. Univ. Naples. *Rend. accad. sci. fis. mat. Napoli* 20, 178-81 (1914); *Gazz. chim. ital.* 45, I, 164-7 (1915).—Phenyl-*p*-nitroindone (a), prepd. from phenyl-*p*-nitrocinnamic acid, m. 147° , by the action of P_2O_5 in $CHCl_3$, rhomboidal red laminas, m. 217° . Its small solubility in solvents made mol. wt. detns. impossible. The presence of the double bond was detd. as before by prepg. the ozonide. 30 g. (a) suspended in $CHCl_3$, treated 30 hrs. with O_3 and evapd., gave a syrupy substance. By treating again with $CHCl_3$, 15 g. of an easily sol. substance was sepd. which proved to be 2,5-OHC(O_2N) C_6H_4 CHO (b), m. 161° (Wegscheider, *Monatsh.* 24, 805), as was shown by oxidizing it in 20% Na_2CO_3 with 0.66 mol. of 6% $KMnO_4$ to 4-nitrophthalic acid. Another portion of the ozonization product contained $BzOH$ which was sepd. with petr. ether and then with C_6H_6 . More (b) was isolated from the part less sol. in C_6H_6 . The portion of the syrupy residue more sol. in C_6H_6 contained a compd. of the comp. of the ozonide as was shown by analyses and by boiling a short time with H_2O which gave a mixt. of $BzOH$ and (b) which were isolated. This ozonide could not be obtained as a solid like that of the *o*-deriv. It was thus shown that (a) is $(5)O_2NC_6H_4(2)CH:CPh.CO$, which indicates the

manner of its formation. Another portion of the ozonized indone was gently boiled with Na_2CO_3 and gave *p*- $O_2NC_6H_4CO_2H$ and *p*- $O_2NC_6H_4CHO$ (m. 105°), besides the compds. isolated above. E. J. WITZEMANN.

Symmetrical diaminotetrazine. IV. G. PONZIO AND C. GASTALDI. Univ. Sassari. *Gazz. chim. ital.* 54, I, 181-3 (1915).—The prep. of $N:(H_2N)C:N:N.C(NH_2):N$

(a), from aminoguanidine-HCl (b), $CH_2N_4.HCl$, has been described (*C. A.* 8, 80, 2691). The prepn. of (a) by the decompn. of aminoguanidine bicarbonate (c), $CH_2N_4.H_2CO_3$, by heat is described. 1 mol. (c) = $(H_2N)_2C:NNH_2 + H_2O + CO_2$. 2 mols. $C(NH_2)_2:NNH_2$ give 1 mol. *N-v-dihydro-C-diaminotetrazine* (d), $N:C(NH_2).NH.NH.C(NH_2):N$,

and (d) by the action of atm. O is oxidized to (a). For this purpose (b) was mixed with excess $NaHCO_3$ in a mortar and warmed in a dish on the H_2O bath. After 1 hr. the product was treated with dil. AcOH and on the addition of HNO_3 the nitrate of (a), $C_2H_4N_6.HNO_3.0.5H_2O$, seps., m. $180-2^\circ$. By adding NH_3 the free base (a), m. $204-5^\circ$, was obtained. The yield of (a) is small because most of the aminoguanidine (e) remains unchanged. When the bicarbonate of (e) was heated at 100° the yield was less than when (b) + $NaHCO_3$ were used. A cold concd. soln. of (a) treated with HBr gives the *hydrobromide*, yellow laminas, decomp. in the air, explodes at 120° . A concd. aq. soln. of $KHCO_3$ treated with a soln. of a salt of (a) ppts. the *bicarbonate* of (a), $C_2H_4N_6.H_2CO_3$, yellow laminas, decomp. 100° to give (a) + CO_2 . It is better obtained by passing CO_2 into a cold aq. soln. of (a).

E. J. WITZEMANN.

Action of nitroso derivatives on unsaturated compounds. LUIGI ALESSANDRI. Florence. *Atti accad. Lincei* 24, I, 62-7 (1915).—In an earlier study (Angeli, *et al.*, *C. A.* 4, 2457) of the action of $PhNO$ on unsatd. compds. its action on saffrole was studied. $CH_2O_2C_6H_4CH:CH.CH:N(:O)Ph$ (a) was obtained. This is the *N-Ph*

ether of $\text{CH}_2\text{O}_3\text{C}_6\text{H}_5\text{CH}:\text{CH}:\text{CH}:\text{NOH}$ which is formed by the action of NH_2OH on safrole. From this oxime piperonalacrolein is easily obtained and from this + PhNHOH the compd. (a) was likewise obtained. It is thought that dimol. PhNO acts on safrole to give the addition compd. $\text{CH}_2\text{O}_3\text{C}_6\text{H}_5\text{CHCH}:\text{CH}:\text{N}:(\text{O})\text{Ph}$ which then gives (a) +



PhNHOH and the latter reacts with PhNO to give azoxybenzene which was found in the products. In extending the expts. in order to det. how general the reaction is A. treated estragole, myristicin and methyleugenol with PhNO and obtained 3 yellow products that m. 165° , 180° and 154° , resp., the structure of which is like (a); they decomp. in the sunlight. Apiole (from parsley) treated with PhNO similarly gives a yellow compd., m. 137° (decompn.), unstable to KMnO_4 and contains no N. This deriv. reacts with NH_2OH to give a compd. (b), $\text{C}_{12}\text{H}_{12}\text{NO}_5$, m. 172° . The product, m. 137° , may be apiolacrolein, $\text{CH}_2\text{O}_3(\text{MeO})_2\text{C}_6\text{HCH}:\text{CHCHO}$, of which the oxime would correspond to (b). The facts that the acid $\text{CH}_2\text{O}_3(\text{MeO})_2\text{C}_6\text{HCH}:\text{CHCO}_2\text{H}$ was identified and that a colorless compd. m. about 100° , which was probably apiolaldehyde, was extd. as the bisulfite compd., lend support to this view. The explanation is further confirmed by expts. on aromatic derivs. with propenyl side chains. Asarone + PhNO give a cryst. yellow compd. (c) similar in every way to the allyl derivs. (l. c.) and with KMnO_4 it evolves PhNO . (c) seps. with solvent of crystn. which it loses completely at 125° and shows the comp. $\text{C}_{11}\text{H}_{11}\text{NO}_4$. (c) treated with NH_2OH gives a colorless oxime, m. 137° , probably identical with asarylaldoxime (Fabinyi, *Z. physik. Chem.* 12, 578). Likewise (c) hydrolyzed with dil. acid gave a product, m. $112-3^\circ$, having the properties of asrylic aldehyde. The latter reacts with PhNHOH to give back (c). Thus (c) is the N-Ph ether of asarylaldoxime, $(\text{MeO})_2\text{C}_6\text{H}_5\text{CH}:\text{N}:(\text{O})\text{Ph}$. Among the secondary products asrylic aldehyde and azoxybenzene were found. Fabinyi found a similar reaction when treating asarone with alkyl nitrite + HCl . The final product was in all cases either asarylaldoxime-HCl or asaryl aldehyde and in the latter case the N_2O evolved corresponded to the azoxybenzene found by A. in the prepn. of (c). A. believes that the PhNO may reduce some of the allyl chain to the propenyl group and thus gives rise to other side reactions and it was for this reason in part that in the case of isosafrole the N-Ph ether of piperonal could not be isolated. From the above it appears that the reaction is not always simple and that the variable yield is due to these causes. The unsuccessful expts. with rubber (l. c.) were taken up again. Powdered rubber was placed in C_6H_6 with PhNO and when the mixture became rose-yellow the liquid, sepd. by decantation and dild. with ligroin, gave amorphous yellow flocks which were taken up with ligroin and gave a friable mass, sol. in CHCl_3 , less sol. in C_6H_6 and very little sol. in CS_2 , ligroin and Et_2O , insol. in H_2O , softens with decompn. $135-40^\circ$. The product, pptd. several times from ligroin with CHCl_3 , had a comp. equiv. to that calcd. for the condensation of 1 mol. rubber with 2 mols. PhNO . It also evolved PhNO and isonitrile with KMnO_4 but seemed insensible to light. Further details on all of the above will be published later. E. J. WITZEMANN.

The constitution of triphenylaminoethyl alcohol obtained by the action of light. LYDIA MONTI. Univ. Rome. *Atti accad. Lincei* 24, I, 143-6 (1915); *Gazz. chim. ital.* 45, I, 359-62 (1915).—Paternò recently described a compd. $\text{C}_{20}\text{H}_{19}\text{ON}$ (*C. A.* 8, 2687) obtained by the action of light on a mixture of BzPh and PhCH_2NH_2 to which, on the basis of analogy, he assigned the constitution of a triphenylaminoethyl alcohol (a), $\text{Ph}(\text{NH}_2)\text{CHCPh}_2\text{OH}$. The correctness of this supposition was proved by treating some of it with NaNO_2 and AcOH to obtain the known anhydride of triphenylglycol (b), $\text{PhCH}:\text{CPh}_2\text{O}$. 2 g. (a) in 25 cc. AcOH treated in the cold with 2 g. NaNO_2 in a little

H₂O evolved gas and sepd. yellowish white crystals of (b), recrystg. from EtOH as white needles, m. 134-6°. The compd. (b) was further identified by prepg. the *acetyl derivative*, m. 101-3°. Sometimes in treating (a) with NaNO₂ + AcOH other products, m. 217-9° and 232-3°, were formed but were not studied further. Presumably the first is the *monoacetyl derivative* of (a) obtained by Paternò by the action of PhBz on PhCH₂OAc in the sunlight. The 2nd is probably a hydrocarbon obtained by Biltz (*Ber.* 26, 1957; *Ann.* 296, 242).

E. J. WITZEMANN.

Action of hydrochloric acid gas upon carbohydrates. XV. THEODOR PANZER. *Z. physiol. Chem.* 94, 10-72(1915).—A study was made of the action of HCl gas upon finely pulverized galactose, grape sugar, levulose, sucrose, maltose, lactose, starch, sol. starch and dextrin. All these seem to take up HCl and bind it chemically. By the action of H₂O upon these chem. compds. the bound Cl is easily and completely given off as HCl. The amts. of HCl taken up by the various carbohydrates are very different. In levulose and cane sugar there is a deep-seated decompn. which leads to carbonization. In the case of the other carbohydrates, aldoses and their di- and polysaccharides, the reaction seems to be comparatively simple. *In vacuo* the reaction products give up a part of the bound Cl as HCl, but a part is retained. Besides the HCl, H₂O is also probably given off *in vacuo*. This might result from the action of the HCl upon the HO groups. This needs proof, however, for oxidation processes may also be produced by the action of the HCl in the presence of O, and volatile org. or Cl-contg. compds. might then be given off *in vacuo*.

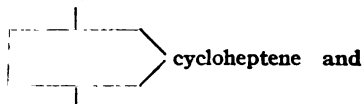
G. M. MEYER.

Action of ultraviolet rays on glycerol. HENRY AND RANC. *Giorn. farm. chim.* 62, 73(1913).—Ultraviolet rays cause the decompn. of glycerol with production of CH₂O and traces of other substances of an aldehyde nature. The decompn. takes place more readily in the presence of H₂O.

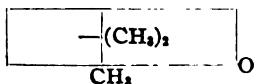
H. S. PAINE.

Simplified representation of cyclic compounds. ENRIQUE V. ZAPPI. *Anales soc. quim. Argentina* 2, 119-23(1914).—Bonds are represented by a succession of lines which limit a polygon, the number of sides of the latter being equal to the number of elements which form the ring. C is not indicated and is considered to be present at each angle of the polygon; if the compd. is heterocyclic, the extraneous elements are indicated at the proper position in the ring. Valences which are not indicated as being satisfied mutually or by substitution are considered to be satisfied by H without further representation, the valences of S and O being 2, and N and C 3 and 4, resp. in cyclic compds. Substitutions are indicated at the side of the proper angle of the polygon. When the angles of the figure become less prominent in the case of more complicated cyclic compds. certain elements may be suppressed and their existence

indicated by short lines in simpler figures, thus



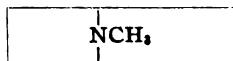
cycloheptene and



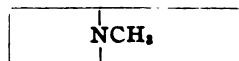
camphor. If another element is present in place of C it is

sufficient to intercalate it without adding a line, thus tropine and tropidine may be

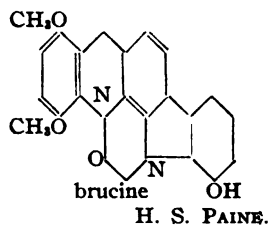
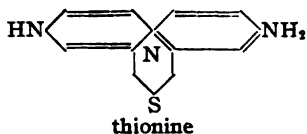
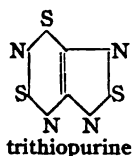
represented, resp. by



—OH and



The following examples of simplified representation will serve to illustrate the above system:

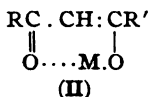
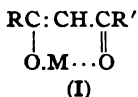


Mercury glycerophosphate. G. PRUNIER. *Boll. chim. farm.* 53, 697(1914).—Mercury glycerophosphate was prepd. by the reaction of a soln. of Hg nitrate containing HNO_3 with a 50% soln. of Na glycerophosphate. When HgNO_3 was employed a Hg' glycerophosphate containing 70.07% Hg and 5.40% P was obtained. A Hg' glycerophosphate with 54.29% Hg and 8.21% P was produced from $\text{Hg}(\text{NO}_3)_2$. Hg' and Hg'' glycerophosphates have the following formulas, resp.: $(\text{HgO})_2\text{P}(\text{:O})\text{OCH}_2\text{CH}(\text{OH})\text{CH}_2\text{OH}$; Hg  $\text{P}(\text{:O})\text{OCH}_2\text{CH}(\text{OH})\text{CH}_2\text{OH}$.

Electrolytic reduction of the quinoline alkaloids. J. A. W. BREDENBERG. *Svensk Kem. Tidskrift* 27, 5-8(1915).—An elec. current passed through H_2SO_4 solns. of the cinchona alkaloids (quinine, cinchonine, and cinchonidine) causes them to take up 2 mols. H per mol. alkaloid. B. notes in the case of cinchonine that part of the product formed in this reaction is cryst. The cryst. part has the same comp. as the amorphous part. The substance after reduction is sol. in Et_2O , by which property it is removed from the reaction mixt. The moisture is removed with fused KOH and the Et_2O distd., leaving a semi-liquid residue in which crystals formed on standing. The crystals were insol. in Et_2O and by this solvent completely sepd. from the amorphous part. Cryst. yield, 50%; m. p. 135° . B. designates it as dihydrodesoxycinchonine.

A. R. ROSE.

Chromoisomeric salts of acetoacetic ester-like phenol and enol derivatives. A. HANTZSCH. *Ber.* 48, 785-97(1915); cf. *C. A.* 9, 2095.—Sym. compds., $(\text{RCO})_2\text{CH}_2$, never form chromoisomeric enol salts while unsym. compds., $\text{RCOCH}_2\text{COR}'$, often do, forming structural isomers, $\text{RC}(\text{OM}) : \text{CHCOR}'$ and $\text{RCOCH} : \text{C}(\text{OM})\text{R}'$, which with residual affinities can be represented as "conjugated" enol salts with 6-membered rings, (I) and (II). The existence of such chromoisomers can be shown only if the



absorption of the most strongly absorbing series, at least, extends to the visible spectrum, giving a colorless form absorbing only in the ultraviolet, and a yellow form absorbing in the violet, or, if the absorption of the acid ion is sufficiently great, a more weakly absorbing yellow and a more strongly absorbing red form. In the case of a compd. like succinylsuccinic ester (a), there exist colorless and yellow monometallic and yellow and red dimetallic salts. *p*-Dihydroxy-*p*-phthalic (b) and dihydroxy-quinonedicarboxylic ester (c) likewise form yellow and red dimetallic salts; these compds. contain the structurally isomeric complexes $(\text{MO})\text{C} : \text{C} \cdot \text{CO} \cdot \text{OR}$ and $\text{O} : \text{C} \cdot \text{C} : \text{C} : \text{C} \cdot (\text{OM}) \cdot \text{OR}$ and may be designated as enol and ethoxyenol or benzoid (phenol) and quinoid (enol) salts, resp., the former being the more weakly absorbing forms. They should form 3 series of salts: dibenzoid, least absorbing or yellow; benzoid-quinoid, with medium absorption or orange; diquinoid, most strongly absorbing or red. In general, however, only the yellow and red forms have been isolated. When the chromo-

isomerism cannot be proved by direct isolation of 2 forms, it can be shown indirectly by taking advantage of the fact that all alkali and alk. earth salts of a colored acid of unchangeable constitution are "monochromic" in the solid state and give almost isospectric solns. (C. A. 8, 10); if, therefore, an acid gives alkali or alk. earth salts differing in color, this affords proof of chromoisomerism; another indirect proof is afforded if the hydrate of such an alkali or alk. earth salt differs in color from the corresponding alcoholate or other solvate; again, if the anhydrous salt differs from its solvate; and, finally, if the solid salt differs from its solns. in color. *Salts of (a)* (cf. Herrmann, *Ann.* 211, 327(1882)). The pure monoalkali salts are pptd. from an Et_2O soln. of (a) by barely 1 atom, the dialkali salts by a good 2 atoms of alc. alkali; they must be filtered and dried as quickly as possible, protected from the air. The much more stable alk. earth salts are obtained by shaking the freshly pptd. alkali salts, still in Et_2O - EtOH suspension, with the aq. alk. earth chlorides at 0° . All the monoalkali salts are colorless (Herrmann describes them as pink) but dissolve in H_2O and alc. with intense yellow color. *Dilithium salts: dialcoholate*, crimson, loses its alc. at 90° ; *dihydrate*, yellow; *anhydrous*, brick-red. *Barium: dihydrate*, light crimson; *anhydrous*, yellow. *Calcium: dihydrate*, yellow; *anhydrous*, yellow. *Magnesium: dihydrate*, red; *anhydrous*, yellow. *Salts of (b)* (obtained by Herrmann only in cinnabar-red forms): *Dilithium: dialcoholate*, cinnabar-red; *solvent-free*, yellow. *Barium: dihydrate*, red; *anhydrous*, yellow. *Calcium: anhydrous*, red. *Magnesium: dihydrate*, red; *anhydrous*, yellow. The indications in the literature that the salts of the free acid corresponding to (b) are sometimes colored are erroneous; the yellow to brownish colors observed were due to impurities, produced by rapid oxidation of the acid in alk. soln. *Salts of (c)*: Gradual neutralization of (c) gives red solns. of the monometallic salts changing to yellow solns. of the dimetallic salts; in the solid state all the salts of colorless inorg. bases, NH_4Me , NHMe , PhNH_2 , piperidine, NPr_4OH are yellow; those of NMe_3 , NPr_3 , $\text{C}_6\text{H}_5\text{N}$ and PhNMe_2 only when crystd. from H_2O alc. or Et_2O , sepg. from CHCl_3 or C_6H_6 in red solvated form. *Diammonium salt: Trimethylammonium; solvent-free*, yellow; *with 1 C}_6\text{H}_6*, red; *with CHCl}_3*, orange. *Pyridine salt, (c).2.5C}_6\text{H}_5\text{N}*, red, goes over at 60° into the *monopyridine salt, (c).C}_6\text{H}_5\text{N}*, yellow. *Tetramethylammonium salts; yellow*, pptd. in cryst. form by Et_2O from concd. alc. (c) cautiously neutralized with 33% aq. NMe_2OH ; on long standing under the liquid from which it is pptd. or after a few sec. under C_6H_6 it goes over into a *red form* which is converted back into the yellow form on warming gently or, slowly, on standing in the air. Both dissolve in H_2O with yellow color and neutral reaction.

CHAS. A. ROULLER.

Resolution of the phenylglyceric acid melting at 141° into its optically active components. C. N. RIBBER. Drontheim. *Ber.* 48, 823-31(1915).— $\text{PhCH:CHCO}_2\text{Me}$ is obtained in 97% yield from 20 g. acid in 130 cc. H_2O neutralized with solid KOH , shaken 2 hrs. with 40 cc. Me_2SO_4 (which has been washed with H_2O to remove free H_2SO_4), poured off from the aq. liquid, treated with H_2O and heated 0.5 hr. on the H_2O bath. From 20 g. of the ester in 1500 cc. alc. treated at -40° in the course of 4 hrs. with 24 g. KMnO_4 in 800 cc. H_2O is obtained 15 g. inactive phenylglyceric acid, m. 141° . To 6.0 g. morphine in 700 cc. boiling acetone is added 7.3 g. of the acid in 200 cc. acetone and the soln. concd. *in vacuo* over H_2SO_4 to 0.5 its vol.; the cryst. warts (8.8 g.) which gradually sep. are dissolved in dil. H_2SO_4 , extd. with 25 vols. Et_2O , dried with Na_2SO_4 and evapd.; the resulting acid (3.4 g.) is shaken several hrs. at 20° with 22 parts H_2O , whereby the inactive portion dissolves; the residue, after 2 crystns. from H_2O in a vacuum desiccator, gives the pure *l*-acid, while the acetone mother liquors, similarly treated, yield the *d*-acid. The *l*-acid, m. 164° ; $[\alpha]_{\text{D}}^{20}$ -39.63° , -31.42° , -30.90° for the lines D, C, E, resp., (p 3.16% in H_2O); $[\alpha]_{\text{D}}^{20}$ -40.10° (p 1.26% in

H₂O), -30.48° (p 6.28% in 97.7% alc.), -36.43° (p 7.36% in acetone). *d*-Acid, m 164°, [α]_D²⁰ 39.57° (p 3.39% in H₂O). 100 g. H₂O at 20° dissolves 9.00 g. of the *d*- and 4.10 g. of the *d*- or *l*-acid. The crystals of the active acids are monoclinic-sphenoidic with concordant angles but enantiomorphic development, $a : b : c = 2.1875 : 1 : 2.0794$, β 93°53'; observed forms, referred to the *d*-compd., a (100), m (110), m' (110), c (001), d (101), q' (112), r (102), p (102), frequent; q (112), π (212), γ (312), seldom; M (120), uncertain. The inactive crystals, which are very similar in habit, are apparently monoclinic-prismatic. The sp. gr. (1.451) is the same as that of the active forms. The inactive form is therefore probably only apparently racemic, being built up of active parts which, as indicated by the etchings obtained with alc., are larger than mol. in size. This is confirmed by the fact that addition of the active to the inactive acid in increasing amts. produces a continuous rise in the m . p., never a fall. Again, if to a satd. aq. soln. of the inactive form the *d*-acid is added, the concn. of the soln. does not change and it remains inactive, and a soln. satd. with both the *d*- and *l*-acids has the same concn. and sp. gr. as one satd. with the inactive acid. C. A. R.

Condensation of γ -ketonic acids with aldehydes. II. W. BORSCHÉ. Univ. Göttingen. *Ber.* 48, 842-9 (1915); cf. *C. A.* 8, 2164.—Unlike compds. of the type of HOCPh : CHCH₂CO₂H or its Na salt, Na levulinate (*a*) with aromatic aldehydes and Ac₂O does not give MeC : CH.C (: CHR).CO.O, but 2 mols. condense with 2 mols.

of the aldehyde with loss of 3 mols. H₂O. Thus, after several hrs. warming with BzH is obtained (in very poor yield, however) *dimolecular α -acetonylcinnamic anhydride*, [O.CO.C (: CHPh).CH₂.CMe-]₂O, yellow needles from MeOH, m . 108-9°. From

28 g. dry (*a*) heated 12 hrs. on the H₂O bath with 56 g. Ac₂O and 28 g. anisaldehyde, stirred up while still warm with 150 cc. H₂O, kneaded next day with 50 cc. alc., washed repeatedly with cold alc., finally boiled up with 50 cc. alc. and cooled, there is obtained 8.5 g. (the mother liquors yield 1.1 g. more) of the *condensation product*, C₂₂H₂₀O₇, long yellow needles from CHCl₃-EtOH, m . 137-8°; 6 g. boiled with 6 g. soda in 80 cc. alc. and 100 cc. H₂O until a clear soln. results and heated 15 min. longer on the H₂O bath gives 3.7 g. α -anisallevalulinic acid (Thiele, *Ann.* 319, 180 (1901)) and 2.2 g. of its Et ester whose *semicarbazone*, leaflets from AcOH-H₂O, m . 203-4°. From piperonal and 28 g. (*a*) is obtained 10-1 g. of the *compound* C₂₂H₂₂O₈, orange-yellow needles from CHCl₃-EtOH, m . 187°; 6 g. with soda in aq. alc. 0.5 hr. on the H₂O bath yields 2.7 g. α -piperonylidenevalulinic acid, faintly yellow prisms from C₆H₆, m . 125-6°, and 1.8 g. of its *ethyl ester*, yellowish crystals from ligroin, m . 84-5°, whose *semicarbazone*, leaflets from AcOH-H₂O, m . 212° (decompn.). The acid condenses with piperonal in alk. soln., forming α , δ -dipiperonylidenevalulinic acid, pptd. by HCl as a dark yellow amorphous tar which is quickly converted by boiling alc. into a yellowish white cryst. powder, m . 201°; when heated above its m . p., with Ac₂O containing H₂SO₄ etc., it gives 1,4-dipiperonylideneangelicalactone, red-brown needles from PhNO₂, m . 260-1°, sol. in H₂SO₄ with blue-red color; this lactone is better prepd., however, with piperonal and Ac₂O from the Na salt of δ -piperonylidenevalulinic acid, yellowish crystals from alc., m . 150°, which is obtained from 11.6 g. levulinic acid and 15 g. piperonal in 100 cc. alc. warmed a short time with 160 cc. of 5% NaOH. From 28 g. (*a*) with PhCH : CHCHO is obtained 10-2 g. of the *product* C₂₂H₂₀O₈, yellow-red needles from 80 parts alc., m . 166°, b , 166° in small amts. without appreciable decompn.; 6 g. with soda in aq. alc. after 2 hrs. on the H₂O bath gives 4 g. α -cinnamallevalulinic acid, yellowish white needles from 10 parts C₆H₆, m . 154-5°, and 0.7 g. of its *ethyl ester*, flat yellowish spears from ligroin, m . 62-3°. The acid with anisaldehyde or, better, 1-cinnamal-4-anisangelicalactone boiled 12 hrs. with soda in aq. alc. give α -cinnamal- δ -anisallevalulinic acid, light yellow needles from AcOH, m . 233-4°.

CHAS. A. ROULLER.

Cholesterol. XX. Oxidation of cholesterol acetate with chromic acid. A. WINDAUS AND C. RESAU. Innsbruck. *Ber.* 48, 851-7(1915); cf. Mauthner and Suida, *Monatsh.* 17, 594(1896).—Oxycholesterylene (*a*), prepd. by M. and S.'s method, when treated 3 days in Et₂O with Pt sponge and H, yields β -cholestane, indicating that (*a*) is a doubly unsatd. ketone containing the same C skeleton as cholesterol, whereas with Na in boiling alc. it takes up 4 atoms H, forming a new alc., *pseudocholesterol* (*b*), C₂₇H₄₆O, sepg. on the addition of H₂O to turbidity and slow cooling in needles, m. 116°, distinctly adds Br, gives the Liebermann-Burchard cholesterol test but forms no difficultly sol. digitonin addition product; *benzoate*, with BzCl in C₆H₅N, microscopic felted needles from Et₂O-alc., m. 155-6°. Converted in the usual way with PCl₅ into the non-cryst. chloride and reduced with Na and alc., (*b*) gives M.'s pseudocholestene (*C. A.* 2, 659), so that in the formation of (*b*) there must be a rearrangement or shifting of the double bonds. The acid products formed together with β -oxycholesteryl acetate in the oxidation of cholesteryl acetate with CrO₃ were distd. *in vacuo*; CO₂ and AcOH are split off and at 320° (temp. of the air bath) under 25 mm., there passes over a faintly yellow oil crystg. in the receiver; washed in Et₂O with dil. KOH, freed from Et₂O and repeatedly crystd. from alc., it yields a doubly unsatd. *hydrocarbon* (*c*), C₂₆H₄₀, needles, m. 76°, gives in the L.-B. test only a yellow-red color gradually changing to red-brown, $[\alpha]_D^{20}$ -142.9° in C₆H₆, adds only 2 atoms Br in Et₂O-AcOH, forming a *dibromide*, slender needles from acetone, m. 147°. The acid from which (*c*) is derived is therefore probably an acetate of a HO acid with 26 C atoms. With Pt sponge and H in Et₂O, (*c*) yields a mixt. of stereoisomeric *hydrocarbons*, C₂₆H₄₄ (freed from unsatd. compds. by treatment in a little Et₂O or CHCl₃ with Ac₂O and a little H₂SO₄); the satd. compds. sep. from the Et₂O in crystals m. 65°; by repeated crystn. from alc. are obtained long slender needles, m. 80°, and more sol. slender leaflets m. 55-9°; the L.-B. test is negative in both cases. Structural formulas, which, however, are not free of arbitrary assumptions, are given to represent the various changes. **XXI. Coprosterol.** A. WINDAUS and CL. UBRIG. *Ibid* 857-63; continuation of *C. A.* 8, 3442.—Coprostan, obtained from coprosteryl chloride with Na in AmOH, is different from β -cholestane but is identical with Mauthner's pseudocholestane (*C. A.* 4, 1158). W. and C. believe that the isomerism of cholestene and pseudocholestene is due to a shifting of the double bond in the addition and splitting off again of the HCl and that cholestane and β -cholestanol (*d*) differ from pseudocholestane and coprosterol (*e*) only in the arrangement of a H and a Me about the asym. C atom in the EtCHMe- chain. Repetition of Dorée and Gardner's work (*C. A.* 2, 3336) showed that when (*e*) is boiled with Na in AmOH, an equil. is established between (*e*) and pseudocoprosterol (*f*), with over 90% (*f*), and that while (*e*) gives a complex with digitonin (*f*) does not; this affords a means of quant. sepg. the isomers. When 1 mol. each of (*d*), m. 142°, and (*e*), m. 117°, in hot petr. ether are brought together, a *double compound* quickly seps. which crysts. from dil. alc. in long anhydrous needles, m. 152°; digitonin ppts. 0.5 of it, xylene extg. (*d*) from the ppt. and (*e*) from the soln. A sample of Fischer's (*e*), m. 112-6° (*Z. physiol. Chem.* 73, 232(1911)), obtained from human feces, on repeated crystn. from petr. ether yielded a small amt. of difficultly sol. material which was treated with Na and boiling AmOH to convert the (*e*) into (*f*) which is not pptd. by digitonin; the product gave with digitonin a slight ppt. from which xylene extd. pure (*d*), showing that in the human intestine cholesterol can be reduced not only to (*e*) but also to a slight extent to (*d*).

CHAS. A. ROULLER.

Homovanillin. C. HARRIES. Univ. Kiel. *Ber.* 48, 868-9(1915).—The impure oily homovanillin (*a*) described in *C. A.* 9, 1052, was repeatedly fractionated whereupon the part b_{0.24} 105-6° gradually solidified at winter temp. to a hard white cryst. mass; by seeding with this, fractions boiling even considerably lower could be made to cryst.

also; when the crystals were dissolved in warm CS_2 and cooled, a thick reddish oil sepd. on the surface and was mechanically removed; the mother liquors in a freezing mixt. now deposited pure (a) in thick prisms or leaves, m. $50-0.5^\circ$, b. $116-8^\circ$ but always leaves a thick, oily residue. The reddish oil obtained in the crystn. of (a) also gives some pure (a), together with a syrupy residue, on distn. *in vacuo*. While this oil considerably reduces Fehling soln. in the cold, the pure (a) has only moderate reducing power even on warming. Traces of acids or alkalis quickly produce resinification of (a). The derivs. prepd. from pure (a) show the same properties as those previously made from the impure substance, except that the *p*-nitrophenylhydrazone m. 154.5° .

CHAS. A. ROULLER.

Arsenobenzoic acids. A. MICHAELIS. Univ. Rostock. *Ber.* 48, 870-3 (1915). —3 g. $p\text{-HO}_2\text{CC}_6\text{H}_4\text{AsO}_3\text{H}_2$ (*Ann.* 320, 303 (1901)) in 70 cc. boiling H_2O is treated with 2 g. amorphous P and gradually with 12-3 cc. HI (d. 1.96) and heated until the liquid over the crystals which sep. is colorless; the resulting iodide, $\text{HO}_2\text{CC}_6\text{H}_4\text{AsI}_2$, seps. from CHCl_3 in yellow-red needles, m. 153° ; from its soln. in aq. soda, dil. HCl ppts. cryst. $\text{HO}_2\text{CC}_6\text{H}_4\text{AsO}_3\text{H}_2$ which, when dissolved in just the necessary amt. of hot H_2O and heated to boiling with excess of solid H_3PO_3 , yields a yellow-white voluminous ppt. of *p*-arsenobenzoic acid, $(\text{HO}_2\text{CC}_6\text{H}_4\text{As})_2$, decomp. without melting, insol. in H_2O and org. solvents. Disodium salt, prepd. by dissolving the acid in exactly the necessary amt. of dil. NaOH and concg., yellow-brown amorphous powder, sol. in H_2O with neutral reaction, difficultly sol. in dil. NaOH. *o*-Benzarsinic acid, $\text{HO}_2\text{CC}_6\text{H}_4\text{AsO}_3\text{H}_2$, prepd. like the *p*-compd., when reduced with red P and HI, evapd. to dryness, treated in H_2O with dil. NaOH to faint alk. reaction and boiled with H_3PO_3 , gives *o*-arsenobenzoic acid, more deeply yellow than the *p*-compds., melts over the free flame with formation of drops but also partial decompn. and deposition of As. Sodium salt, viscous mass solidifying with difficulty. Both acids, in the form of the Na salts, are very toxic, the *o*- more than the *p*-acid, acting chiefly on the kidneys (albumin and sugar), destroy in small doses the appetite of carniv. and herbivora, cause frequent vomiting in dogs. Sections show severe lesions of the kidneys, numerous small hemorrhagic spots in the mucous membranes of the stomach, and the liver, after long continued action, may show degenerative changes. Of the *o*-acid, amts. corresponding to 1 mg. As per kg. produce albumin and sugar in the urine of rabbits; As can be detected in the decompd. urine.

C. A. R.

New facts on aldehyde-ammonia and chloral-ammonia. OSSIAN ASCHAN. *Ber.* 48, 874-91 (1915); cf. Delépine, *Ann. chim. phys.* [7] 16, 106 (1899), and earlier papers. —A. believes that in aldehyde-ammonia $\text{MeCH}(\text{OH})\text{NH}_3$, which is probably always first formed but cannot be isolated, gives a dimol. form, $\text{MeCH}(\text{OH})\text{NH}_2(\text{OH})\text{CHMeNH}_3$, capable of existence only in soln., and the ordinary solid, trimol. form, $\text{MeCH}(\text{OH})\text{NH}_2(\text{OH})\text{CHMeNH}_2(\text{OH})\text{CHMeNH}_2$ (a), and that the compd. formed when (a) is allowed to stand over H_2SO_4 has the structure $\text{MeCH} : \text{NCHMeNHCHMeNH}_2$ (b). (a) is obtained in 56% yield when 100 g. AcH, cooled with ice-NaCl, is cautiously treated with 200 cc. com. NH_3 (0.201 g. NH_3 per cc.), then with a little Et_2O , allowed to stand 2 hrs. at room temp. and 20-4 hrs. in the ice-chest. So obtained it m. $96-8^\circ$ and after 2 weeks in a closed vessel it still m. $95-7^\circ$ and is hardly yellow after 2 months. In spite of its dissociation it dissolves in 7 parts boiling AcOEt and seps. on cooling in yellowish crystals, m. $94-6^\circ$. It crysts. best from 0.6 part H_2O . In boiling AcH (b. p. const. = 11.8, as detd. with *l*-borneol and Ph_3CO), the mol. wt. of (a) was found to be 30.9-6.5; in freezing H_2O 161-7 immediately after soln., 124-30 after 20-40 hrs. (c). cubes, m. 85° , shows in freezing H_2O the mol. wt. 110-3 immediately after soln., 91.7 after 24 hrs. As the addition of 3 mols. H_2O to (c) in CHCl_3 at once gave (a), probably the same thing occurs when (c) is dissolved in H_2O ; if the above mol. wts. are recalcd.

on this assumption they become 145-62 immediately after soln. and 131.8 in 24 hrs. In freezing C_6H_6 (c) shows a mol. wt. of 153-64; in boiling AcH , 33-6. Alanine was obtained in 8 g. yield from 25 g. AcH dropped into 48 cc. cold concd. NH_3 , allowed to stand 2 hrs. at room temp., treated with 54 g. KCN , then 200 cc. cold HCl (d. 1.19), allowed to stand overnight, filtered, concd. to 0.5 its vol., allowed to stand, again filtered, concd., cooled, treated with a little alc. filtered, dild. with H_2O , boiled with freshly pptd. $Pb(OH)_2$ until free from NH_3 , and decompd. with H_2S . In the prepn. of (a) by the old method (AcH in Et_2O with NH_3 gas) there is formed in about 20% yield a by-product, which A. believes is *dihydroxytriethylidenediimine* (d), $MeCH(NHCHMeOH)_3$, which remains in the Et_2O and after several crystns. carried out as rapidly and at as low a temp. as possible is obtained in leaves, m. 45-7°, decmps. 70-80°, quickly volatilizes at room temp., deposits (a) on long standing in Et_2O (treatment with NH_3 gas does not produce (a) appreciably faster); in closed vessels it slowly turns yellow, the yellow portion now being insol. in Et_2O and the remainder, after evapn. of the Et_2O forming an oil sol. in H_2O , with an amine odor, sol. in acids apparently without decompn. and sepd. by concd. $NaOH$. In freezing C_6H_6 (d) shows a mol. wt. of 180-93; in H_2O 123-42 immediately after soln., 98.3 after 12 hrs. Chloral-ammonia (e), prepd. by Schiff's method (*Ber.* 10, 165(1877)) or from $CCl_3CHO.H_2O$ in 5 parts cold Et_2O with excess of dry NH_3 , m. 69-72°, evolves NH_3 when stirred with cold H_2O and gradually dissolves; mol. wt. in freezing C_6H_6 , 256-350. A. thinks it has the structure $HOCH-(CCl_3)NH_2(OH)CH(CCl_3)NH_2$. When allowed to stand some days over $CaCl_2$ *in vacuo* it passes over into *dihydroxybistrichloroethylideneimine* (f), $HOCH(CCl_3)NHCH-(CCl_3)OH$, m. 51-3°, much more easily sol. in C_6H_6 and H_2O than (e), mol. wt. in freezing C_6H_6 266-316 immediately after soln., 308 after 24 hrs., in freezing H_2O 101-5; in boiling Et_2O 195-285. After 1 month in a closed vessel (f) had become sticky and when stirred with a little H_2O left a solid, m. 67-8°, whose aq. soln. did not smell of NH_3 and was not alk.; mixed with (e) it m. 55-65°. When (f) in cold C_6H_6 is treated with NH_3 and evapd. it gives (f).

CHAS. A. ROULLER.

Use of iodine as a dehydrating and condensing agent. HAROLD HIBBERT. *J. Am. Chem. Soc.* 37, 1748-63(1915).—When heated with small amts. of I, alcs. are readily dehydrated, the ease of dehydration diminishing, however, in the order: tertiary, secondary, primary alc. Possibly, just as $2 KOH + I_2 = KOI + KI + H_2O$, so here, too, alkyl iodides and hypiodites are formed which dissociate to a greater or less extent at or below their b. p. into unsatd. hydrocarbons and HI and HIO, the 2 acids regenerating I, or the iodide and hypiodite may react directly with each other: $RI + ROI = ROR + I_2$. Thus, 60 g. $EtCMe_2OH$ and 0.14 g. I heated 24 hrs. on the H_2O bath in a distg. flask yielded 27 g. $MeCH:CMe_2$, b. 35-9°; 5 g. pinacol and 0.012 g. I at 140° gave 3 g. $(CH_2:CMe)_2$, b. 69-72° (from pinacol hydrate only very poor yields were obtained); 27 g. cyclohexanol with 0.54 g. I in 60 hrs. at 170-5° yielded 21 g. distillate from which was isolated 7-8 g. pure tetrahydrobenzene, b. 82-4°. $AcCH_3CMe_2OH$ and 0.01% of its wt. of I gives 98% of crude $AcCH:CMe_2$ (a), b. 80-130° (the method can be applied to mixts. of acetone and $AcCH_3CMe_2OH$, the greater part of the former distg. over below 80°). In the prepn. of (a), there is always obtained a lower boiling product (b. 80-125°), whose b. p. gradually rises on repeated distn. and the substance is finally converted completely into (a); it is probably the isomeric $AcCH_3CMe:CH_2$. While paracetaldol and acetaldol on slow distn. yield 55 and 49%, resp., of crotonaldehyde (b), addition of a little I (0.1-0.05%) increases the yield to 82 and 80%, resp. A small quantity of H_2O (0.5 g. to 100 g.) appreciably lowers the b. p. of (b) (102-4°), 2.5 g. distg. over below 98° and 30.5 g. at 98-102°. When acetaldol is used in its prepn. there is always obtained a fraction, b. 65-96°, which after careful drying invariably decmps. on distn., yielding (b) and AcH ; this

may possibly be a compd. of the 2 aldehydes of the type $\text{MeCH:CHCH} \begin{array}{c} \diagup \diagdown \\ \diagdown \diagup \end{array} \text{CHMe}$.

From 200 g. butylene glycol and 1 g. I heated 8 hrs. below 130° is obtained 80 g. polyglycols, b. $200\text{--}350^\circ$. From 1518 g. glycerol and 0.506 g. I heated 7 hrs. at $210\text{--}5^\circ$ were obtained, besides H_2O and unchanged glycerol, 265 g. b. $169\text{--}83^\circ$, 113 g. b. $183\text{--}226^\circ$ and 346 g. b. above 226° ; reduction of the amt. of I to 0.02% appreciably diminishes the yield of polyglycerols. From 50 g. butylene glycol, 60 g. AcH and 0.3 g. I heated 4–6 hrs. on the H_2O bath is obtained 55.5 g. $\text{MeCH.O.CH}_2.\text{CHMe.O}$, b. $110\text{--}25^\circ$.

C. A. ROUILLER.

Acetolysis of carbohydrates. S. BORN AND J. M. NELSON. *J. Am. Chem. Soc.* 37, 1763–9(1915); cf. *C. A.* 8, 1435.—Sucrose and AcBr on the H_2O bath give acetobromoglucose, while AcCl yields a sirup containing halogen and reducing Fehling soln. and which is probably acetochloroglucose. From maltose and AcBr is obtained acetobromomaltose; AcCl gives a glistening white powder, m. about 65° , reduces Fehling soln., contains the amt. of Cl calcd. for *acetochloromaltose*; 25 cc. Ac_2O and 0.25 cc. H_2SO_4 give octaacetylmaltose. From lactose with AcCl is obtained a white powder; from α -methyl glucoside and $\text{Ac}_2\text{O}\text{--H}_2\text{SO}_4$, α -pentaacetylglucose; from the glucoside and AcBr, a light brown syrup; from inulin and AcBr in ice a yellow syrup reducing Fehling soln. and which when shaken with excess of Ba(OH)_2 gives a syrup yielding fructosazone. B. and N. feel justified in concluding that there is a marked difference in stability toward acetolysis by different O linkages in di- and polysaccharides and that AcCl, AcBr and $\text{Ac}_2\text{O}\text{--H}_2\text{SO}_4$ show similar acetolytic action. A bibliography of acetolysis of carbohydrates is given.

CHAS. A. ROUILLER.

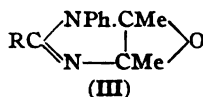
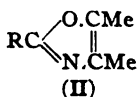
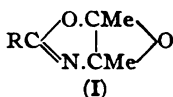
Some constituents of the root of *Brauneria angustifolia*. FREDERICK W. HEYL AND MERRILL C. HART. *J. Am. Chem. Soc.* 37, 1769–78(1915); cf. *C. A.* 8, 3836.—33.3 kg. of the air-dried drug was percolated with 260 l. of 95% alc., the percolate concd. *in vacuo* to 11.5 l. and the resin completely pptd. by adding 20 l. H_2O . The aq. soln. yielded traces of a *phenolic acid*, $\text{C}_9\text{H}_{10}\text{O}_3$ (possibly a trihydroxyphenylpropionic acid), needles, m. about 207° ; 0.3% of a brown amorphous substance extd. by AmOH and giving *d*-phenylglucosazone, m. $202\text{--}3^\circ$; 0.1% of betaine; levulose and sucrose. Of the resin (628 g.), 222 g. was extd. by ligroin, 107 by Et_2O , 180 by CHCl_3 , 35 by AcOEt and 70 by alc. The ligroin ext. yielded oleic, linolic, cerotic and palmitic acids; 2 isomeric *phytosterols*, $\text{C}_{27}\text{H}_{48}\text{O}$, plates from AcOEt , m. $154.5\text{--}6.5^\circ$, $[\alpha]_D^{20} -42.2^\circ$ in CHCl_3 (*acetate*, plates, m. $131.5\text{--}2.0^\circ$), and the isomer m. $136\text{--}7^\circ$ (*acetate*, needles, m. $118\text{--}20^\circ$). The Et_2O ext. of the resin yielded a *phytosterolin*, $\text{C}_{28}\text{H}_{48}\text{O}$, m. $280\text{--}90^\circ$ (decompn.); *acetate*, m. $163\text{--}4^\circ$. No definite products were isolated from the CHCl_3 , AcOEt and alc. exts.

C. A. R.

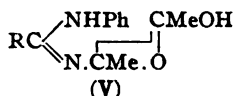
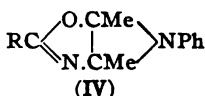
Santonin series. XIII. Oxidation of δ -hydroxysantonin to santononic acid. E. WRECKIND. Univ. Strassburg. *Ber.* 48, 891–5(1915); cf. *C. A.* 9, 78.—When 5 g. δ -hydroxysantonin (isoartemisin) in 40 cc. of cold, freshly purified CHCl_3 is treated 2 hrs. with a moderately rapid stream of O_2 , poured upon ice, allowed to stand overnight, freed from CHCl_3 on the H_2O bath, repeatedly extd. with Et_2O and freed from neutral products in the usual way, there is obtained, instead of the expected diketone $\text{C}_{14}\text{H}_{16}\text{O}_4$, a ketonic acid, *santononic acid*, $\text{C}_{14}\text{H}_{16}\text{O}_7$ (best yield, 3 g.), crystals from AcOEt -petr. ether, decomp. 205° , $[\alpha]_D^{20} 23.08\text{--}24.03^\circ$ (alc.), 24.49° (CHCl_3); titration with 0.1 N KOH gives values intermediate between those calcd. for a mono- and a dibasic acid; it is sol. in 100 parts H_2O at room temp. and 40 parts boiling H_2O , easily reduces $\text{NH}_3\text{--AgNO}_3$, Fehling soln. only very slowly. The acid is probably identical with the yellowish syrup obtained by Angeli and Marino from santonin with alk.

KMnO₄ (*Chem. Zentr.* 1907, I, 1333; 1908, I, 1629) and by Bargellini and Gialdini with O₂ (*Atti accad. Lincei* 17, 248 (1908)). Bisphenylhydrazone, m. 98–100°, decomps. at a higher temp., easily sol. in warm NaOH but only slowly reprecipitated on acidification. Warmed with PbO₂ in AcOH, the acid loses CO₂ slowly. CHAS. A. ROULLIER.

Course of the reaction between aromatic aldehydes and diacetyl monooxime in the presence of strong hydrochloric acid. OTTO DIELS AND DONALD RILEY. Univ. Berlin. *Ber.* 48, 897–905 (1915); cf. C. A. 7, 2940.—In the presence of concd. HCl, aromatic aldehydes and AcCMe:NOH (a) do not give unsatd. 1,2-diketone oximes, but compds. of a new type (I), strong acids and distinct, though weak, bases, whose



salts are hydrolyzed by H₂O; on reduction with Zn dust in H₂O, they yield stable, faintly basic compds. (II) and with PhNCO compds. of the type (III) or (IV); (IV)



is given the preference, for while these latter compds. cannot be reduced with Zn dust and H₂O, so also (II) does not react with PhNCO, indicating that the O which disappears in the reduction is the one which reacts with PhNCO. With PhNH₂ (I) gives very unstable compds. which probably have the structure (V); the most dil. acids decomp. them quant. into Ac₂; if (CO₂H)₂ is used, besides the Ac₂ there are obtained amidine oxalates yielding, on cautious treatment with alkalis, (CO₂H)₂, PhNH₂ and the expected acid amides. Thus, from 50 g. (a), 50 g. anisaldehyde and 100 cc. of 37% HCl shaken 20 hrs., filtered, dissolved in 1 l. H₂O and 10 cc. concd. HCl, again filtered and treated with KOH, is obtained the compound C₁₂H₁₁O₄N (b), long slender needles with 1 H₂O, m. 72–80°; after dehydration for 12 hrs. *in vacuo* over P₂O₅ it m. 140–1° and becomes so unstable towards light that it must be kept in the dark; it is very stable towards alkalis and forms with acids beautifully crystd. but easily hydrolyzed salts. When 9 g. suspended in 250 cc. Et₂O and 7 g. PhNCO are shaken 3 hrs., protected from moisture, cooled several hrs., filtered, extd. with 25 cc. CHCl₃ at room temp., evapd. *in vacuo* at room temp., again extd. with 5 cc. CHCl₃, filtered, evapd. as before and crystd. twice from alc. and once each from AcOEt and MeOH, there is obtained 0.4 g. of the compound C₁₈H₁₅O₂N₃, m. 164–5°. The original Et₂O filtrate leaves on evapn. *in vacuo* at room temp. a mixt. of the above compd., diphenylurea and Ac₂. 10 g. (b) boiled 2 hrs. with 50 g. Zn dust in 30 cc. H₂O and thoroughly extd. with Et₂O yields 8.5 g. of the product C₁₈H₁₅O₂N₃, b₁₁ 175°, m. 71–2°, mol. wt. in freezing C₆H₆ 201–2, forms with acids well crystd. salts hydrolyzed by H₂O, does not react with NH₃, PhNH₂ or PhNHNH₂; cautiously warmed with 10 parts of 9% HNO₃, it first forms the nitrate, which crysts. out, but soon redissolves and as the temp. rises energetic reaction sets in and H₂O, Ac₂ and MeNO₂ or EtNO₂ distil over; on further heating to incipient turbidity and cooling, anisic acid seps. almost quant. and the mother liquors, on being made alk., deposit a very small amt. of crystals m. 164–5°. Heated 6 hrs. at 100° with 4 g. PhNH₂ and stirred up with 10 cc. of 50% AcOH, 10 g. of (b) give the anilide, C₁₈H₁₅O₂N₂, m. 164°, decompd. by acids into Ac₂, PhNH₂, NH₃ and anisic acid; if 4 g. is boiled with 80 cc. of 5% (CO₂H)₂ until there is no more odor of Ac₂ (which is evolved quant.) and cooled, crystals of an oxalate, C₁₈H₁₅O₄N₃·2H₂O, m. 157°, sep.; rubbed with NaHCO₃, this gives PhNH₂ and anisamide. The compound C₁₁H₁₁O₂N, in 19 g. yield from 12 g. (a) and 15 g. BzH, long hydrated needles, m. 58–62° and,

anhydrous, $100-1^\circ$. *Reduction product*, $C_{11}H_{11}O_2N$, $b_{11} 147^\circ$, m. $50-5^\circ$. *Anilide*, $C_{17}H_{15}O_2N_2$, m. 150° , decompd. by $(CO_2H)_2$ into an *oxalate*, light gray leaflets, which with $NaHCO_3$ gives $PhNH_2$ and $BzNH_2$.
CHAS. A. ROUILLER.

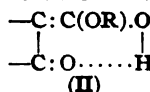
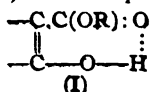
Mixed mercury dialkyls. SIEGFRIED HILPERT AND GERHARD GRÜTTNER. Berlin. Ber. 48, 906-15 (1915).—Different alkyls show great differences in their affinity for Hg, and mixed Hg dialkyls can be obtained by treating an alkylmercuric halide with the Mg halide of another alkyl having less affinity for Hg. Thus, while $PhCH_2MgCl$ and $PhHgBr$ give $Hg(CH_2Ph)_2$, showing that $PhCH_2$ has greater affinity for Hg than Ph, from $PhCH_2HgBr$ and $PhMgBr$ is obtained $PhCH_2HgPh$. These mixed Hg dialkyls do not cryst., quickly decomp. into the sym. Hg dialkyls, solidify in liquid air to glassy amorphous masses, cannot be distd. even in a high vacuum and as criteria of individuality recourse was had to the phenomena of crystn. velocity. Thus, if an equimol. mixt. of $Hg(CH_2Ph)_2$ and $HgPh_2$ is heated, the eutectic begins to m. 80° and the last solid particles have disappeared at 95° ; on cooling slowly the 1st germs appear at about 70° and the crystn. velocity at this temp. is so great that the whole mass solidifies in a few sec.; if, on the other hand, the compd. $PhCH_2HgPh$ is seeded at this temp. with either $Hg(CH_2Ph)_2$ or $HgPh_2$, the crystals do not grow but, as a matter of fact, dissolve, showing that the oily $PhCH_2HgPh$ is different from the mixt. above, but after it has stood several weeks in a closed vessel, it does behave just like the mixt. Moreover, $PhCH_2HgPh$ slowly decomp. with deposition of Hg after several days at 80° , while a mixt. of $Hg(CH_2Ph)_2$ and $HgPh_2$ is not changed even at 100° . *Benzylmercury phenyl* is obtained by slowly treating 32 g. $PhMgBr$ in Et_2O with 10.5 g. powdered $PhCH_2HgCl$, allowing to stand not more than 0.5 hr., decompg. with 1% H_2SO_4 , drawing off the Et_2O , evapg. *in vacuo* at 40° , shaking the faintly yellow oil twice with 5 vols. cold alc., pouring into 200 cc. boiling alc., filtering at once, repptg. the oil by cooling, repeating the whole process twice and drying *in vacuo* over P_2O_5 at 35° ; it is difficultly sol. in H_2O and cold alc., more easily in warm alc., miscible with Et_2O , petr. ether and C_4H_4 homologs, dissolves considerable $Hg(CH_2Ph)_2$ and $HgPh_2$ at room temp., at once gives with cold neutral or faintly acid $AgNO_3$ a ppt. free from Ag, but Ag seps. on short boiling. *Benzylmercury ethyl*, from 4 mols. $EtMgBr$ and 1 mol. $PhCH_2HgCl$. *Ethylmercury phenyl*, from $PhMgBr$ and $EtHgCl$. *Benzylmercury o-tolyl*, in 6 g. yield from 20 g. MeC_6H_4MgBr and 9.5 g. $PhCH_2HgBr$, eagerly absorbs I with formation of $PhCH_2HgI$, dissolves considerable $Hg(CH_2Ph)_2$ at room temp., less $Hg(C_6H_4Me)_2$, decomp. in a few hrs. at 80° into $(PhCH_2)_2$, Hg and $Hg(C_6H_4Me)_2$. The $PhCH_2HgCl$ was prepd. by adding to 23.8 g. $PhCH_2MgCl$ in 100 cc. Et_2O 46.7 g. powdered $HgCl_2$ in 2 g. portions, allowing to stand 24 hrs., boiling 2 hrs., decompg. with ice and H_2SO_4 and treating like $PhHgBr$ (C. A. 7, 2750) except that the H_2O used to wash out the excess of $HgCl_2$ is not heated above 80° ; it seps. from equal vols. of xylene and alc. in leaves, m. 104° ; yield, 43 g. *o-Tolylmercuric bromide*, in 42 g. yield from 28 g. MeC_6H_4MgBr and 58 g. $HgBr_2$ in 100 cc. Et_2O , shaken 1 hr., boiled 2 hrs. and allowed to stand overnight, hair-like needles from xylene or alc., m. 168° , not sensitive to light. *Iodide*, obtained quant. from the bromide boiled 2 hrs. with a slight excess of alc. KI, granules and short prisms from alc., m. $176-7.5^\circ$. *Sulfide*, from the iodide and H_2S in $C_6H_5N-Et_2O$ at -10° , white powder gradually becoming yellowish, stable for several days when dry, soon decomp., when moist, with sepn. of PbS , decomp. completely on heating. *p-MeC₆H₄HgBr*, in 44 g. yield from 28 g. MeC_6H_4MgBr and 58 g. $HgBr_2$, needles from C_6H_6 , m. $234-5^\circ$ when heated rapidly (Pope and Gibson, C. A. 6, 3266, give 228°). *Iodide*, m. 217° .
C. A. R.

Some new derivatives of glucose and cellobiose. GÉZA ZEMPLÉN AND EDUARD D. LÁSZLÓ. Budapest. Ber. 48, 915-26 (1915).—The following pentaacyl derivs. of glucose are difficultly sol. in alc. and H_2O (and consequently very difficult to hydrolyze)

and in cold acetone, but easily sol. in Et₂O, petr. ether and CS₂, while the RO₂CO derivs. are difficultly sol. in the last 3 solvents. *β*-Pentaisovalerylglucose, obtained in 6.5 g. yield from 5.4 g. *β*-glucose in 1.3 g. C₄H₉N and 70 cc. cold CHCl₃ treated with 19.8 g. C₄H₉COCl in 50 cc. CHCl₃ in small portions, shaken about 15 min., evapd. *in vacuo*, treated with alc., again evapd., suspended in 40 cc. hot alc. and cooled, long needles, sinters 90°, m. 92°, [α]_D²⁰ 91° in CHCl₃. *α*-Pentalaurylglucose, in 4.5 g. yield from 1.8 g. *α*-glucose and 10.9 g. C₁₁H₂₃COCl shaken 4 hrs. and allowed to stand 24 hrs., long needles from CHCl₃-alc., sinters about 48°, m. 52° when heated rapidly, [α]_D²⁰ 40.62°. *β*-Compound, in 6 g. yield from 1.8 g. *β*-glucose after 15 min. shaking, needles from CHCl₃-alc., sinters 60°, m. 66°, [α]_D²⁰ 3.9°. *α*-Pentapalmitylglucose, in 11 g. yield from 1.65 g. *α*-glucose and 13.7 g. C₁₅H₃₁COCl after 8 hrs. shaking, needles from a slowly evapg. mixt. of CHCl₃ and 2 vols. alc., sinters 72°, m. 75°, [α]_D²⁰ 29.7° (Stephenson describes an amorphous compd. m. 10° lower; C. A. 8, 2156). *β*-Compound, in 8 g. yield after shaking 0.5 hr., spherical microcryst. aggregates from acetone, sinters 68°, m. 72°, [α]_D²⁰ 4.6°. *β*-Pentastearylglucose, in 22 g. yield from 1.2 g. *β*-glucose and 35 g. C₁₇H₃₅COCl after 12 hrs. shaking, spherical microcryst. aggregates from acetone, sinters 72°, m. 78°, [α]_D²⁰ 14.12°. *β*-Pentacarbomethoxyglucose, in 3.5 g. yield from 6.6 g. *β*-glucose and 19 g. ClCO₂Me shaken 2 hrs., microscopic rhombic plates from 75% MeOH, sinters 121°, m. 122-3°, [α]_D²⁰ 1.35°. *Carboethoxy compound*, in 8.5 g. yield from 5.4 g. *β*-glucose and 18 g. ClCO₂Et shaken 0.5 hr., columns or thick plates from MeOH, sinters about 100°, m. 102°, [α]_D²⁰ 2.47°. *β*-Tetraacetylbenzoylglucose, in 85% yield from 10 g. acetobromoglucose (a) heated 0.5 hr. on the H₂O bath with 10 g. AgOBz in 60 cc. C₄H₈, prisms from alc., sinters 143°, m. 146°, [α]_D²⁰ -28.1°. *β*-Tetraacetylsalicylglucose, in 1.2 g. yield from 5 g. (a) and 6 g. Ag salt boiled 2 hrs., prisms from alc., m. 184°, [α]_D²⁰ -43.4°. *Hippuryl compound*, in 2.5 g. yield from 10 g. (a) and 12 g. Ag salt boiled 4 hrs., needles from acetone, sinters 191°, m. 193°, [α]_D²⁰ 3.64°. *β*-Heptaacetylbenzoylcellobiose, in 85% yield from 1 part each of acetobromocellobiose (b) and AgOBz boiled 2 hrs., slender needles from alc., sinters 205°, m. 210°, [α]_D²⁰ -30.5°. *Salicyl compound*, in 5.5 g. yield from 15 g. (b) and 12 g. Ag salt boiled 4 hrs., needles from MeOH, m. 221-3°, [α]_D²⁰ -43.43°. *Hippuryl compound*, in 5 g. yield from 15 g. (b) and 10 g. Ag salt boiled 6 hrs., needles from MeOH, sinters 182°, m. 186°, [α]_D²⁰ -15.04°.

CHAS. A. ROUILLER.

The chromoisomerism of *p*-dihydroxyterephthalic acid derivatives as phenol-enol isomerism. A. HANTZSCH. Ber. 48, 797-816(1915); cf. preceding abstr.—The chromoisomerism of free dihydroxy-*p*-phthalic acid (a) and its esters (b) is entirely analogous to that of the salts of (b) and the 2 forms may be represented by the formulas (I) and (II) (R = H, Me or Et). This has been established by the isolation of a colorless and a yellow form of the di-Cl deriv. of the Me ester, whose solns. are colorless or yellow, depending on the nature of the solvent, and optically identical with those of the Et ester (which is stable only in the colorless form) and therefore they are present in these solns. only in monomol. form (C. A. 6, 9). The absorption of the free phenol derivs., containing labile H atoms, is greatly influenced by the nature of the solvent and by temp. whereas all derivs. in which the phenol H is replaced by immobile org. residues are practically optically const. in all media and at all temps. between 0° and about 90°. The colorless solns. in MeOH are optically almost identical with those of the MeO deriv., C₆Cl₂(OMe)₂(CO₂R)₂. The yellow esters are also acids, *i. e.*, HO and not ketone-like quinonehydro derivs., as they form salts. Among the reasons for preferring the formulas (I) and (II) to the simple formulas C(OH) : C.CO.OR and CO.C : C(OH).OR



are the following: The latter would imply great differences in the isomers while as a matter of fact their spectra are very similar and differ only in the position, not the form, of the absorption curve; correspondingly, in (I) and (II) there is the same 6-membered ring, the only difference being in the positions of the single, double and secondary bonds. Secondly, the simple formula for the quinoid form contains no acid group, only $>C(OH)_2$. The *dimethyl dichlorodihydroxyterephthalates* (c) are prepd. exactly like the Et ester (*Ber.* 20, 1312(1887)); the *colorless form* seps. exclusively on rapid cooling of a boiling satd. Et_2O soln. and on addition of H_2O to a MeOH soln., while H_2O ppts. the *yellow form* from EtOH; on slow evapn., mixts. of both generally sep. from these and other solvents. In the solid form, the yellow passes smoothly into the white ester at temps. above 135° ; it then m. 177° to a yellow liquid giving the yellow ester on cooling unless it is seeded with the colorless ester. So far, no chem. differences have been detected in the 2 forms. The yellow form of the di-Et ester is so unstable that thus far it has been isolated in solid form only transitorily from very concd. hot C_6H_6 soln. Mol. extinction detns. show that the color intensity, i. e., the increase in concn. of the yellow ester at the expense of the colorless ester, increases with variation of the solvent in the order H_2O , MeOH, EtOH, $C_6H_{11}OH$, Et_2O , AcOH, $CHCl_3$, CCl_4 , C_6H_6 ; the absorption curves are shifted considerably towards the red in the same order but remain very similar to each other in form. That in aq. MeOH practically only the colorless form is present is shown by the fact that addition of H_2O to the MeOH soln. produces only a very slight shifting towards the violet, and on addition of HCl the aq. alc. soln. remains optically const., being almost identical with that of *diethyl dichlorodimethoxyterephthalate*; this ester, prepd. from the yellow di-K salt of (c) with MeI or Me_2SO_4 , seps. from alc. in needles, m. 177° , easily sol. in most media with strong blue-yellow fluorescence but without color even in $CHCl_3$ and C_6H_6 ; it is optically const. in all solvents. Heating the alc. soln. of (c) to 60° shifts the absorption towards the red, cooling to 0° towards the violet, while the curves for the colorless soln. in aq. MeOH and the yellow soln. in $CHCl_3$ are practically unchanged between 0 and 60° . *Dimethyl dibromodihydroxyterephthalate*, m. 205° to a yellow liquid quickly becoming colorless on solidifying; the *diiodo ester* decomps. 188° . The colorless *dimethyl dihydroxyterephthalate* can be obtained only by sublimation and spontaneously passes over into the *yellow-green form*, in which form almost exclusively it exists in all solvents; all its solns. are yellow-green and optically very similar and are unchanged by heating. The solns. of the di-MeO ester (Nef, *Ann.* 258, 297) show greenish blue fluorescence but are colorless. The yellow-green anhydrous $C_6H_4(OH)_2(CO_2H)_2$ is an enol or pseudo acid, the colorless dihydrate a true phenol, while the opposite holds for the colorless anhydrous di-Cl deriv. and its yellow-green dihydrate; in solns. the acids behave very much like their esters. This work shows that MeO and HO groups have optically (almost) the same effect, and stronger color and absorption in a HO compd. as compared with the MeO deriv. cannot be explained by Kauffmann's theory of increased splitting of valence but is due to constitutional change, generally rearrangement.

CHAS. A. ROUILLER.

Constitution of the phenolaldehyde salts. H. PAULY. *Ber.* 48, 934-7(1915).—Answer to Hantzsch (preceding abstr.). P. does not abandon his view that H.'s rearrangement rule does not hold for the phenolaldehyde salts. CHAS. A. ROUILLER.

Derivatives of indole and methylindole containing sulfur. W. MADELUNG AND M. TENCER. Univ. Freiburg i/Br. *Ber.* 48, 949-53(1915).—In the hope of obtaining an indole mercaptan, 12 g. indole was added to $EtMgBr$ (from 2.5 g. Mg and 11 g. $EtBr$ in 100 g. Et_2O) and, after the evolution of C_2H_4 had ceased, 3.2 g. fine S powder was introduced with turbing; after standing several hrs. the Et_2O was filtered off and the solid washed with HCl and recrystd. from alc.; this gave 5 g. *diindolyl*

sulfide (a), $C_{14}H_{12}N_2S$, needles from xylene, m. 232° , indifferent towards chem. reagents, forms no addition products with acids (even picric and $HClO_4$), only H_2SO_4 producing an orange color; all tests for NH groups were negative, neither HNO_3 nor long boiling with Ac_2O producing any change; it is quite stable towards oxidizing agents such as $KMnO_4$ and cannot be converted into the sulfone; boiling alc. KOH produces only slight decompn.; heated above its m. p., it evolves indole. α, α' -Dimethyldiindolyl *sulfide*, obtained in the same way from α -methylinole, m. 226° , gives a transitory blue color with H_2SO_4 . Indolemagnesium bromide (b) treated with excess of SO_2 in Et_2O gives *diindolyl sulfoxide*, needles from dil. alc., m. 157° (decompn.), reduced to (a) by Zn dust in AcOH on the H_2O bath; in general it shows the same indifference towards chem. reagents as (a) but is less stable, partially decompg. into indole and SO_2 ; on long boiling in soln. with SCl_2 , (b) gives (a). C. A. R.

Some reactions of indole. W. MADLUNG. Univ. Freiburg i/Br. *Ber.* **48**, 953-5 (1915).—In an attempt to prep. diindolyl sulfide (cf. preceding abstr.) in another way, 10 g. indole and 4 g. S were heated 2 hrs. at $180-90^\circ$, cooled, extd. with acetone, the ext. pptd. with aq. Na_2S and the ppt. (3 g.) crystd. from acetone. It was found to be a S-free compound, $C_{14}H_{12}N_2$, needles, m. 319° (partial decompn.) on slow, 326° on rapid heating, mol. wt. in freezing $C_{10}H_8$ 206, sol. in H_2SO_4 with yellow color turning green on warming, gives with weak oxidizing agents ($FeCl_3$, dil. Br or I) a difficultly sol. green product, forms fluorescent solns. sensitive to air and gradually turning green on standing, shows no basic properties or tendency to form addition products (picrate), cannot be acylated; with concd. HNO_3 it gives isatin. Methylinole does not yield an analogous product. With PhNO and a few drops of alc. KOH, indolone does not yield a ppt. of the anil as is the case with its homologs; reaction sets in at room temp. and the soln. becomes yellow but, instead of a ppt. forming, PhNC is evolved; probably the anil, $C_6H_4.C:(NPh).CH:N$, is first formed but decomp. at room temp. into 2 mols. PhNC. C. A. R.

γ -Substituted piperidines. ERNST KOENIGS AND LUDWIG NEUMANN. Univ. Breslau. *Ber.* **48**, 956-63 (1915); cf. Emmert and Dorn, *C. A.* **9**, 2093.— γ -Hydroxypiperidine, obtained in 30% yield (together with 50% unchanged γ - C_6H_4NOH) from 1 part C_6H_4NOH and 4 parts Na in 25 parts alc., m. $86-7^\circ$, b_{748} $212-3^\circ$, b_{82} 136° ; HCl salt, hygroscopic needles from alc.- Et_2O , softens above 142° , m. $146-8^\circ$; *chloroaurate*, yellow needles, m. $206-9^\circ$; *chloroplatinate*, yellow-red needles from alc., m. $184-7^\circ$ (decompn.); *sulfate*, non-hygroscopic needles from alc.- Et_2O , m. $263-6^\circ$. γ -Hydroxypyridine *propyl ether*, from γ - C_6H_4NCl heated 8 hrs. at 150° with Na in excess of $PrOH$, alk. liquid, b_{742} $218-20^\circ$; *hydrochloride*, long needles from alc.- Et_2O , m. $156-7^\circ$; *chloroaurate*, light yellow needles, m. $147-50^\circ$; *chloroplatinate*, ocher-yellow feathery prisms, m. $192-5^\circ$; *picrate*, moss-like prisms from alc., m. $120-4^\circ$. *Phenyl ether*, obtained with concd. aq. alk. PhONa after 10 hrs. at 150° (in alc. soln. γ - C_6H_4NOEt is also formed), m. $45-6^\circ$, b_{10} $134-6^\circ$, b_{760} $277-9^\circ$ (slight decompn.); *hydrochloride*, m. $177-8^\circ$; *chloroaurate*, yellow, m. $159-62^\circ$; *chloroplatinate*, orange, m. $196-7^\circ$; *chromate*, orange-red, sinters 125° , m. 130° (decompn.). Reduction of the above ethers with Na and alc. always gave piperidine as the chief product with a little of the piperidine ethers and none of the piperidine ethers. γ -Methoxypiperidine, $C_6H_{11}ON$, b_{11} $61-5^\circ$, absorbs H_2O and CO_2 from the air; *chloroaurate*, red, unstable crystals. γ -Phenoxypiperidine, yellowish, b_{11} $143-6^\circ$. γ -Hydroxypiperidine *hydrochloride*, crystals with 1 H_2O , m. $94-6^\circ$, and, anhydrous, $147-9^\circ$. γ -Aminopiperidine, from $C_6H_4NNH_2$, Na and alc., strongly alk., hygroscopic, sensitive to CO_2 , evolves heat when dissolved in H_2O , is diacid; HCl salt, m. $333-4^\circ$ (decompn.); *chloroaurate*, yellow-red; *chloroplatinate*, turns brown above 240° , m. $266-7^\circ$ (decompn.). γ -Bromopiperidine *hydrobromide*, in 4.5 g. yield from 3 g. hydroxypiperidine heated 8 hrs. at 150° with 24 g. of 66% HBr, m.

192–3°; *hydrochloride*, non-hygroscopic prisms, m. 188–9°; *chloroaurate*, orange-yellow prisms, m. 171–2°; *chloroplatinate*, yellow moss-like needles, m. 213–4°. γ -*Iodopiperidine hydriodide*, in 76% yield from hydroxypiperidine heated 5 hrs. at 150° with excess of HI (d. 1.96), needle-shaped prisms, m. 170–2°; *hydrochloride*, needles, m. 175–8°; *chloroaurate*, reddish yellow needles, m. 147° (decompn.); *chloroplatinate*, ocher-yellow needles, m. 187° (decompn.); free *base*, odorless when dry, smells of piperidine and impure AcNH_2 when moist, decompn. on distn., even *in vacuo*. In alk. solns. the above halogenpiperidines lose halogen acid and give piperidines. C. A. R.

Phthalidenephenylisocrotonic acid. W. BORSCHÉ AND G. HEIMBÜRGER. Univ. Göttingen. *Ber.* 48, 966–72 (1915); cf. C. A. 9, 302.— α -*Phthalidenephenylisocrotonic acid* (a), $\text{O.CO.C}_6\text{H}_4\text{C:C(CO}_2\text{H)CH:CHPh}$, yellow needles from AcOH, m. 252°,

becomes orange when moistened with H_2SO_4 , is obtained in 14–5 g. yield when 18.4 g. $\text{PhCH:CHCH}_2\text{CO}_2\text{Na}$ is heated 12–4 hrs. on the H_2O bath with 14.8 g. $\text{C}_6\text{H}_5(\text{CO})_2\text{O}$ and 20 cc. Ac_2O . It easily dissolves with yellow color in the calcd. amt. of dil. soda on gentle warming and is pptd. unchanged by acids, but if it is boiled for a short time with excess of soda, acids ppt. a yellowish flocculent amorphous substance which quickly balls together, with evolution of CO_2 , to a viscous tar which smoothly dissolves in cold NaOH and is apparently ω -*styrylacetophenone-o-carboxylic acid*, which is converted by HCl-AcOH or short boiling with alc. H_2SO_4 into *phthalidenestyrylmethane* (b) (see below). In soda the acid combines with diazobenzene to an azo compd. pptd. by acids in red amorphous flocks; with PhNHCONHNH_2 , $\text{N}_2\text{H}_4\cdot\text{H}_2\text{O}$ and PhNHNH_2 it gives only amorphous products. (b), also obtained (but in very impure form) by heating (a) at about 270° until the evolution of gas ceases but best by boiling 10 g. (a) with 90 cc. alc. and 10 cc. H_2SO_4 until dissolved (yield, 80%), light yellow cryst. powder, m. 144–5°; when boiled with H_2O , alc. and a little soda it dissolves clear and acids ppt. the above acid; in dry CHCl_3 it smoothly adds only 1 mol. Br_2 , the *dibromide* sepg. from AcOEt in silky needles, m. 159–60° (foaming); it is unchanged by PhNHNH_2 in AcOH after several hrs. heating, while with N_2H_4 it gives a substance which in neither basic nor acid, probably the *phthalazone*, $\text{C}_6\text{H}_4\text{CO.NH.N:CCH}_2\text{CH:CHPh}$, yellowish flat needles

from alc., m. 201°; this is also formed directly from (a) and $\text{N}_2\text{H}_4\cdot\text{H}_2\text{O}$, but in alc. some phthalic hydrazide is also formed. 2-*Styryl-1,3-diketohydriindene*, $\text{PhCH:-CHCH.CO.C}_6\text{H}_4\text{CO}$, obtained in 90% yield from 6.2 g. (b) in 125 cc. MeOH gently

warmed with 0.6 g. Na in 60 cc. MeOH until a clear, dark red soln. results, acidified, allowed to stand until the violet amorphous flocks become white (rearrangement of the enol into the diketone?) and crystd. from alc., needles, m. 162°, forms cryst. derivs. with PhNHCONHNH_2 and NH_2OH and is converted by PhNHNH_2 and AcOH into a dark brown resin. α -*Phthalidyl- γ -phenylbutyric acid*, from (a) in the calcd. amt. of soda with H and Pd colloid, yellowish viscous mass, converted by alc. H_2SO_4 into the *ethyl ester*, silky needles from ligroin, m. 68–9° CHAS. A. ROULLER.

Benzoylanthraquinones. ALFRED SCHAARSCHMIDT. Berlin. *Ber.* 48, 831–9 (1915).—1-*p*-*Chlorobenzoylanthraquinone* is obtained in 25 g. yield when 35 g. $\text{C}_6\text{H}_4(\text{CO})_2\text{C}_6\text{H}_4\text{COCl}$ in 180 g. PhCl at 15–20° is treated in the course of 0.5 hr. with 40 g. AlCl_3 in 3 portions, shaken 0.5 hr. more at the same temp., allowed to stand 0.5 hr. at 25°, heated 3 hrs. at 40–60°, allowed to cool overnight, poured upon ice, treated with 40 cc. HCl, freed from excess of PhCl by steam distn., filtered, washed with HCl and hot H_2O , boiled up with dil. NH_4OH until the filtrate is no longer green, then, while still wet, with 375 cc. AcOH, cooled, filtered, boiled with 700 cc. AcOH and charcoal and filtered boiling hot; it seps. in faintly brownish yellow platelets, m. 238°, sol. in H_2SO_4 with faint yellow color which becomes intensely green on addition of a few particles of

Cu bronze and H_2O produces an intensely violet-blue ppt.; the soln. in alk. $Na_2S_2O_4$ is red. In 1 prepn., after the extn. with NH_4OH , the crude product was boiled up twice with 6 parts alc., then 4 times with 6 parts AcOH; the 1st of the AcOH exts. yielded what was apparently the isomeric *1-o-chloro compound*, snow-white powder from AcOH, m. 177° , sol. with orange color in H_2SO_4 and, only slightly, in $Na_2S_2O_4$; towards Cu bronze, however, the H_2SO_4 soln. behaves like that of the *p*-compd. The latter with $N_2H_4 \cdot H_2O$ in boiling PhMe quant. gives the *o*-diazine, $C_{21}H_{11}ON_2Cl$, yellow needles from AcOH, m. above 300° , sol. in H_2SO_4 with red color and in org. solvents with green fluorescence. *1-Benzoylanthraquinone*, obtained with C_6H_6 instead of PhCl, faintly yellowish white cryst. powder, m. 229° , sol. in alk. hydrosulfite with red, in H_2SO_4 with faint yellow color turning green with Cu bronze and forming an intensely blue ppt. with H_2O . *1-p-Toluylanthraquinone*, obtained in 20 g. yield from 40 g. $C_6H_4(CO)_2C_6H_5CO_2H$ boiled with 36 g. PCl_5 in 150 cc. PhMe till the evolution of HCl ceases, cooled, treated with 150 cc. more PhMe and, in the course of 0.5 hr., with 40 g. $AlCl_3$ at $15-20^\circ$, thick plates from AcOH, m. 200° , sol. in $Na_2S_2O_4$ with red, in H_2SO_4 with yellow color turning green with Cu or Al and giving an intensely blue ppt. with H_2O . *1-p-Methoxybenzoylanthraquinone*, m. 269° , behaves in the same way with H_2SO_4 and Al. *2-p-Toluylanthraquinone*, obtained in 58 g. yield from 50 g. $2-C_6H_4(CO)_2C_6H_5COCl$ in 400 cc. PhMe at $40-5^\circ$ treated in the course of 0.5 hr. with 50 g. $AlCl_3$ and heated 4 hrs. at $65-75^\circ$, m. $181-2^\circ$, gives an intensely green vat which, however, has no affinity for plant fibers; the H_2SO_4 soln. is faintly yellow and hardly changed by Cu powder. *2-m-Chlorotoluyyl compound*, forms a red-brown vat. *1-Chloro-2-p-toluyyl compound*, obtained in 19 g. yield from 25 g. $1,2-C_6H_4(CO)_2C_6H_5ClCO_2H$ in 250 cc. PhMe boiled 0.5 hr. with 22 g. PCl_5 , cooled, treated with 22 g. $AlCl_3$ and heated 2 hrs. at $50-70^\circ$, m. 193° , sol. in $Na_2S_2O_4$ with red-brown color.

CHAS. A. ROUITLER.

A new class of colored reduction products of 1-benzoylanthraquinones or 2,3-phthaloylbenzophenones. I. Preliminary communication. ALFRED SCHAARSCHMIDT. Berlin. Ber. 48, 973-8(1915); cf. preceding abstr.—When 3 g. *1-p*- $ClC_6H_4COC_6H_4(CO)_2C_6H_4$ in 60 g. cold concd. H_2SO_4 is treated at room temp. with 0.09 g. Al bronze (= 1 atom H), the faintly yellow soln. soon becomes intensely green; after all the Al has dissolved (about 1.5 hrs.), there sep. out emerald-green needles, which are washed on glass wool with cold H_2SO_4 until the washings are only faintly green (the dark green mother liquors yield more of the product when treated with ice as long as a green ppt. is formed and until the dild. H_2SO_4 is colorless). The crystals show red-violet surface luster in incident light and in H_2O change into an intensely red-violet product insol. in H_2O and dil. acids and which, washed free from acid with H_2O at 50° and dried *in vacuo* over P_2O_5 , sinters 218° , m. $220-2^\circ$. Its comp. is $C_{21}H_{11}O_2Cl$. It dissolves in H_2SO_4 with green color and on slow diln. with H_2O the green "intermediate product" first seps. and on further diln. passes over into the blue "end product." The limit of H_2SO_4 concn. above which the green product is still stable is about 50%. If the green crystals still moist with concd. H_2SO_4 are stirred with HCl (d. 1.19), the green color persists but washing with concd. HCl converts the crystals into the blue form. Quickly warmed with alk. $Na_2S_2O_4$, the blue compd. forms a red-brown soln. on whose surface air forms a film of the regenerated blue compd.; if the vat is warmed longer, the soln. does not change color but air no longer produces a blue film. Cotton dipped in the original vat, squeezed out and washed with H_2O , acquires in the air a very faint blue color. In org. solvents the blue product is but slightly sol. and in the higher boiling solvents decompn. apparently occurs. The solns. prepd. cold show characteristic color and fluorescence phenomena, depending on the nature of the solvent; in aliphatic and aromatic hydrocarbons, C_6H_5N and $PhNMe_2$, small amts. of the compd. produce scarlet fluorescent solns. red in transmitted light; EtOH, AmOH, PhOH, $PhNH_2$ and

AcOH solns. are intensely blue without fluorescence, while Ac_2O gives a bluish red soln. with red fluorescence. The red solns. in hydrocarbons become blue and non-fluorescent when treated with a few drops of alc. or AcOH. The red solns. lose their color and fluorescence on standing several days, while the blue alc. or AcOH solns. are stable much longer; light is a factor in these color changes. If, in the reduction, 3-4 times as much Al bronze is used and the temp. is raised to 40-50°, $\text{Al}_2(\text{SO}_4)_3$ seps. and the reduction product remains in soln.; after filtering, ice ppts. a blue tarry substance soon becoming granular and sol. in warm H_2O with blue-violet color, the hot soln. dyeing wool and silk intensely blue-violet. The above properties of the blue reduction product are best represented by the formula $(\text{HOCRR}')_3$, ($\text{R} = \text{C}_6\text{H}_4(\text{CO})_2\text{C}_6\text{H}_5$, $\text{R}' = \text{ClC}_6\text{H}_4$), while the green intermediate product is probably a H_2SO_4 compd. of the blue compd.

CHAS. A. ROUILLER.

Chemical constitution and crystal structure (GROTH) 2. Activation of chlorates by formic acid (HOFMANN) 2. Hydrazine (SCHLENK) 6. Electron conception of valence VII (FALK) 2.

II. BIOLOGICAL CHEMISTRY.

WILLIAM J. GIES, EDGAR G. MILLER, JR., PAUL E. HOWE.

A. GENERAL.

FRANK P. UNDERHILL.

Effect of some trivalent and tetravalent cations on permeability. W. J. V. OSTERHOUT. *Botan. Gaz.* 59, 464-73(1915); cf. *C. A.* 9, 1791.—All of the trivalent cations investigated (La, Ce, Y, Fe, Al) and the tetravalent cation Th decrease permeability to a marked degree.

B. H.

Influence of glycerol on alcoholic fermentation and inversion of sugar. G. ROSSI. Bologna. *Boll. chim. farm.* 53, 657-9(1914).—Definite amts. of sterilized glucose soln. (9.60 g. in 100 cc.), Pasteur nutrient soln., pure culture yeast and glycerol (in various proportions) were brought to a const. vol. of 30 cc. with distd., sterilized H_2O and the final soln. was allowed to remain for a definite time in a thermostat at 32°; a duplicate soln. without glycerol was subjected to identical conditions. Detn. of the amt. of glucose present before and after fermentation showed that the amt. of glucose fermented in 12 hrs. was not affected by amts. of glycerol varying between 1.269 g. and 3.1727 g. in 30 cc. Alc. fermentation was retarded by a conc. of 6.3455 g. glycerol in 30 cc. and totally inhibited by a conc. of 12.691 g. glycerol in 30 cc. (42.30%). Glycerol was added to a mixt. of glucose soln., Pasteur nutrient soln., pure culture yeast and H_2O in such proportion that the final conc. of the glycerol was 50 g. per 100 cc. After 12 hrs. sufficient H_2O was added to reduce the glycerol conc. to 10 g. per 100 cc. (this conc. does not even retard fermentation) and the final soln. was kept in a const. temp. app. for 24 hrs. No fermentation of glucose occurred and it is concluded that the enzyme or yeast was destroyed by the original high conc. of the glycerol. Ten cc. of a 10% sucrose soln., pure culture yeast, nutrient soln. and 15 g. glycerol were brought to a vol. of 30 cc. with H_2O and the amt. of invert sugar present was detd. after 12, 24 and 36 hrs. at const. temp. Inversion was not inhibited. [The influence of the above conc. of glycerol on the rate of inversion was not detd.—ABSTRACTOR.] H. S. PAINE.

The identity of oxidizing enzymes. G. WOKER. *Arch. sci. phys. nat.* 39, 405-14(1915); cf. *C. A.* 8, 3663.—The article is chiefly an answer to Bach's attempt to disprove Woker's theory of the identity between ferments which induce oxidation and those which induce reductions. (Cf. *C. A.* 9, 1919.) W. reports that catalase

and peroxidase when submitted to increasing temps. undergo similar changes. At first a new substance, which has no peroxidizing effect in presence of H_2O_2 and does not decompose the peroxide, is produced, but if the temp. is raised more, another new substance, which causes both changes to take place, is formed. This enzyme which is stable to heat is different, then, from the enzymes from which it was formed and it is the presence of this which enables one to speak of the re-activation of a dead ferment by means of heat. It was noticed that the action of peroxidase is much more feeble when the plant extracts have remained in contact with H_2O_2 before the addition of benzidene.

R. L. SIBLEY.

Chemical and physico-chemical properties of muscles and muscle juice. VI. The phosphorus content of white and red striated muscle. G. QUAGLIARIELLO. Univ. Naples. *Atti accad. Lincei* 24, I, 348-52(1915); cf. C. A. 9, 1637.—The muscles of various animals have been studied for various reasons but so far no comparison between the P content of white and red muscle has been made. Q. examd. muscles of the rabbit (*Lepus cuniculus*), turkey (*Meleagris gallopava*) and the cock (*Gallus domesticus*) in this way. The dry residue at 110° , the total P and the P of phosphatides were detd. The results show that the striated muscles (white or red) have a higher P content than those of other animals such as the ox. The white striated muscles have a total P content slightly higher than that of the red muscles when calcd. for the fresh muscles, but when calcd. for the dry residue it is slightly lower. The phosphatides show much difference. In the birds the P of the phosphatides represents about 11% of the total P in the white and 22% in the red muscles; in the rabbit the values are 13% and 17%, resp. It is thus concluded that the red and white muscles show no difference in total P, but marked differences in the nature of the chem. combination of the P.

E. J. WITZEMANN.

B. METHODS AND APPARATUS.

STANLEY R. BENEDICT.

The estimation of phosphorus in biological material, and the standardization of solutions of molybdenum. A. E. TAYLOR AND C. W. MILLER. Univ. Penna. *J. Biol. Chem.* 21, 255-62(1915); cf. C. A. 8, 3311.—The modification of Neumann's method proposed by the authors is further modified as follows: The ash from material containing about 2 mg. P is dissolved in a small amt. of dil. HNO_3 and transferred to a 50 cc. centrifuge tube. The vol. should not exceed 12-15 cc. Two g. NH_4NO_3 and 10-12 drops of strong HNO_3 are added and the mixt. is heated in a H_2O -bath. When hot, 2 cc. of 10% $(NH_4)_2MoO_4$ are run directly into the liquid, without touching the sides of the tube. The contents of the tube are shaken and allowed to settle for 10 min. Not more than 5 cc. abs. EtOH are then poured around the sides of the tube and the floating ppt. freed from the sides of the tube by gentle swinging. Fifty EtOH is then floated over the mixt. until the tube is filled. This is then centrifuged, the supernatant liquid poured off, 5 cc. H_2O and 5 drops strong HNO_3 added, and the sides of the tube scrubbed with a rubber-tipped rod. Abs. EtOH and then 50% EtOH are added as described above and the tube again centrifuged. Thereafter the ppt. usually packs easily and may readily be washed with 50% EtOH (5-6 washings). The ppt. is then dissolved in 25 cc. 0.1 N NaOH and evapd. to 5 cc., when it is titrated in the usual manner. If desired the Mo, and from this the P, may be detd. by Raper's method (cf. C. A. 9, 813). The standardization of the molybdate soln. required in the author's colorimetric method is best accomplished by Raper's method or else by titration with $KMnO_4$ after reduction in a Jones reductor. In order to obviate the error due to reoxidation by the air, the receiver of the reductor is charged with H_2O and 25 cc. of the following soln.: Fe^{++} alum 100 g., H_2SO_4 25 cc., H_3PO_4 40 cc., H_2O to 1000 cc. After reduction by the reduced Mo soln., this is not readily oxidized by the air.

I. GREENWALD.

The determination of hippuric and benzoic acids in blood and tissue. F. B. KINGSBURY. Univ. Minn. *J. Biol. Chem.* 21, 289-95(1915).—*Removal of proteins.*—Blood is drawn into a tared flask containing 25% MgSO_4 soln. The vol. of soln. is about $\frac{1}{4}$ that of the blood to be drawn. After cooling the flask is weighed and a portion of the mixt., usually 60 g., is centrifuged. The plasma is poured into a small beaker and the cells hemolyzed with about 250 cc. H_2O . The plasma and hemolyzed cells are united, a drop of caprylic alcohol added and the mixt. made up to 300-400 cc. Of this, 100 cc. are treated with 2 g. tannic acid in 10-12 cc. H_2O and centrifuged. The clear, colorless supernatant liquid is poured off and the ppt. washed 4 times, using 300-350 cc. H_2O in all; the supernatant liquids are added to that first obtained. If desired the proteins may be removed by boiling the dild. blood, filtering and washing the coagulum with hot H_2O . The filtrate is evapd. on the H_2O -bath to about 30 cc., 0.5 g. (more, if necessary) tannic acid is added, the mixt. filtered and the ppt. washed with 200 cc. H_2O . The latter method is required in the case of tissues other than blood. *Detn. of benzoic acid.* The filtrate obtained by either of these methods is transferred to a 500 cc. separatory funnel (in the first method, 2 funnels are required) containing 110 g. $(\text{NH}_4)_2\text{SO}_4$. After soln., 5 cc. concd. HCl are added and the soln. extd. with neutral, EtOH -free CHCl_3 in 1-50, 1-35 and 2-25 cc. portions. The combined exts. are washed once with 100 cc. of satd. NaCl soln. containing 0.5 cc. conc. HCl in 1000 cc. The washed ext. is titrated with 0.1 N EtONa , using phenolphthalein as indicator. *Detn. of hippuric acid (total benzoic acid).* The filtrate from the tannic acid ppt. is evapd. to dryness with 20 cc. of 5% NaOH soln. The residue is treated as in the Folin-Flanders procedure for the detn. of hippuric acid (cf. C. A. 6, 2245). Blanks must be run. Benzoic and hippuric acids added to blood were quant. recovered.

I. GREENWALD.

A method for the determination of chlorides in small amounts of body fluids. FRANKLIN C. MCLEAN AND DONALD D. VAN SLYKE. Rockefeller Inst. *J. Biol. Chem.* 21, 361-70(1915); cf. C. A. 9, 1588.—Two cc. of oxalated plasma (measured in a pipet containing 2 cc. ± 0.005 cc.) are run into 10 cc. 10% MgSO_4 in a 20 cc. vol. flask and rinsed out with the soln. in the flask, 2 drops 50% HOAc are added and the mixt. heated in the H_2O -bath for 10 min. After cooling, the mixt. is poured onto 0.3 g. blood charcoal (Merck's reagent) in a small beaker and filtered after a few min. For the titration the following solns. are used: (A) AgNO_3 5.812 g., HNO_3 (sp. gr. 1.42) 250 cc., H_2O to 1000 cc.; (1 cc. = 2 mg. NaCl); (B) KI 0.3%, standardized so that 10 cc. = 5 cc. soln. A; (C) $\text{Na}_2\text{C}_4\text{H}_4\text{O}_7 + 5.5\text{H}_2\text{O}$ 446 g., NaNO_3 20 g., sol. starch 2.5 g., H_2O to 1000 cc. Ten cc. or other convenient vol. of the above filtrate, are measured into a 25 cc. vol. flask, 5 cc. Soln. A added and the mixt. dild. to 25 cc. Two drops caprylic alcohol are added and the mixt. shaken a few times. After 5 min., it is filtered and 20 cc. of the filtrate treated with 4 cc. of C and titrated with B to the appearance of a blue color. Number of g. NaCl per liter = 12.5 (8 cc. B used)/cc. blood filtrate taken. The error is less than $\pm 1\%$ and the results agree well with those obtained by incineration and titration according to Volhard. With albumin-free urine, 1 cc. is mixed in a 50 cc. flask with 10 cc. A and 2 drops caprylic alcohol, dild. to the mark, filtered and 25 cc. of the filtrate treated with 5 cc. C and titrated with B. Urine containing albumin is treated as is blood.

I. GREENWALD.

Changes in the fat content of feces preserved by freezing without the addition of a preservative. C. A. SMITH, RAYMOND J. MILLER AND PHILIP B. HAWK. Jefferson Med. College. *J. Biol. Chem.* 21, 395-401(1915).—"The fat of feces kept at -12° undergoes both hydrolysis (shown by the increase in fatty acid) and actual destruction (shown by the decrease in total fat)..... The Saxon method (cf. C. A. 8, 1799) for the detn. of fat in moist feces avoids most of the objections to which other simple

extn. methods are subject, and has the added advantage of allowing for the differentiation between neutral fat and fatty acids (free and combined as soaps)."

I. GREENWALD.

Microtechnical methods. W. J. G. LAND. *Botan. Gaz.* 59, 397-401(1915).—Descriptions of improved methods of replacing the paraffin solvent with paraffin; of fixing paraffin ribbons to the slide with certainty; of imbedding in gelatin; and of cleaning cover glass.

B. HOROWITZ.

A new method for the determination of the activity of diastase. O. WOLFF. Univ. Jena. *Chem. Ztg.* 39, 105-7(1915).—Methods previously worked out for the study of enzyme reactions, *e. g.*, the detn. of diastatic activity, are briefly reviewed. For optical methods the Zeiss interferometer is far more sensitive than the refractometer. In the 2 cm. cell a 0.2% soln. of sol. starch shows a reading of 142 as compared with H₂O, while a similar soln. of dextrose shows 200, the subjective error of the instrument being only 2 scale divisions. The interferometer may be calibrated by means of 1% solns. of sol. starch and dextrose, one cell being kept filled with the starch soln. and compared with mixts. of starch and dextrose in complementary proportions in the other cell. The differential readings are plotted with scale divisions as abscissas and g. of dextrose as ordinates, and a straight line is thus obtained from which subsequent results can be integrated, provided identical quantities of H₂O or solid matters be added to each soln. For the detn. of diastatic activity, add a known amt. of diastase (about 0.2 g.) to each of two 50 cc. portions of 1% starch soln. in 2 flasks; boil one portion immediately to destroy the enzyme and digest the other at 38° for 2 hrs. Filter both solns. through dry paper filters of the same size and compare the clear filtrates together in the cells of the interferometer. Some little difficulty may arise in obtaining perfectly clear filtrates and hence it is seldom possible to employ the 4 cm. cells, but if very small proportions of enzyme are present, the delicacy of the method may be increased by adopting a longer time of digestion. Detns. have shown that the readings obtained are proportional to the quantity of diastase within certain limits.

F. W. SMITHER.

A simple test for the detection of bile pigments and hemoglobin in urine. H. LIPP. *Münch. med. Wochschr.* 61, 1965(1914).—Gmelin's test is performed on unglazed porcelain or in a thin layer of white sand.

H. G. WELLS.

C. BACTERIOLOGY.

ERNEST D. CLARK.

The practical applicability of acid agglutination for the recognition of typhoid bacilli. E. MICHAELIS. *Deut. med. Wochschr.* 41, 243-4(1915).—A suspension is made of a dense 24 hr. growth of a pure culture on an agar slant in about 20 cc. distd. water, which need not be sterile. In each of six test tubes are placed 3 cc. of this suspension and 1 cc. of the acid mixts. 1-6. The acid mixts. contain in 100 cc. the following amts. of *N* NaOH and *N* AcOH, resp.: (1) 5, 7.5; (2) 5, 10; (3) 5, 15; (4) 5, 25; (5) 5, 45; (6) 5, 85. The tubes are shaken and put in an incubator 1/2-2 hr. The optimum agglutination is easily recognizable. The optimum for typhoid bacilli is No. 3, the paratyphoid group No. 5-6. Coli and dysentery bacilli are, as a rule, not agglutinated at all. The acid agglutination is next to the specific serum agglutination, the most constant characteristic of typhoid bacilli.

S. AMBERG.

D. BOTANY.

CARL L. ALSBERG.

Variations in respiratory activity in relation to sunlight. H. A. SPOEHR. *Botan. Gaz.* 59, 366-86(1915).—In S.'s expts. (mostly with wheat seedlings) the CO₂ production in the dark at constant conditions of temp. and humidity was measured by drawing air from out-of-doors over plants, and then through a standard Ba(OH)₂ sofn. It

was found that the rate at which CO_2 was produced in daytime was regularly higher than that at night. Expts. with deionized air were also conducted with a view to finding whether or not activity and atmospheric ionization, resp., were related. For the following materials the ratio of the day rate to the night rate in normal air and the same ratio in deionized air are, resp.: Onion, 1.150, —; wheat 1.042, 1.010; wheat 1.091, 1.014; beetles 1.099, —.

B. HOROWITZ.

Evidence for the general distribution of oxidases in plants. G. B. REED. *Botan. Gas.* 59, 407-9(1915).—Tissues markedly acid in reaction and those said to contain large amts. of reducing substances have been reported to be without oxidases. Modified methods of investigation have convinced R. that this is not the case; that, in fact, "oxidases are universally distributed in living plants."

B. HOROWITZ.

Specific action of organic compounds in modifying plant characteristics; methylglycocoll versus glycocoll. O. SCHREINER AND J. J. SKINNER. *Botan. Gas.* 59, 445-463(1915).—Wheat plants were grown in nutrient culture solns. composed of fertilizer salts, used singly and in combinations of 2 or 3 salts. Glycocoll, in solns. free from nitrate but containing various amts. of phosphate and potash, stimulated growth. Methylglycocoll caused a decrease in growth.

B. HOROWITZ.

The acid secretion of the gram plant, *Cicer arietinum*. D. L. SAHASRABUDDHE. Poona Agr. College, Agr. Res. Inst., Pusa, 1914, *Bull.* No. 45, 12 pp.; *J. Soc. Chem. Ind.* 34, 439.—The acidity of this secretion is due to malic, oxalic, and a small quantity of acetic acids. There is a marked and fairly sudden rise in the amt. of acidity at the time of flowering, after which the quantity remains steady until the pods are formed. When this occurs there is another rapid rise in the quantity of acids produced; this is maintained until the plants, including the pods, begin to dry, when the quantity rapidly declines. The proportion between malic and oxalic acids is const. from the tenth week onwards, 94% malic and 6% oxalic acids. The oxalic acid content is highest when the plants are dry. While the compn. of the acids from the normally grown and from the pruned plants is approx. the same, the amt. of dry matter per plant is greater with pruned plants and the amt. of acids per 100 parts of dry matter in the plant is considerably greater. The plant is continually producing acid, and it is secreted in sufficient quantity for the normally found amt. on the plant to be produced in a week. Continual washing appears to exhaust the acid-producing power of the plant, but it is evident that washing up to a certain point stimulates the production. Washing every 6 days is considered the most favorable. The acid production is greater where knobbed hairs are most abundant. The probable yield of malic acid, from 9 to 18 weeks, is 2686.8 g. The removal of the acid secretion from the plant in the customary manner has no effect on the vitality of the plants.

W. H. FRY.

E. NUTRITION.

PHILIP B. HAWK.

NORMAL.

Basal metabolism and body surface. A contribution to the normal data. JAMES H. MEANS. Mass. Gen. Hosp. *J. Biol. Chem.* 21, 263-8(1915).—The surface area, calcd. from the formulas of Meeh and Du Bois and Du Bois (cf. *C. A.* 9, 1795) and the basal metabolism per sq. m. of body surface are given for 16 normal persons. By the Meeh formula, the average is 31.5 cal. per sq. m. and hour; by the Du Bois formula it is 38.8 cal. The deviation from the average is smaller in the latter case (always less than $\pm 10\%$) than in the former. In hypo- or hyperthyroidism, the basal metabolism lies well without this zone.

I. GREENWALD.

Synthesis of hippuric acid in the animal organism and the occurrence of free benzoic acid in the urine. G. W. RAIZISS AND H. DUBIN. *J. Biol. Chem.* 21, 331-

43(1915).—Hippuric acid is readily decomposed in urine, particularly when alk. The urine should be collected in acid (dil. HNO_3). In rabbits receiving not more than 1 g. of benzoic acid per kg., the conversion into hippuric acid is practically quant. With larger doses from 10 to 20% of free benzoic acid appears in the urine. A diet of milk and eggs increases the capacity of the organism to synthesize hippuric acid, as much as 96% of nearly fatal doses of benzoic acid being conjugated. There is an increase in the proportion of benzoic acid synthesized into hippuric acid after the first day, also after repeated administration of benzoic acid. Of the non-conjugated benzoic acid, the largest amt. appears in the urine in the first 6 hrs. after feeding. (Cf. C. A. 9, 920). I. GREENWALD.

The metabolism of creatine and creatinine. VII. The fate of creatine when administered to man. VICTOR C. MYERS AND MORRIS S. FINE. N. Y. Post-Graduate Med. School. *J. Biol. Chem.* 21, 377-81(1915).—After a fore-period of 6 days on a meat-free diet, the authors each ingested creatine, 1 g. on the first day, increasing the dose by 1 g. per day until 5 g. were taken on the 5th day. There was a slight increase in the urinary creatinine (3-4%) and an excretion of creatine varying from none on the first day to about 25% of the ingested quantity on the last 3 days in one case and from 20% on the first day to 37% on the last day in the other. The excess creatinine excreted is believed to be derived from the creatine ingested. VIII. The presence of creatinine in muscle. *Ibid* 383-7(1915).—As a result of a large number of analyses, M. and F. conclude that creatinine is a normal constituent of muscle and that muscle is the chief creatinine-forming tissue. The normal concn. is about 6 mg. per 100 g. of muscle and is much less than this in blood. In uremic persons or in nephrectomized rabbits, the blood may contain more creatinine than muscle. IX. The creatine content of the muscle of rats fed on isolated proteins. *Ibid* 389-93.—M. and F. detd. the creatine content of the muscle of rats kept on a normal mixed diet and on diets containing either casein, lactalbumin or edestin as the sole protein. The muscles of rats on a casein diet (poor in arginine) contained slightly less (2.5%) creatine than did those of rats kept on a normal or edestin diet. (Cf. C. A. 8, 1132). I. GREENWALD.

The occurrence of methyl alcohol in urine in different kinds of nutrition. T. VON FELLEBERG. *Mitt. Lebensm. Hyg.* 6, 24-37(1915).—MeOH in urine was detd. by the author's modification of the Dénigès method (cf. C. A. 9, 1887). On a pectin-free diet very small amts. of MeOH occur in the urine (about 0.4-1.0 mg. per 750 g.), and on a fast it is reduced one-half. On a diet rich in pectin the amt. increases to 0.8-2.5 mg. The condition of the pectin, whether raw, containing pectase, or cooked and pectase-free, makes little difference in the MeOH secretion. The use of EtOH on a pectin-free diet raises the MeOH content slightly; with pectin there is a large increase. Cheap wines containing both MeOH and EtOH cause a max. rise. F. discusses briefly the pathological effects of MeOH on the system. H. L. OLIN.

Nutrition and growth. LAFAYETTE B. MENDEL. New Haven. *J. Am. Med. Assoc.* 64, 1539-47(1915).—An address (cf. C. A. 8, 3578). L. W. RIGGS.

Feeding experiments with young swine, making comparison of skim milk, granulated blood and extracted fish meal. KLEIN. *Milchwirtsch. Zentr.* 44, 81-7(1915).—Three lots of young swine were given rations containing the same amts. of digestible nutrients. Each ration contained skim milk, barley, barley bran and potatoes; the first contained a relatively large amt. of skim milk; the second, less skim milk but some granulated blood; the third still less skim milk but some fish meal. The av. increase of wt. per animal was 33.4 kg. on the first ration, 31.8 kg. on the second (blood) and 31.1 kg. on the third (fish meal). The addition of blood and of fish meal slightly increased the cost of the ration. L. L. VAN SLYKE.

Further observations of the influence of natural fats upon growth. THOMAS B. OSBORNE AND LAFAYETTE B. MENDEL. Conn. Agr. Expt. Sta. and Yale Univ. *J. Biol. Chem.* 20, 379-89(1915).—Lard, prepared in the lab. by filtration at a temp. just above its m. p., fails to promote growth in the same manner as com. lard, showing that the inefficiency of lard is not due to any heating during its prep. commercially. Heating butter fat for 2 1/2 hrs. with live steam does not destroy its growth-promoting power. Beef-fat facilitates growth but is not as efficient as butter fat, its content of the growth-promoting substance probably being so small that it becomes finally quant. inadequate. By subjecting butter- and beef-fat to fractional crystn., it has been found that the fats with high m. ps. are ineffective, the growth-promoting factor remaining in the mother liquors.

ALFRED P. LOTHROP.

ABNORMAL.

Persistence of glycogen in dogs during inanition. C. N. MICHAILESCO. Bucharest. *Compt. rend. soc. biol.* 76, 314-6(1914).—Twenty-four dogs of various ages and sizes were subjected to absolute fast for a period of 4-38 days, the detn. of glycogen being made by the Pflüger method. In the majority of cases glycogen disappeared completely from the organism of the smaller and younger dogs after a fast of 10-22 days. In the case of certain unusually vigorous animals glycogen had not disappeared after a fast of 31 days; glycogen disappeared completely, however, from a large dog of 18.7 kg. when the fast was prolonged to 38 days. In general, glycogen had always disappeared when the wt. of the animal became reduced by more than 40% of the original wt. as a consequence of fast.

H. S. PAINE.

Hypophysectomy and alimentary glucosuria. JEAN CAMUS AND GUSTAVE ROUSSY. Paris. *Compt. rend. soc. biol.* 76, 344-7(1914).—Expts. on young and full grown dogs showed that neither partial hypophysectomy extending to 1 or both lobes nor total hypophysectomy modified to an appreciable degree the tolerance to carbohydrates or the conditions governing the appearance of alimentary glucosuria. The limit of assimilation of carbohydrates was not appreciably affected by injection of concd. exts. of the entire hypophysis or of the anterior or posterior lobes in dogs which had been subjected to partial or total hypophysectomy. The results of these expts. (with respect both to spontaneous and to provoked glucosuria) on hypophysectomized animals are opposed to the views of Cushing and tend to diminish considerably the role attributed by him to the posterior lobe of the hypophysis as a regulator of carbohydrate assimilation.

H. S. PAINE.

Nutrient enemas. V. SCHEEL AND E. BEGRUP. *Ugeskrift Læger* 77, No. 13 (1915); *J. Am. Med. Assoc.* 64, 1804.—The findings testify to the good absorption and utilization of suitable nutrient enemas, thus sparing the reserves of the body. Milk and eggs irritated the rectum and were not absorbed properly even when combined with pancreas ext. The best results were obtained with meat amino acids. The 10 g. of N were given with 50-75 g. of grape sugar, fractionated in 2 or 3 enemas in the course of 24 hrs. About 250 cc. of fluid was found best for a single administration. The osmotic conc. was kept at about the same as that of the tissues to avoid irritation. More than 25 g. of sugar should never be given at one time. This treatment was kept up for nearly 3 weeks, supplying from 400 to 600 cal. daily. Most of the amino acids used were made by long-continued digestion of meat or milk by trypsin-erepsin.

L. W. RIGGS.

F. PHYSIOLOGY.

ANDREW HUNTER.

Is epinephrine present in the blood at birth? S. CANNATA. *Pediatrics* 23, No. 4 (1915); *J. Am. Med. Assoc.* 64, 1883.—C. obtained constantly negative results in 31 healthy infants whose serum was tested for epinephrine by various technics.

L. W. RIGGS.

Differences in the digestion in adults and infants. J. F. McCLENDON. Minn. *J. Am. Med. Assoc.* 65, 12-4(1915).—The acidity of the stomach and reaction of the duodenal contents were measured by means of H electrodes. Indicator papers were calibrated so that approx. H-ion concs. may be detd. After a normal meal, the acidity of the adult stomach reaches its max. in from 2 to 3 hrs., the rise in acidity being more rapid the lighter the meal. The height to which the acidity rises varies with the individual. The H-ion conc. of the duodenal contents is 0.00000002 normal. This is slightly alk., since that of pure H₂O is 0.00000011 at 25°. The acidity of the infant's stomach rises slowly after the milk begins to leave it, and 4 hrs. after nursing may be the same as some normal adult stomachs. That of the gastric juice of the new-born is 0.005 normal. The acidity of the duodenal contents of the infant is 0.0008, and hence it is probable that both peptic and tryptic digestion take place in the intestine of the infant. Pepsin was always found and was apparently more abundant (active) than the trypsin.

L. W. RIGGS.

Forms of nitrogen in stools of infants. D. D. VAN SLYKE, *et al.* New York. *Am. J. Dis. Children* 9, No. 6(1915); *J. Am. Med. Assoc.* 65, 52.—Of the total N of infants' feces, from 50 to 70% was found as proteins and amino acids, 2.4 to 24% as free amino acids and from 3 to 37% as ammonia. Usually, though not invariably, the higher percentages of amino acid N were found in the looser stools, the more rapid passage through the intestine resulting in somewhat less complete absorption of these protein digestion products. The results show no evidence of antagonism between the processes of acid and ammonia formation, respectively, in the intestine. Urea was absent in 75% of the stools examd., and in the other 25% formed only 1 to 5.6% of the total N. Despite the care taken to keep the feces free from urine, the authors think that some of the positive results as to the presence of urea in the feces may have been due to the presence of traces of urine. As some of the watery stools contained no urea, it appears improbable that the intestine is capable of rendering significant assistance to the kidney, at least in the excretion of urea.

L. W. RIGGS.

The effect of functional activity upon the metabolism, blood-flow, and exudation in organs. J. BARCROFT AND T. KATO. *Proc. Roy. Soc. London (B)* 88, 54(1915).—Expts. on dogs. By measuring the rate of flow of blood in a vein from (1) striated muscle and (2) the submaxillary gland, and comparing this blood with arterial blood in respect to its O content and hemoglobin value, data were obtained of (a) the O used, (b) the rate of flow, and (c) the exudation of fluid. In the case of muscle, distinct retention of fluid was observed during stimulation. In the case of submaxillary gland, the lymph varies with the quantity of saliva secreted, and relatively to the rate of flow of saliva the increased O consumption and flow of blood rise for 2-3 hrs.

A. T. CAMERON.

G. PATHOLOGY.

H. GIDEON WELLS.

Functional edema in frog muscle. M. BACK, K. M. COGAN AND A. E. TOWERS. *Proc. Roy. Soc. London (B)* 88, 544-8(1915).—In frogs in which the medulla and upper part of the spinal cord were left uninjured, but the brain was destroyed, and the lower part of the cord pithed, it was found that stimulation of the gastrocnemius invariably produced a distinct edema, the gain of wt. amounting in some cases to 12%. The edema was still evident 6 hrs. after stimulation, but the fluid was absorbed in less than 16 hrs.

A. T. CAMERON.

The activation of tetanus toxin. A. MARIE. *Ann. inst. Pasteur* 28, 1-5(1914).—Several million fatal doses of tetanus toxin can be neutralized by 1 g. of epinephrine, but the toxin is not neutralized in the presence of other substances contained in the suprarenal glands, or of exts. of liver or nerve tissue, or even of such a definite compound as lecithin. Because of the variability of various samples of lecithin, the effect of the

yolk of hen eggs upon tetanus toxin was tried. A quantity of the toxin 0.00001 as large as the dose which alone gave no stiffening of the inoculated foot of a mouse, gave a marked local tetanus when mixed with a minimal quantity of yolk of egg; 0.0000001 cc. of toxin added to this substance sufficed to give a 15 g. mouse a fatal tetanus in 8 days, while the control showed no apparent effects with 0.0001 cc. of the toxin, i. e., with a dose 10,000 times as large. This activation of tetanus toxin by the yolk of hen eggs occurs always in species very susceptible to the toxin, such as the mouse and the guinea pig. With the dog, which shows a marked natural immunity to tetanus toxin, doses of the toxin much inferior to those which produce tetanus by intramuscular injection cannot be rendered active.

GEO. T. CALDWELL.

Ricin. III. *Hypersensibility to ricin.* E. ALLAIRE. *Ann. inst. Pasteur* 28, 605-7(1914).—Ricin, like abrin, produces after incubation an ocular inflammation in man when placed in the conjunctiva. The author states that he reacts violently without incubation even to traces of ricin. Symptoms similar to those of hay-fever appear as a result of the inhalation of the small amt. of ricin liberated by the removal of a stopper from a bottle containing the dry prepn. An intense itching is produced by the application of a trace of a glycerinated soln. of ricin to the back of the hand. This hypersensibility is specific and seems to be acquired.

GEO. T. CALDWELL.

The anaphylactic reactions produced by the albuminous substances of the crystalline lens. V. MORAX AND J. BOLLACK. *Ann. inst. Pasteur* 28, 625-38(1914).—An animal sensitized by the injection of the albuminous substances from the crystalline lens of a given foreign species reacts nearly always to a second injection of crystalline lens from this same species, more often to a second injection from a different species and practically never to a subsequent injection of serum from the same species. An animal may not react to a subsequent injection of crystalline lens of its own species if it has been sensitized by an injection of crystalline lens of a different species. So far as anaphylactic reactions are concerned, the crystalline lens seems to possess special properties, differing from those of all other organs and of the serum. It is possessed with a true organ specificity, since the animal sensitized to crystalline lens of any one species does not react to the serum of the same species. On the contrary, it is destitute of all species-specificity, since animals react to crystalline lens from whatever species they come. The properties of organ extracts may be due to the serum which they always contain. The vascular crystalline lens of the embryo may possess an action analogous to that of the sera of the animals of the same species. The organ-specificity is probably a secondary property dependent upon the special biological conditions of this organ in the adult.

GEO. T. CALDWELL.

Ricin. V. The fate of ricin (toxin and agglutinin) during the germination of the castor-bean. H. AGULHON. *Ann. inst. Pasteur* 29, 237-48(1915).—The ricin toxin disappears slowly during the germination of the castor-bean; it remains localized in the albumin; one can find very little of it in the plantule; its disappearance coincides with the transformation of the albumin. The same is true concerning ricin agglutinin; this seems to disappear more quickly proportionately than the toxin. During one short period of the growth, a hemolysin appears, together with the agglutinin, both in the plantule and in the albumin; this hemolysin is thermostable, destroyed by alcoholic pptn. and unaffected by anti-ricin serum. Whether this hemolysin bears any relation whatever to the disappearance of the agglutinin is not known. At a certain time in the germination, a substance toxic for mice, resistant to boiling and not precipitated by alc., appears in the plantule; its nature has not yet been detd., but everything seems to indicate that it behaves as an alkaloidal poison.

G. T. C.

The immune bodies occurring in anti-rinderpest serum and the variations occurring in the serum proteins of animals during rinderpest and during immunization and

hyper-immunization. PERCIVAL HARTLEY. *Memoirs Dept. Agric. India, Vet. Series* 1, No. 4(1915).—H. finds that the active bodies are similar to or are associated with the euglobulins. They are insol. in half-satd. $(\text{NH}_4)_2\text{SO}_4$ soln. and in satd. salt soln., and can be completely pptd. by dialysis with running tap water. By drying any of the above ppts. *in vacuo* over H_2SO_4 they can be obtained in the form of a powder. Their activity is lessened by the presence of HCl even in very low concns. The effect of alkalis is not so pronounced. Disease is accompanied by decreases in the total heat-coagulable protein, in the globulins (insol. in half-satd. NH_4Cl soln.), and in the protein insol. in satd. salt soln. The decrease in the last-named group is the most striking. On immunization an increase of the above proteins takes place. The increase of the globulins is shown to be almost entirely in the portion insol. in satd. salt soln. Hyper-immunization is accompanied by a more potent serum and a further increase in the same group of proteins. The potency of the serum is lowered and the quantity of the last-named group of proteins is decreased on repeated bleeding of the hyper-immunized animals; these factors are again increased by further injection of virulent rinderpest blood. The article is supplemented by a large number of charts. H. W. DAUDT.

Observations on the use of the Abderhalden reaction with normal and pathological human serums. ELLISON L. ROSS AND H. D. SINGAR. Illinois State Psychopathic Inst. *Arch. Intern. Med.* 15, 724-32(1915); cf. *C. A.* 9, 92.—Substrates prep'd. from certain human tissues contain material which is digested by enzymes present in normal human serum. This material can be washed out by boiling repeatedly with slightly acidified H_2O . The H_2O used for washing contains material that can be digested by normal serum enzymes. Brain substrate which has been washed until it no longer gives positive reactions with normal serum may still be digested by the serum of general paralytics. The material which undergoes lysis can be removed by further washing. The material thus removed is digested by normal serum in as great a degree as by that of general paralytics. The difference in the action of sera from normal persons and from general paralytics upon brain substrate appears to be quant. rather than qual. Expts. on the lysis of tissue substrates by pathological sera are of no value in permitting conclusions as to the seat of the lesion. I. GREENWALD.

The factors of coagulation in primary pernicious anemia. CECIL K. DRINKER AND SAMUEL H. HURWITZ. Peter Bent Brigham Hosp., Boston. *Arch. Intern. Med.* 15, 733-45(1915).—"Prothrombin is diminished slightly in all cases of pernicious anemia. This diminution is not great and is unimportant if active regeneration is in progress. Antithrombin and fibrinogen are normal even in the presence of very low cell counts. In one case in which there has been pronounced diminution in prothrombin, platelet counts have been strikingly low, and the picture throughout has been that of fairly complete aplasia." (Cf. *C. A.* 9, 1934). I. GREENWALD.

The origin of the protein of nephritic urine. A. L. CAMERON AND H. GIDEON WELLS. Univ. Chicago. *Arch. Intern. Med.* 15, 746-53(1915).—"A series of expts. by the anaphylaxis method gave no evidence of the existence of antigens in either urine or kidney distinct from each other or from the antigen of human serum. This result does not answer the question of the origin of urinary protein, but merely indicates the inadequacy of the anaphylaxis method for the solution of the problem." I. G.

Studies in renal function with special reference to non-protein nitrogen and sugar concentration in blood, phenolsulfonephthalein elimination and blood pressure. ARTHUR H. HOPKINS AND LEON JONAS. Univ. Penna. *Arch. Intern. Med.* 15, 964-73(1915).—High-protein feeding in nephritis, particularly in the chronic interstitial type, increases the amt. of non-protein N (N. P. N.) in the blood. Retention of N is generally accompanied by a low phenolsulphonephthalein (P. S. P.) excretion and by hypertension. Chronic passive congestion does not lead to an increase in the N. P. N.

of the blood but may diminish the excretion of P. S. P. A slight hyperglucemia occurs in many nephritics with high blood pressure and is frequent in those with retention of N and impaired P. S. P. excretion. I. GREENWALD.

A study of general and localized effects of intravenous injections of colloidal copper and casein in cases of human cancer. C. B. McCLURG, W. O. SWEEK, H. N. LYONS, M. S. FLEISHER AND LEO LOEB. St. Louis. *Arch. Intern. Med.* 15, 974-1013(1915).—An extended report not suitable for abstracting. I. GREENWALD.

The relation of uric acid to gouty attacks. AMY L. DANIELS AND FRANCIS H. McCRUDDEN. Peter Bent Brigham Hosp., Boston. *Arch. Intern. Med.* 15, 1046-52(1915).—In 2 cases of gout, the uric acid concn. in the blood was not above the normal and was not altered during gouty attacks. The excretion of uric acid was also unaffected at these times. Such attacks appeared during the period of atophan administration when the concn. of uric acid in the blood had been markedly diminished. I. G.

Urobilin in the stool—an index to blood destruction. OSWALD H. ROBERTSON. Mass. Gen. Hosp. *Arch. Intern. Med.* 15, 1072-8(1915).—An increased amt. of urobilin in the feces was found in 11 cases of pernicious anemia (except during remissions) and in congenital hemolytic jaundice, malaria and 1 case of secondary anemia, all of which showed clinical evidence of increased blood destruction. Cases of leucemia, secondary anemia, chronic passive congestion, pneumonia with jaundice and diseases of the liver all showed a urobilin output within the limits found in normal individuals. Those cases in which evidence of blood destruction was most marked had the highest urobilin content in the feces. None of the cases with normal urobilin showed evidence of hemolysis. The test is believed to be of considerable value. I. GREENWALD.

Further studies on the relation of diet to transmissible tumors. J. E. SWERT, ELLEN P. CORSON-WHITE AND G. J. SAXON. Am. Oncologic Hosp., Philadelphia. *J. Biol. Chem.* 21, 309-18(1915).—Rats fed on a growth-inhibiting diet (cf. Osborne and Mendel, *C. A.* 7, 364, 635) gave a smaller % of takes and metastases and a larger proportion of retrogressions after inoculation with the Flexner-Jobling carcinoma than did those on a normal diet. The administration of cholesterol subcutaneously (on or at a distance from the tumor) or by mouth increased the proportion of takes and metastases in both sets of animals, but did not change the relation between the results obtained with the 2 diets. Treatment inhibiting tumor growth is also apt to inhibit spermatogenesis. I. GREENWALD.

The mixed antigen method of detecting vegetable proteins. A. ZADE. Jena. *Centr. Bakt. Parasitenk. II Abt.* 42, 712-8(1915).—A method of detecting seed protein is as follows: An ext. of 6 different species of seeds was made with physiol. NaCl soln. and injected into an animal. The resulting antiserum produced a max. ppt. only when mixed with the ext. of all 6 seeds. To det. the species of a seed, the ext. of 5 of the seeds with which the animal was immunized was mixed with the antiserum. After the ppt. was formed, the ext. of the unknown seed was added. If an additional ppt. was formed, it was the 6th protein with which the animal was immunized. If no additional ppt. was formed, the unknown ext. was one of the 5. By varying the combinations, the species of the seed could be detd., if it was one of the species with which the animal was immunized. JULIAN H. LEWIS.

Therapy of calcium chloride in tuberculosis. BRASLY. *Indianapolis Med. Journal* (January); *Cincinnati Med. News* 2, No. 4, 55(1915).—Preliminary report concerning the intravenous injection of CaCl_2 in tuberculosis. Subsequent examination of subjects succumbing to the disease, revealed scantiness of C deposits, the quantity of same bearing a direct ratio to the progress attained by the disease. Clinical considerations constitute the rest of the article. SIMON MENDELSON.

The tuberculin reaction in swine. LINDNER. *Arb. kais. Gesundh.* 48, 293-302 (1914).—The normal temp. of 3 mos. old swine ranges between 39.0° and 40.0°. Subcutaneous injections of 0.1 to 0.3 cc. of tuberculin sometimes causes a rise in temp. to 41.0°, even in normal animals. A rise of temp. of 1.0° must be regarded as a positive reaction in swine after an injection of tuberculin. Of 16 positively tubercular animals all gave typical reactions after subcutaneous injection. The max. temp. was reached in 10-16 hrs., the 40.0° mark often being exceeded in 6 hrs. The administration of glycerol produces an intracutaneous reaction which is slightly different in degree and duration from that produced by tuberculin. For intracutaneous use glycerol-free tuberculin is recommended.

W. A. PERLZWEIG.

Fever studies. I. The specific hypersensitiveness of the heat centers in sensitized animals. MASAKAZU HASHIMOTO. Univ. Vienna. *Arch. exp. Path. Pharm.* 78, 370-93(1915); cf. following abstr.—While the intracerebral injection of small amts. (0.2 cc.) of horse serum or 0.9% salt soln. is without effect upon the body temp. of normal animals, 0.2 cc. horse serum causes a typical temp. fall in sensitized animals; this takes place at the close of the injection and reaches a max. (up to 3°) after 1-1.5 hrs. The duration and amt. of the decrease of temp. is, to a certain degree, dependent upon the amt. of serum injected. There is also a strong parallelism between the sensitization period and the intensity of the reaction. It occurs slightly after 3 days, considerably from the 6th to 8th day, reaches a max. from the 14th to 20th day and is yet present after 45 days. The amt. of serum which is active when injected intracerebrally (0.02 to 0.2 cc.) has no effect when given intravenously. The same effect is obtained by the use of 2-3 cc. intravenously. By the intracerebral addition of horse serum near the thermal center in smaller doses (0.0005-0.01 cc.) there occurs a more or less pronounced fever (0.8 to 1.35°); the same effect is produced by intravenous injection of 10 to 30 times that amt. (0.005 to 0.3 cc.). The fever begins in about 1/2 hr., reaches a max. at 1.5-2 hrs. and lasts 2-3 hrs. These temp. changes can be completely suppressed by the so-called "Zwischenhirn" puncture of Citron and Leschke (*C. A.* 8, 2747). The changes produced by intracerebral injections take place only if the proper antigen is injected into the sensitized animal; this reaction is, therefore, specific. They are entirely lacking in immunized animals. This shows that it is a typical anaphylactic phenomenon.

C. J. WEST.

H. PHARMACOLOGY.

ALFRED N. RICHARDS.

Fever studies. II. Effect of direct heating and cooling of the heat center upon the temperature action of different pyrogenetic and antipyretic substances. MASAKAZU HASHIMOTO. *Arch. exp. Path. Pharm.* 78, 394-444(1915); cf. preceding abstr.—This is a study of the effect of heat upon the heat centers, and upon the fever produced by different chem. compds.

C. J. WEST.

The effect of theobromine sodium salicylate in acute chromate nephritis. JAMES P. O'HARE. Harvard Med. School. *Arch. Intern. Med.* 15, 1053-8(1915).—The administration of theobromine sodium salicylate to rabbits with chromate nephritis appears to hinder the excretion of H₂O and phenolsulfonephthalein and possibly that of N. In severe or moderately severe types, such treatment usually shortens the life of the animal; in mild cases it may prolong it.

I. GREENWALD.

I. ZOÖLOGY.

R. A. GORTNER.

The adaptability of amphibia to the surrounding liquid medium by variations of the osmotic pressure of their body fluids. VI. The time in which osmotic regulation takes place. BRUNO BRUNACCI. *Atti accad. Lincei* 24, I, 272-6(1915); cf. *C. A.* 7, 2802, 3475; 9, 1944.—The expts. were carried out in solns. at room temp. (about 12°).

The frogs were first kept in soft water and then transferred to a hypertonic Ringer soln. (1.0% NaCl, etc.) and some to a weaker Ringer soln. (0.9% NaCl, etc.). 8-9 hrs. were required for the animals to raise the level of the concn. of their internal liquids to somewhat above that of the external soln. 6-7 hrs. were not sufficient. As was stated previously the osmotic regulation of the frog in the first hrs. of the adaptation takes place at the expense of the electrolytes, while during the following days it is due to osmotically active organic substances formed within the organism itself. The lymph of the sacs which is small in amt. in the first 6-7 hrs. increases later. The urine is formed following the increase in lymph. When the frogs were transferred to running soft water after remaining some days in the hypertonic solns. there was no increase in the lymph in the lymph sacs after 6-7 hrs. In general it was found that it took less time to increase the mol. concn. of the internal liquids of the animal than it took to reduce this greater conc. to that present at first. Since B. observed that frogs taken from a different locality, even after being kept for some days under the same conditions, showed a greater mol. concn. of their blood, he suggests that it is possible that osmotic characteristics acquired from the external medium become fixed in the blood to some extent.

E. J. WITZEMANN.

12. FOODS.

W. D. BIGELOW AND F. F. FITZGERALD.

The development of the technic of the microscopic examination of stockfoods at the federal agricultural experiment stations, during the last twenty-five years, especially with reference to compressed stockfood cakes. F. F. BRUYNING. *Wageningen. Pharm. Weekblad* 52, 273-93, 309-33(1915).—A review. P. v. D. M.

The determination of water in spices. L. VAN ITALLIE, M. KERBOSCH AND A. P. OLIVIER. *Leyden. Pharm. Weekblad* 52, 205-16(1915).—Of the various methods for the detn. of water in spices, only the distn. method gives accurate results. For this method, toluene or xylene is preferable to benzine, which yields low results, and to paraffin, which yields high results. The numerical data cannot be briefly abstracted. P. v. D. M.

Microscopy of cinnamon and its adulteration. P. POOTH. *Mikrokosmos* 16, 9-12(1915).—P. enumerates a number of the commonest adulterants and microscopical methods of detecting same. Two illustrations (drawings) are appended. C. A. N.

Unfermented grape juice. A. MCGILL. *Lab. Inland Rev. Dept., Ottawa, Canada, Bull.* 307, 19 pp.(1915).—An examn. was made of 107 samples collected throughout Canada during the last 3 months of 1914. The Canadian legal requirements for grape juice are: d_{40} must be between 1.0400 and 1.1240; total sugars 7-28% (stated as reducing sugars); ash 0.20-0.55 g. per 100 cc.; P_2O_5 15-70 mg. per 100 cc.; alc. must be less than 2% (vol.). With very few exceptions these limits are met by the samples reported; the exceptions indicate additions of sugar or water or both. E. J. C.

Determination of boric acid and its compounds in extracts of tomatoes and other preserved food. NICOLÁS CAMUS. Buenos Aires. *Anales soc. quim. Argentina* 2, 123-30(1914).—The method which is usually employed for the detn. of H_3BO_3 in food products and which consists in incinerating the initial material (after previous addition of alk.), extg. the ash with HCl and H_2O and evapg. the filtered acid soln. in the presence of turmeric paper is difficult of application to food products, such as canned tomatoes, which contain a large amt. of salts (usually NaCl), inasmuch as the latter crystallize upon the turmeric paper during evapn. of the filtered acid ext. and interfere to a varying extent with the development of the characteristic reddish coloration. This difficulty may be obviated by extg. the free H_3BO_3 with acetone (in which NaCl and the

other salts present are insol.); it is possible by this means to make an approx. quant. detn. which is sufficiently accurate when the amt. of H_2BO_3 present varies between the limits of 0.00001–0.002 g. The modified method consists in taking, 5 g. tomato conserves in a 30 cc. porcelain crucible, adding several drops of a 20% NaOH soln., mixing well, heating gently over a flame until the H_2O has evapd. and then incinerating at a dark red heat (so as to prevent fusion of salts). It is only necessary that organic material be sufficiently destroyed so that it does not cause coloration of the ext. The ash is finely pulverized and is then (after being moistened with several drops conc. HCl in order to liberate H_2BO_3) extd. successively for 1–1½ min. at boiling temp. on the H_2O bath with two 20–25 cc. portions of pure Me_2CO . The combined Me_2CO exts. are filtered and evapd. to dryness and the residue is dissolved in 3 cc. very dil. HCl (1 cc. HCl of 1.19 sp. gr. in 100 cc. H_2O); the latter soln. is then evapd. to dryness in the presence of two 1×15 cm. strips of recently prepd. turmeric paper. The Me_2CO employed should be colorless and should distil entirely at 56–7° without leaving a trace of colored residue; it should be free from MeOH or EtOH (so as to prevent the formation and loss by volatilization of Me and Et esters of H_2BO_3). It is possible, by means of simultaneous tests on standard solns. executed under identical conditions, to det. approx. the amt. of H_2BO_3 present from the shade and intensity of coloration of the turmeric strips. The intensity of the coloration diminishes rapidly (especially in damp weather); it is also necessary to avoid the presence of NH_3 vapors. The turmeric reagent paper should be prepd. by soaking white filter paper in an alc. soln. of pure curcumin and drying the former in an atm. free from acid or NH_3 vapors; when kept in closed bottles (preferably in the dark) the sensitiveness of this reagent paper is preserved for several days. The shade of coloration obtained with a given amt. of H_2BO_3 varies from a rose to an intense red according to the conc. of the curcumin solns. used in prepg. the test papers. When the latter were prepd. from a 0.01% curcumin soln. a pale rose coloration was produced in the presence of 0.0005 g. H_2BO_3 , while subsequent application of dil. NH_4OH (1 vol. NH_3 to 2 vols. H_2O) produced a sky-blue coloration. Test papers prepd. from a 0.08% curcumin soln. gave a red coloration with the same amt. of H_2BO_3 , while NH_3 caused the red coloration to change to intense blue. Test papers prepd. from a 0.5% curcumin soln. gave, with the above amt. of H_2BO_3 , a dark red coloration which changed to black when treated with NH_3 . A 0.05% curcumin soln. is most suited for amts. of H_2BO_3 varying between 0.00002–0.001 g. For each conc. of curcumin soln. the coloration produced by increasing amts. of H_2BO_3 reaches a max. intensity which represents the limiting amt. of H_2BO_3 which may be detd. by this method of color comparison. A tabulation is given of the intensity and shade of the colorations produced with definite amts. of H_2BO_3 and test papers prepd. from curcumin solns. of various concs. In order to have comparable conditions it is necessary to use test papers of the same dimensions, inasmuch as the intensity of coloration is a function of the area of the surface of the paper. H. S. P.

Some important constituents in the fruit of the Osage orange. J. S. MCHARGUE. *J. Ind. Eng. Chem.* 7, 612–3(1915).—Analytical. The pulp and seed contain constituents which might be of value to feed, fertilizer, oil and resin industries. I. M.

The detection of phytosterol in animal fats according to the Bomer acetate test with separation of the sterol by digitonin precipitation. B. KÜHN, F. BENGEL AND J. WERWERINKE. *Stettin. Z. Nahr.-Genussm.* 29, 321–9(1915).—The methods hitherto proposed (*C. A.* 8, 536; 1315, 3246; 9, 1079) have been further modified in that the sterol digitonide is pptd. directly in the mixed fatty acids without mechanical stirring and the sterol acetate is pptd. directly from the acetylation mixt. by treatment with 4 vols. of 50% EtOH. Treat the fatty acids from 50 g. of the fat in a 200 cc. beaker with 25 cc. of a 1% soln. of digitonin in 96% EtOH and heat on a closed

steam bath at 70° for $1\frac{1}{2}$ to $2\frac{1}{4}$ hr. until the ppt. seps. out, stirring occasionally during this time. Dil. the mixt. with 15–20 cc. of CHCl_3 , filter by means of suction, and wash the ppt. first with CHCl_3 , and then with ether until free from fat. Dry the ppt., boil with 3–5 cc. of acetic anhydride for 5 min. and then dil. the hot mixt. with 4 vols. of 50% EtOH. Sep. the crystals by filtration and recrystallize from ether in the usual way. The method will permit the detection of 1% of cottonseed oil in lard.

A. F. SEEKER.

A proposed new method for detecting the watering of milk. REMO CORRADI. Palermo. *Boll. chim. farm.* 53, 399–400(1914).—C. discusses the reply (C. A. 9, 1515) of E. Comanducci to C.'s previous criticism of Comanducci's proposed method for the detection of watering of milk. C. again contends that the average values of 5.46% lactose and $2^\circ 54'$ rotatory power assumed by Comanducci for pure milk are not correct inasmuch as the latter was not justified in rejecting certain data in obtaining these average values. C. points out that a decrease in rotatory power due to watering may be readily compensated by the addition of glucose or sucrose (which is by no means a new practise in adulteration).

H. S. PAINE.

Evaporated milk. A. MCGILL. Lab. Inland Rev. Dept., Ottawa, Can., *Bull.* 305(1915).—Analyses (for total solids and fat) of 178 samples of evapd. milk collected throughout Canada.

P. J. DONK.

Condensed milk. A. MCGILL. Lab. Inland Rev. Dept., Ottawa, Can., *Bull.* 304(1915).—Report on analyses of 200 samples of condensed milk collected throughout Canada, giving values for sp. gr., total solids, ash and fat.

P. J. DONK.

The influence of the age of cheese on the fat content. K. SCHERINGA. *Pharm. Weekblad* 52, 238–45(1915).—The pressing of the curd into cheese can produce a very decided irregularity in the distribution of fat in the cheese. If a cheese be allowed to stand at high temp. these irregularities will disappear. Furthermore, after some time an entirely different condition from the original will usually be found to prevail, due to salt and fat displacement, so that on repetition of the investigation great differences can be found between samples from the same location. As sample a pyramid should be taken, preferably from more than one point. It is suggested that a limit be set for the fat content, calcd. on the dry material, after subtraction of the ash content.

P. V. D. MEULEN.

Baking powders. A. MCGILL. Lab. Inland Rev. Dept., Ottawa, Can. *Bull.* 308(1915).—Analyses of 251 samples of baking powder collected throughout Canada, giving content of available, residual and total CO_2 .

P. J. DONK.

Studies upon the microscopy of flour and bread. C. POSENER. Berlin. *Z. Nahr.-Genussm.* 29, 329–37(1915).—P. indicates the well-known characteristics of cereal and potato flour when examd. under the microscope both by ordinary and by polarized light, showing also how these characteristics are altered by moist heat. He advocates the use of selective stains for ascertaining the nature of mixed flours and of bread prepared from them. For staining purposes mix a little of the flour or a thin paste of bread prepared by rubbing with water in a mortar, with the staining soln. and wash out the excess of water by centrifuging. Mounts may be stained by rubbing to a thin paste on a slide with a drop of the staining soln. and washing under the cover glass with water. The Ehrlich-Biondi triacid mixt. leaves wheat starch uncolored, but stains cellulose green, aleurone grains red, and pseudo-nucleins blue-green. Naphthalene blue leaves starches uncolored, cell walls and proteins becoming dyed. Methylene blue stains cereal starches a light blue, potato starch dark blue, the stain being easily washed out of cereal starch but not out of potato. A "black-white-red" stain evidently containing Congo red employed by the (Berlin?) Institute für Getreideverarbeitung

stains rye starch blackish, protein pink or red, while potato starch remains colorless. Other useful selective stains are giesma soln., thionine, cresyl violet and gentian violet.

A. F. SEEKER.

Kansas flours. Chemical, baking and storage tests. C. O. SWANSON, J. T. WILLARD AND L. A. FITZ. *Kansas Agr. Expt. Sta. Bull.* No. 202, 135 pp.(1915).—The bull. is divided into 4 parts. In Part I are described the equipment and the method used in making the baking tests. The method is in a stage of development. In Part II are given the results of the baking tests and the chem. analyses of 35 com. flours collected from Kansas mills. In addition chem. analyses of 21 wheats are given, which represent the wheats from which the flours were made. The flours were classified into 3 grades; short patent, long patent and straight. A close relation is shown between acidity and P, both total and water-sol. There is also a relation between ash and acidity. The water added in tempering influences the moisture content of the flour more than the moisture originally present in the wheat. It is shown that the protein content of wheat has a pronounced effect on the protein content of the flour. The method of milling influences acidity, ash and P content of the flour more than any variation of these constituents in the wheat. In Part III are given the chem. comp. and baking tests on flours from 2 sets of mill streams. In Part IV is given the report of 2 seasons' work on the effect of conditions of storage on flour, using bleached and unbleached flour.

B. E. BROWN.

Note on the estimation of carbonic acid in self-rising flours and baking powders. T. MACARA. *Analyst* 40, 272-5(1915).—Since in the analysis of baking powder and similar preps. no account is taken of the CO_2 liberated from the excess of NaHCO_3 by the acid in the food and the heat of baking, M. suggests that the "apparent" available CO_2 be detd., and he defines this as the amt. of CO_2 liberated on boiling with water for 30 min. He suggests the following method: 2-5 g. of the baking powder (or 10 g. self-raising flour) are transferred to a dry liter flask, A. Four or 5 pieces of pumice are added, and the flask is closed with a 2-holed stopper carrying a dropping funnel and an outlet tube leading to the bottom of a second liter flask, B. Flask B is also fitted with a 2-holed stopper through which are passed the tube from A, and a safety funnel; it contains 50 cc. satd. $\text{Ba}(\text{OH})_2$ and 100 cc. well boiled, cooled water. The seal of the safety funnel is closed with $\text{Ba}(\text{OH})_2$ soln. colored with phenolphthalein. 100 cc. alc. are run into A and the mixt. shaken to break any lumps. 100 cc. water are then added and the mixt. shaken again. The absorption flask should also be shaken if any CO_2 appears to be passing into it. 100 cc. liquid paraffin are added to A and the mixt. is heated to brisk boiling, the boiling being continued for 15 min. Without stopping the operation, 400-500 cc. boiling water are added, and the boiling continued for 15 min. The absorption flask B should be kept well shaken during the earlier part of the process. It is cooled in a basin of water when it begins to heat. At the end of 30 min., flask B is disconnected, the inlet tube closed, and the contents cooled in running water, if necessary. A small funnel is then inserted in the inlet tube, and the excess of $\text{Ba}(\text{OH})_2$ neutralized with 20% HCl to slight acid reaction with phenolphthalein. 0.5 N NaOH is then run in to slight alkalinity, and the flask is well shaken to absorb any CO_2 which may have been liberated. The stopper is then removed, and the contents of the safety funnel washed into the flask. Then the soln. is carefully neutralized with 0.5 N or 0.1 N HCl . Methyl orange is added, and titration completed.

P. B. DUNBAR.

The detection of the addition of potato to war bread. A. LINGELSHEIM. Breslau. *Z. Nahr.-Genussm.* 29, 361-8(1915).—Raw potato starch can readily be detected in cereal flour when seen under the microscope both by its well-known form and by its behavior under polarized light. The cooked and rolled potato product called "Walz-

mehl" is characterized by the mottled appearance of the rounded or somewhat polygonal masses of starch about 300μ in size, which under polarized light show strongly illuminated borders. It is also to be recognized by the cork cells occurring in fragments of the potato peel, the lumen of which measure $60-100\mu$. For detecting potato products in the finished bread remove 5 pieces about the size of a pea from different parts of the loaf and soften each separately by soaking in water. Prepare a separate mount of each by placing a piece about one cmm. in size upon a slide and pressing it down very thin under the cover glass. Exam. under a magnification of $70-80$ by polarized light. Strongly illuminated, irregular, oyster-shaped or oval particles containing dark lines or patches indicate potato starch. If "Walzmehl" is present it is indicated by the large ($80-300\mu$) starch cells of the potato, these being shown in sharp bright outline under polarized light. By mounting the bread in dil. NaOH the cork cells also become plainly visible under polarized light. The process of baking destroys the feeble optical activity of the cereal starches but impairs that of potato starch to a much less degree. The cell walls of the aleurone layer and the parenchyma of the endosperm of cereals also become visible under polarized light, the former being gradually destroyed if the mount be made in dil. NaOH. These elements are not readily confused with those of potato preps. By comparing the appearance of the unknown with that of amounts prepared from bread of known potato content an estimate can be formed of the amt. of potato present in the sample under exam. Illustrations are given. A. F. SEEKER.

Importance of potato-meal as a food. KARL LANZ. Cüstrin-Neustadt. Z. *Spiritusind.* 38, 199-200(1915).—A review of the uses of potato-starch and products derived therefrom. L. W. HAAS.

Detection of wheat and potato flour in bread. BODINUS. *Pharm. Ztg.* 60, 110 (1915).—Triturate about 3 g. of the finely powdered sample, previously dried at $60-70^{\circ}$, with 10 g. H_2O , then transfer to a boiling mixt. of 200 cc. H_2O and 1 cc. 50% KOH soln. and boil in a porcelain evapg. dish during 5 min. with const. stirring. After allowing to stand a short time, decant the hot liquid carefully, leaving about 20 cc. behind. Centrifuge the latter and subject the solid matter to a microscopical examn. It is suggested that permanent preps. of pure wheat and potato flour mixts. be made for comparison. W. O. E.

Decision of the Kaiserlichen Gesundheitsamt on the use of potato products in bread-making. Arb. kais. Gesundh. 48, 595-606(1915).—A bread prepared from rye flour with additions of potato products (potato flakes, "Walzmehl" (a cooked and rolled potato product) and potato starch) as high as 20% was not inferior to pure rye bread in appearance, color consistency, odor, and taste. Total food value (cal.) was only slightly less than that of pure rye bread. It is possible to increase the water content. H. A. PIPER.

Ether-soluble matter in the nitrogen-free extract of feedstuffs. J. B. RATHER. J. Ind. Eng. Chem. 7, 613-5(1915).—Twelve samples were studied. The N-free ext. contained from 0 to 3.84% ether-sol. material, averaging 1.49%. Six hays and 6 excrements from them contained 2.72-12.39%, av. 5.97%. In the concentrates this ether-sol. material consisted on an average of 2% unsaponified and 98% free fatty acid while in the hay and excrements the av. compn. was 3% unsaponified, 30% fatty acids and 67% saponified residues. ISADOR MILLER.

The determination of the total amount of cottonseed hulls in cottonseed cake and meal. P. S. TILSON. Houston (Tex.) Labs. Paper read before The National Oil mill Superintendents Assoc., Galveston, Tex., *Separate*(1915).—The method is based on the crude fiber content of pure cottonseed hulls and hull-free meal, the average for the former having been found to be 54.39%, for the latter 2.46% on an oil- and moisture-free basis. Det. the moisture, oil and crude fiber contents of the sample

by the usual methods. Next calc. the factors 54.39 and 2.46 to the basis of the moisture and oil contents. The total amt. of hulls can then be calcd. algebraically. Results correct within 1% of the total hull content of cottonseed cake or meal can be obtained.

BERNARD RAYMUND.

Feeding experiments with fattening swine, making comparison of dried yeast, granulated blood and extracted fish meal. KLEIN. *Milchwirtsch. Zentr.* 44, 97-103 (1915).—Three lots of swine were fed for three separate periods. The ration for each group contained barley, barley bran and potatoes; the first contained skim milk and dried yeast; the second, one-third as much skim milk and in addition granulated blood; the third, no skim milk but some fish meal. The first group gained more wt. than the second, and the second more than the third.

L. L. VAN SLYKE.

Dried yeast as food for farm stock. CHARLES CROWTHER. *Univ. Leeds. Brewers J. (London)* 51, 286-8(1915).—Dried yeast has proved a safe food for cows, pigs and calves. For cows, it is not to be strongly recommended, since they show a special aversion to its bitter taste. It has proved a good food for pigs, having given results markedly better than those obtained with an equal wt. of wheat "sharps." Dried yeast keeps well, and on mixing with other meals and water, may be kept for some time without objectionable fermentation taking place. The value of the manurial excreta may be expected to be as high as that of any other foodstuff commonly used on the farm. Although the experience with dried yeast has been favorable, there is no reason to believe that dried yeast possesses special medicinal or dietetic virtues which any other highly digestible food, rich in albuminoids, might not be expected to possess.

L. W. HAAS.

Utilization of salmon cannery waste (TURRENTINE) 27. Atlantic coast menhaden industry (GREER) 27. Cottonseed crushed in 1912, 1913 and 1914 27.

U. S., 1,143,413, June 15. G. LUNT. Bleaching and aerating dough by forcing large amts. of air containing a small proportion of NO₂ through the dough after expiration of about 3/4 the usual time of fermentation.

U. S., 1,143,516, June 15. B. E. DUNN. Producing an acidulated whole-milk beverage by maintaining natural whole milk at a temp. of about 32° until an acidity equivalent to 0.6% lactic acid is developed, then cooling immediately to about 7° and agitating to form a homogeneous mixt.

U. S., 1,144,539, June 29. W. P. M. GRELCK. A fatty mixture for use as a butter substitute, composed, *e. g.*, of the usual constituents of butterin, is formed by thoroughly mixing the constituents and atomizing them together while heated and congealing the atomized material by contact with cool air. The process is stated to produce a butterin of better flavor and aroma than when the product is cooled in H₂O.

U. S., 1,144,883, June 29. B. D. WHITE. Apparatus for pasteurizing milk.

Brit., 5,001, Feb. 26, 1914. F. HOFFMANN and C. MEERWEIN. Malt ext. and Ca casein are mixed to form a food.

Brit., 5,111, Feb. 27, 1914. VICTOR CHEMICAL WORKS. A baking powder or baking acid in which Ca(H₂PO₄)₂ is the main acidic constituent which reacts with a carbonate is prep'd. by introducing an alkali salt which reacts with Ca(H₂PO₄)₂ to form a primary alkali phosphate. Na₂HPO₄, a primary or secondary sulfate, a primary or secondary tartrate, a primary, secondary, or tertiary citrate and meta- or pyrophosphate may be employed. The prepn. may take the form of a baking powder, self-rising flour, or the form of a wet dough mixed ready for baking. In the last-mentioned form, the salt employed may be in the hydrated form; in the others, the salt used should

be non-hygroscopic. The following is the comp. of baking powder and baking acid, resp.: $\text{Ca}(\text{H}_2\text{PO}_4)_2$, 30%, 60%; Na_2HPO_4 (anhydrous), 15%, 30%; starch, 30%, 10%; NaHCO_3 , 25%.

Brit., 5,154, Feb. 27, 1914. J. R. KATZ. Keeping bread or pastry fresh by submitting it to the influence of a current of air of about 85% humidity. The moisture is given to the air by passing it over aq. solns. of H_2SO_4 , NaCl , CaCl_2 , etc. Cf. C. A. 9, 2204.

Brit., 5,206, Feb. 28, 1914. C. CORDES. Preserving eggs by washing them with soda, exhausting the air, filling with HCHO , again exhausting, filling with an inert gas such as sterile air, and finally packing, preferably after dipping them in a soln. of HCHO , etc., in an antiseptic packing or receptacle. The packing may consist of wood-wool, wadding, or paper wrappers folded over at the meeting edges and twisted at the ends. The packing or receptacle may be sterilized with HCHO , etc.

Brit., 5,742, Mar. 6, 1914. J. S. DAVIDSON. Construction of an app. for drying tea, coffee, grain, etc.

Ital., 118,591, July 21, 1913. SOCIETÀ DI ESPORTAZIONE POLENGHI-LOMBARDI & SONCINI EMILIO. A milk product is obtained from whey by dialyzing whey after the lactose has crystallized out, concg. the dialyzed portion, and pptg. with alc.

14. WATER, SEWAGE AND SANITATION.

EDWARD BARTOW.

Solubility of calcium carbonate and magnesium carbonate in water free from carbon dioxide, with a consideration of the salt content and organic substances. E. GOTHE. *Chem. Ztg.* 39, 305-7, 326-7(1915).—The solubility of CaCO_3 in CO_2 -free H_2O varies slightly, averaging 31.0 mg. per l. The solubility of MgCO_3 varies much more widely, averaging 94.4 mg. per l. The solubility of CaCO_3 and MgCO_3 is raised by chlorides, nitrates, and sulfates of the alkalis and is lowered by carbonates. The chlorides, nitrates, and sulfates of the alk. earths lower the solubility. Ca and Mg bicarbonates are greatly influenced in their solubility by organic matter, especially in the presence of neutral salts of the alkalis.

W. W. HANFORD.

Absorption of chlorine as criterion of quality of waters. E. A. ZALESKII AND N. A. EL'MANOVICH. *J. Russ. Phys. Chem. Soc.* 46, 1270-83(1914).—When chlorinated lime (a) is used for the purification of H_2O for drinking purposes, the alkalinity and the temp. of the H_2O exercise a great influence on the amt. of Cl it is capable of absorbing. Hence the authors treat the H_2O with $\text{Ca}(\text{OH})_2$ and (a), successively boil and cool the mixt. for a definite length of time, and, after adding $\text{KI} + \text{HCl}$, det. the unabsorbed Cl by titrating the liberated I with $\text{Na}_2\text{S}_2\text{O}_3$. Numerous tables illustrate the results.

H. M. GORDIN.

Representation of the results of analysis of natural waters. P. P. VON VEIMARN. *J. Russ. Phys. Chem. Soc.* 46, 752-3(1914).—The expression of the analytical results of water analysis in terms of salt contents is incorrect, since many of the salts (e. g., $\text{Ca}_3(\text{PO}_4)_2$, CaCO_3 , etc.) do not exist in the water on account of insolubility. On the other hand, the representation of the data in terms of ions is to many insufficiently lucid. The author, therefore, proposes an interpretation in salt terms of the compn. of the dry residue which actually contains these salts in the form represented.

H. M. GORDIN.

Detection and iodometric determination of nitrous acid in polluted waters. L. W. WINKLER. Budapest. *Z. Nahr.-Genussm.* 29, 10-7(1915).—On adding KI in

acid soln. to a water containing nitrites, free I is liberated and the sepn. of I goes on indefinitely as long as there is dissolved O present. If the I is titrated after a given period of time, the nitrite content may be detd. with a relatively great degree of accuracy when the nitrite content is less than 0.3 mg. N_2O_5 per l. For larger amts. the author's iodometric bicarbonate method (*Chem. Ztg.* 23, 454(1899) and 25, 586(1901)) is applicable. Preliminary expts. were run to det. the amt. of I liberated after definite periods of time. To 100 cc. portions of nitrite-free H_2O , satd. in glass-stoppered flasks with air at 20°, known amts. of $NaNO_2$ were added, and 0.2 g. pure KI and 5 cc. of 25% H_3PO_4 added to each flask. The flasks were allowed to stand 3, 6, and 24 hrs. in the dark and the liberated I titrated at the end of each period. The I set free was not proportional to the HNO_2 present. A table was constructed from the results of the titrations to show directly mg. N_2O_5 corresponding to any titration of 0.02 N thiosulfate from 0.05 cc. to 10 cc. The detn. on unknown waters is carried out in the same way as the above expts., titrating preferably after 24 hrs. Small amts. of iron and organic matter do not interfere, but when in larger amts. they should be removed.

L. D. ELLIOTT.

Physical and chemical constants of mineral waters. F. BORDAS. *Ann. fals.* 7, 387-407(1914); through *J. Chem. Soc.* 108, II, 101(1915).—Analyses of Fr. mineral waters giving n , capillary pressure, f. p., elec. resistance and cond., ionization, and estn. of total solids, alkalinity, Cl, nitric N and other elements characteristic of mineral waters.

H. S. BAILEY.

Chemical composition of the water of the "Kuvak" springs and the probable cause of their pollution. P. P. VON VEIDMARN. *J. Russ. Phys. Chem. Soc.* 46, 746-52(1914).—At present there are no human habitations in the neighborhood of the springs; the fact that the H_2O is polluted with org. matter seems to indicate that refuse from former times must exist somewhere nearby. The physical properties are satisfactory but a chem. exam. shows, however, that the H_2O contains NH_3 and nitrites, and must be regarded with suspicion if it is to be used for drinking purposes. H. M. GORDIN.

Hydrological evidence of soft water. E. PRINZ. *Intern. Z. Wasser Versorgung.* 2, 84-7(1915).—The city of Luckenwald decided to secure a new water supply. In order to obtain the softest water possible a hydrological survey was made. This consisted of analyzing water from springs and wells and also from the various water courses. Borings were made and curves of equal hardness were drawn. These showed that the hardness varied in the territory investigated. By means of this systematic investigation a continuous supply of softer water than might have otherwise been obtained, was secured.

FRED W. TANNER.

Biochemical and engineering aspects of sanitary water supply. G. W. FULLER. *J. Frank. Inst.* 180, 17-61(1915).—An address.

W. F. L.

Purification of boiler feed water. E. BROWN. *Met. Chem. Eng.* 13, 156-60(1915).—A review.

W. F. L.

Value of chemical examination of ground waters. R. HAACK. *Z. Ver. Gas- u. Wasserfachm. Oesterr. Ungarn.* 55, 200-2(1915).—The bacterial exam. of ground waters is not necessary at intervals as frequent as in the case of chem. exam. Some of the advantages of a chem. analysis mentioned are as follows: physical appearance, whether or not a ppt. will form on standing, CO_2 content, nature of Fe and Mn compds. if present, hardness, whether Cl is united to Na or Ca, forms of N organic matter as shown by O consumed.

F. W. TANNER.

The necessity of an iron removal plant. F. H. SCHILLING. *Intern. Z. Wasser Versorgung.* 2, 69-71(1915).—The objectionable features of an iron-bearing water are considered from an industrial and sanitary standpoint.

F. W. TANNER.

The necessity of an acid removal plant. F. H. SCHILLING. *Intern. Z. Wasser Versorgung*. 2, 77-9(1915).—Acid-ground waters often attack the pipes and walls of concrete reservoirs and pipes are sometimes clogged by pptn. of the substances thus dissolved. The most objectionable factor to be considered is the solution of Cu and Pb. Lead poisoning from water has reached epidemic proportions in a few German cities. In cities using acid-ground water, tin-lined pipes are sometimes used. F. W. T.

Sterilization of drinking water by compressed calcium hypochlorite tablets. M. VINCENT AND M. GAILLARD. *Compt. rend.* 160, 483-6(1915); *J. pharm. chim.* 11, 271-5(1915).—Three sizes of tablets are prepared, for 1, 5 and 10 l. of H_2O , containing, resp., 0.015, 0.075 and 0.15 g. of $CaOCl_2$, and 0.08, 0.38 and 0.60 g. of NaCl as an adjuvant. They yield 3-3.5, 17 and 35 mg. of Cl. NaCl efficiently aids in the diffusion of Cl through the H_2O which is almost complete after 20 min. Results of about 30 analyses of natural and polluted waters show a decrease of N (albuminoid and NH_4) by 25-75%. Odors due to putrid fermentation disappear completely. Pathogenic bacteria are killed after 10 or 12 min.; in presence of 1:2 pts. per mil. organic N, in 10 or 15 min., non-pathogenic bacteria are markedly reduced in numbers. The tablets when kept dry, cool, and in the dark, will retain their strength for several months. S. WALDBOTT.

Some filtration plant bacteriological data. R. D. SCOTT. *Ohio Pub. Health J.* 5, 734-41(1915).—The bacterial character of water during periods of long storage varies from that of flood stage in that (1) count is less, (2) ratio between 37° and 20° counts is higher and (3) *B. coli* of saccharose-fermenting type are more numerous. In CaO-softened water bacterial count is less, ratio of *B. coli* to total bacterial count is less and ratio between 37° and 20° counts is higher. The proportion of dextrose but non-lactose fermenters is greater, and saccharose-fermenting *B. coli* are more numerous. The proportion of non-fermenting dulcitol organisms is not affected by storage or CaO. This is true of non-indole-formers. The coli group is about 4% of the 37° count, the ratio being irregular. J. GAUB.

Examination of drinking water on railroad trains. R. H. CREEL. *U. S. Hyg. Lab. Bull.* 100(1914).—C. made a bacteriol. survey of drinking water served on trains entering Washington, D. C., from all parts of the eastern U. S. The methods of examn. employed were not standard, being essentially as follows: Fermentation tests were made in both lactose broth and bile, using 5 and 10 cc. quantities of water. Transfers from positive gas tubes to Endo plates and also to plain agar tubes at 75° , were made. Typical colonies on Endo plates were considered positive indication of *B. coli*. Doubtful colonies were inoculated into lactose broth from which final results were recorded. If, with a *B. coli* negative Endo plate, an anaerobic growth with gas production was obtained in the agar tube at 75° , the original fermentation was attributed to an anaerobic spore-forming bacillus. Counts were made on agar at 37° . Of the 1000 samples examd., 421 showed gas in the presumptive test when 10 cc. quantities were inoculated. Only 91 samples were confirmed as contg. *B. coli* while the remaining 330 were recorded as contg. gas-producing anaerobes. Two types of anaerobes were found; the characterization of these is given. Samples collected from mail cars and day coaches were found to indicate *B. coli* much more frequently than were samples from sleeping and dining cars. W. F. LANGLELLER.

Algae troubles in Italian waterworks. G. GASPERINI. *Intern. Z. Wasser Versorgung*. 2, 83-4, 91-2(1915).—G. cites several instances where peculiar odors and tastes in water supplies have been due to algae. Beggiatoaceae give the greatest amt. of trouble. To prevent algae troubles, distribution systems should be kept flushed. Sometimes it is necessary to resort to such disinfectants as Cl and $Ca(OCl)_2$.

FRED W. TANNER.

Sanitary features of the Los Angeles aqueduct. E. O. SLATER. *J. Ind. Eng. Chem.* 7, 622-5(1915).—An address. ISADOR MILLER.

The water supply of the city of Halle a/S. H. PRECHT. *Chem. Ztg.* 39, 410-2 (1915).—Monthly analyses of H_2O from the Elster and Saale rivers and that supplied to Halle are given from Dec. 1912 to Mar. 1915, showing that the proximity of these polluted streams to the region from which the city supply is drawn has not affected the latter. J. H. MOORE.

Water purification at Columbus, Ohio. C. P. HOOVER. *Ohio Pub. Health J.* 5, 709-34(1915); cf. *C. A.* 8, 2766; 9, 495.—H. describes water filtration, methods of analysis for chemicals used, and specifications for the purchase of chemicals. J. GAUB.

River pollution in colliery districts. *Colliery Guardian* 109, 752-3, 820-1(1915).—*Final report of the Royal Commission on Sewage Disposal.* Coal washing water can be effectively dealt with by settlement in tanks or ponds; not more than 4 pts. per 100,000 should remain in the effluent. Na_2SO_4 liquor and spent gas liquor from shale oil distn. plants are allowed to settle in tanks and then pumped onto heaps of spent shale which further filter it. Spent gas liquor from coke ovens may be evapd. either by using it for coke quenching or by means of waste heat in specially constructed evaporators. Under no circumstances should it be discharged untreated into a stream. H. L. OLIN.

Purification of farm drainage. H. WEIGMANN AND A. WOLFF. *Milchwirtsch. Zentr.* 44, 65-73(1915).—Expts. are described in which treatment of drainage water by various methods is given, e. g., by fullers' earth, milk of lime, and $FeSO_4$; the last is recommended. L. L. VAN SLYKE.

Liquid trade wastes. ANON. *Engineering* 99, 483-4(1915).—The Ninth Report of the Royal Commission on Sewage Disposal recommends that the effluent from a works shall not contain more than 40-60 p. p. m. of suspended matter, and shall not absorb more than 20-60 p. p. m. of dissolved O in 5 days. W. W. HANFORD.

Concentration of sewage sludge. J. GROSSMAN. *J. Soc. Chem. Ind.* 84, 588-92 (1915).—A sludge should contain at least 20% solid matter if it is to be subsequently dried by heat. Ordinary settling tank sludges containing only 10% solid matter can economically be 50% dehydrated by treatment with 3 parts per 1000 of H_2SO_4 . It is claimed that this method is more economical than other methods of preliminary water elimination that have heretofore been proposed. W. F. LANCELIER.

Dickson centrifuge system of sewage treatment. E. H. TRIPP. *J. Soc. Chem. Ind.* 34, 517-24(1915).—Sewage sludge taken from settling tanks is treated with 0.5% brewers yeast, warmed to $94^\circ F.$, and allowed to stand in shallow troughs for 24 hrs. In this manner a sepn. of solid and liquid is obtained. The action is due to anaerobic bacteria which feed on the yeast and form gas. The treatment eliminates $1/2$ of the water normally present in the raw sludge. The sepd. sludge is dried in a mechanical heating device and is sold as fertilizer. A centrifuge filter for use in sewage treatment is also described. W. F. LANCELIER.

Treatment of sewage sludge. R. O. WYNN-ROBERTS. *Can. Eng.* 28, 697-9 (1915).—Discussion of paper presented by Gillespie (*C. A.* 9, 830). The processes discussed cover grit chamber treatment, screening, sedimentation, degreasing, biologic treatment (including recent expts. on aeration of sewage with activated sludge) and sludge disposal. ARTHUR LEDERER.

Report of sewage disposal, Columbus, Ohio. C. B. HOOVER. *Ann. Rept. for* 1914, 32 pp. H. P. CORSON.

Reinsch-Wurl sewage screens, Brooklyn. ANON. *Eng. News* 73, 1224-5 (1915).—Two 6-million gal. sewage screens are to be installed at the sewage treatment plant of the 26th Ward, Brooklyn, N. Y. The specifications and plans were prepared on a competitive basis permitting the use of Imhoff tanks or sedimentation tanks with separate sludge-digestion and sludge-drying beds for either of the tank plants, and Riensch-Wurl fine screens. A partial list of foreign screen installations is given; also views showing screening operations at Dresden, Germany. ARTHUR LEDERER.

The practical use of disinfectants. H. E. HASSELTINE. *U. S. Pub. Health Reports* 30, 2049-60 (1915).—Disinfectants properly applied are a good preventative for communicable diseases. The choice must be made with consideration of conditions. HCHO is the simplest and most efficient for gaseous disinfection. Control tests should be made to check the efficiency of the substance used. J. GAUB.

Destruction of flies and the disinfection of cadavers in war zones. E. ROUBARD. *Compt. rend.* 160, 692-3 (1915).—Heavy coal tar oils spread upon fecal matters prevent the attraction of flies. In treatment of manures intended for fertilizer, a 5% soln. of sodium cresolate should be substituted. $\text{Fe}_2(\text{SO}_4)_3$ either pulverized or as a 10-20% soln. is suitable for disinfecting cadavers. Hypochlorites, FeSO_4 and CaO were tried and found inferior. W. F. LANGELIER.

Waste liquor question of the potash industry (BERGE) 18. Solubility of magnesium carbonate in natural waters (WELLS) 8. Arsenic content of wall papers (SCHULZ) 23.

U. S., 1,143,129, June 15. T. H. MULCH and B. H. T. MULCH. Water-filter.

U. S., 1,143,295, June 15. W. F. McNABB. Heat-producing composition for use in clearing sewer pipes, formed of NaOH 3, $\text{K}_2\text{S}_2\text{O}_8$ 1, oxalic or tartaric acid 1 and finely divided Al 0.1 parts. A small amt. of KNO_3 may be added to increase the effect, or the Al may be omitted to form a less energetic mixt. Cf. C. A. 9, 697.

Brit., 5,512, Mar. 4, 1914. L. LINDEN. In app. for filtering and sterilizing liquids, especially impure H_2O supplies, the filters are cleansed by a reversal of the horizontal flow therethrough, and the matter removed is deposited in suitably placed settling tanks. Cf. C. A. 8, 2915.

Ger., 279,990, Oct. 25, 1911. DEUTSCHE DESINFektionENZENTRALE, G. M. B. H. Constructional details of an app. for disinfecting *in vacuo*, by means of mixts. of H_2O and HCHO vapors, or other volatile H_2O -sol. disinfecting agents.

Ger., 281,184, Sept. 24, 1912. Addition to 279,990 (*supra*). DEUTSCHE DESINFektionENZENTRALE, G. M. B. H. Modification in the method of disinfection *in vacuo*, by means of mixts. of H_2O and HCHO vapors. Cf. C. A. 9, 945.

15. SOILS AND FERTILIZERS.

R. O. E. DAVIS.

Soil colloids and their adsorption power. P. ROHLAND. Stuttgart. *Landw. Jahrb.* 47, 239-47 (1914).—A considerable part of this paper is a criticism of views by Ehrenberg, Oryng, Gorski and others on the adsorption of complexly constituted color compounds, such as crystal violet, by soil colloids. R.'s expts. show that kaolin has different adsorption properties depending upon its origin and method of formation. The presence of numerous colloids in clay, clayey soils, peat and red-earth explains the greater adsorptive powers of these soils, also their properties of contraction on evapn. and their solvent action towards such crystalloids as phosphoric acid, potash and lime. This

results from the greater water imbibing power of these soils due to the colloids present. The adsorption of complexly constituted color compounds by these soils makes possible a quant. colorimetric detn. of the colloids. The colloids have the property of taking up in large quantities foreign solids such as sand, when in the form of powder, without altering the original properties of the soil.

J. R. SCHROEDER.

Notes on the colorimetric determination of phosphorus in soil extracts. C. E. MILLAR AND F. A. GANGLER. *J. Ind. Eng. Chem.* 7, 619(1915).—The method of Veitch (*J. Am. Chem. Soc.* 25, 169(1903)) is considered sufficiently accurate. I. M.

Variation of the fertility of soils under the influence of natural conditions and dry air storage. K. GHEDROIZ. *Selkoe Khosiastro i Lessovodstro* 47, 630(1914); *J. Soc. Chem. Ind.* 34, 502.—Soil when stored in dry air gave increased productivity in proportion to the length of storage; the H_3PO_4 and N contents of the plants grown thereon, and the citrate-sol. P_2O_5 of the soil, vary in like manner.

R. O. E. D.

Effect of moisture content of a sandy soil on its nitrogen-fixing power. C. B. LIPMAN AND L. T. SHARP. *Botan. Gaz.* 59, 402-6(1915).—A light sandy soil from a walnut grove in Anaheim, Calif., was employed, and the natural N-fixing flora thereof studied in its relations to moisture. The soil-culture method was used in which 50-g. portions of soil were mixed in tumblers with 1 g. of mannitol and water added in varying quantities. The mixt. was stirred with a sterile spatula, the tumblers covered with Petri dish covers and incubated at $28-30^\circ$ for 21 days. The N fixation in a sandy to sandy-loam soil by means of its natural flora, and under optimum temp. conditions, takes place most actively with a water content ranging from 20 to 24%, based on the air-dry weight of soil, or 22.5 to 26.5% based on the water-free soil.

B. H.

The determination of the sulfoxyg power of soils. P. E. BROWN AND E. H. KELLOGG. Iowa State College. *J. Biol. Chem.* 21, 73-89(1915); see *C. A.* 9, 833.

A. P. L.

New experiments on alkali soil treatment. Preliminary report. CHARLES B. LIPMAN AND LESLIE T. SHARP. Univ. Calif. *Agric. Sci.* 1, 275-90(1915).—Pot tests with barley were carried out on an alkali soil. The soil was distributed in 8-inch earthenware pots in portions of 6 kg. each and the pots were then treated as follows: untreated, 30.42 g. actual H_2SO_4 , 41.76 g. actual H_2SO_4 , 11.02 g. actual H_2SO_4 , 62.08 g. $CaSO_4 \cdot 2H_2O$, 6 g. $CuSO_4$ calcd. as anhydrous salt, 30 g. $FeSO_4$ calcd. as anhydrous salt, 12 g. Na_2SO_4 (anhydrous) and 300 g. air-dry barnyard manure. The beneficial effect of the smallest amount of H_2SO_4 applied is especially noteworthy. Gypsum, $FeSO_4$, and barnyard manure treatments were instrumental in improving the producing power of the soil for barley. $CuSO_4$ and Na_2SO_4 were without effect in a positive direction and appeared even to render the soil a much poorer medium for the growth of barley than it was before treatment. Root yields do not appear to follow in a general way the yield of tops.

W. H. FRY.

Note on the formation of tricalcium phosphate on mixing ground limestone with acid phosphate. R. N. BRACKETT AND B. FREEMAN. Clemson College. *J. Ind. Eng. Chem.* 7, 620(1915).—On mixing ground limestone with acid phosphate, $Ca_3(PO_4)_2$ is formed immediately and the amt. of this increases slightly on standing. I. M.

Utilization of Pacific kelp. J. W. TURRENTINE. U. S. Bur. of Soils. *Pacific Fisherman* 13, No. 6, 13-4, 36, 38, 40(1915); cf. *C. A.* 9, 1218.—A discussion of the feasibility of combining the treatment of kelp with the rendering of cannery waste. The botany of kelp, its distribution, quantity, chem. compn., and fertilizer qualities are described.

W. H. FRY.

Composition of certain fish fertilizers from the Pacific coast and the fertilizer value of degreased fish scrap. J. R. LINDEMUTH. Bur. Soils. *J. Ind. Eng. Chem.*

7, 615-9(1915).—Analytical. The average comp. of the waste is N 9.31%, P_2O_5 6.72%, oil 12.69%. This material is high in fertilizer value. ISADOR MILLER.

Waste products of agricultural interest: wool and leather wastes. E. J. RUSSELL. *J. Board Agr.* 21, 1087; *J. Soc. Chem. Ind.* 34, 439.—Middle grade shoddies have long been used for hops and fruit. At Rothamsted it has been shown that they are also good for ordinary farm crops, and on heavy soils. Shoddy is one of the cheapest nitrogenous fertilizers on the market. Processed shoddy, which has been treated with H_2SO_4 or has had the oil removed, is no better than untreated material. Untreated leather waste is of no value but treated has given some promising results. Untanned leather and scrap from glove-making possess fertilizing value. R. O. E. D.

Antagonism between anions as affecting barley yields on a clay adobe soil. C. B. LIPMAN AND W. F. GERICKER. *J. Agric. Res.* 4, 201(1915).—Expts. to det. the antagonism between the anions of the ordinary alkali soil were carried out under greenhouse conditions. The results indicated the existence of antagonism between anions in a clay-adobe soil for barley as follows: between NaCl and Na_2SO_4 and between NaCl and Na_2CO_3 in the second crop (none shown in the first crop); slight antagonism between Na_2CO_3 and Na_2SO_4 in the first crop. Marked antagonism exists in both first and second crop between Na_2SO_4 and $CaSO_4$ in soil cultures. It was found that 0.1% each of NaCl and Na_2SO_4 stimulates barley in the first crop and is toxic in the second. Na_2CO_3 does not show toxicity but stimulates up to 0.3% of the dry wt. of soil.

R. O. E. D.

The Woburn pot culture experiments. J. A. VOELCKER. *J. Roy. Agr. Soc.* 75, 306-322(1914); cf. *C. A. S.* 8, 2772.—I. Hills' Experiments: (a) *The influence of copper sulfate on wheat.* $CuSO_4$ in soil in pots was injurious to wheat when used in amts. of 0.05% of Cu. Quantities less than this had a slightly stimulating effect. $CuHPO_4$ in amts. as high as 0.10% Cu had no harmful effects. $CuCO_3$ in amts. of 0.10% Cu was as harmful as $CuSO_4$, but was stimulating in amts. of 0.02% Cu. $Cu(NO_3)_2$ in as small amts. as 0.02% Cu was harmful, and was stimulating in smaller amts. $Cu_3(AsO_4)_2$ was harmful in as small amts. as 0.005% Cu. (b) *The influence of lead salts on wheat.* $Pb_3(PO_4)_2$, $PbCO_3$, $Pb(NO_3)_2$, $PbSO_4$ and $PbCl_2$ in amts. of 0.03 to 0.10% Pb were slightly stimulating. There was no indication of toxicity in any of the cultures. II. *The relation of lime to magnesia in soils.* $CaCO_3$ in quantities of 2.5 to 4.5% added to a soil rich in Mg gave increased yields of barley. It is shown that Ca can be added without detriment in amts. double the quantity of Mg in the soil. III. *Acidity of soil.* Barley was grown, in pots, in soil from the Rothamstead $(NH_4)_2SO_4$ -treated plots to test the effect of different amts. of Ca. Acid soil from plots which failed to produce crops was benefited by adding $CaCO_3$ in amts. to exceed that required to neutralize. Acid plots which still produced crops, were not benefited by $CaCO_3$ exceeding the amt. required to neutralize, and the plots which gave a neutral reaction were not benefited by $CaCO_3$ in any amts.

J. J. SKINNER.

Pot tests with fertilizer compared with field trials. G. N. COFFEY AND H. F. TUTTLE. *J. Am. Soc. Agron.* 7, 129-39(1915).—Fertilizer requirements of soils as detd. by growing wheat 4 to 6 weeks in pots containing 40 lbs. of soil are correlated with the requirements as determined by long continued field plot tests. Three soil types were used in these tests. To secure best results it was found that the soil should be placed in pots in the same relative position and condition as in the field, using both soil and sub-soil. Air drying and excessive handling should be avoided. J. J. S.

Constituents of the fruit of the Osage orange (MCHARGUE) 12. Potash salts, 1914 (PHALEN) 18. Potash from kelp (CAMERON) 18. Sludge from the sulfide process of depilating skins (HELFRICH) 29. Atlantic coast menhaden industry (GREER) 27.

U. S., 1,144,405, June 29. T. L. WILLSON and M. M. HAFF. A fertilizer is made by fusing feldspar (*e. g.*, orthoclase) with Ca phosphate and either using the product directly as fertilizer or leaching it and evapg. the soln. to dryness. Carnallite or kainite may be added to the mixt. and fluxes such as fluorides, borates or Fe oxide may also be included in the charge. Cf. C. A. 9, 839.

U. S., 1,144,905, June 29. L. KERN. Fertilizer is made by atomizing or fermenting waste sulfite liquor to remove the SO_2 or carbohydrates and then mixing it with kieselguhr and $\text{Ca}(\text{NO}_3)_2$ or other fertilizer ingredients. Cf. C. A. 9, 950.

Brit., 5,184, Feb. 28, 1914. T. TWYNAM. In mfg. fertilizers finely ground basic phosphatic slag is treated with a restricted amt. of HNO_3 , insufficient to act upon the Fe compds. or to cause the formation of gelatinous SiO_2 to any notable extent. The HNO_3 is preferably obtained from the air by an elec.-arc process. After drying, the deliquescent mass which is obtained may be converted into a dry condition by adding K, NH_4 , or Na sulfates. The $\text{Ca}(\text{NO}_3)_2$ may be sepd. from the mass by soln.

Ger., 281,766, Dec. 10, 1913. C. BÖHRSCH. Process of mfg. a non-dusting bone meal without affecting its value as a fertilizer or increasing its cost materially, consisting in mixing finely ground bone meal with definite amts. of H_2O and adding small amts. of acids or acid salts. At a certain stage of the process a portion of the added H_2O is removed, by artificial drying by heat, either immediately after the mixing or before packing. By the addition of H_2O the small amts. of glutinous substance present in the meal are removed by soln., and form with the small amts. of phosphate, which are likewise dissolved by the acidified H_2O , a glutinous mass which binds the dust particles together. After expulsion of the excess H_2O , a non-dusting, granular product is obtained which may be strewn readily. The addition of acid or acid salts prevents molding in stored masses, and also converts a portion of the $\text{Ca}_3(\text{PO}_4)_2$ into CaHPO_4 , which, in consequence of its greater solubility, increases the value of the product as a fertilizer. *E. g.*, 100 kg. finely ground bone meal of about 30–33% H_4PO_4 content are mixed with about 40 liters H_2O and 10 kg. waste H_2SO_4 from mineral oil refinement (about 50° Bé.) until the product is of uniform texture, which is accomplished in several mins. The excess H_2O is then removed in drying app.

Ger., 282,259, Nov. 13, 1913. J. PLEINES. In a process of mfg. a copper-lime powder for plant treatment, paraffin, ceresin, wax, or the like, is added to the CaO when it is slaked, and the resulting powder is mixed with dextrin or the like. The heat of slaking melts the paraffin, ceresin, or the like, which is absorbed by the $\text{Ca}(\text{OH})_2$. After slaking, the $\text{Ca}(\text{OH})_2$ satd. with paraffin or the like, is dried and pulverized. On account of the absorbed material the mass is preferably ground with the addition of charcoal or the like. In addition to dextrin or a similar binder, S or any other suitable substance is added, when required, to the $\text{Cu-Ca}(\text{OH})_2$ powder. The addition of paraffin imparts to the powder the property of softening in the heat of the sun and of spreading over the surfaces treated, and causes it to adhere firmly. If the powder contains S the oxidation thereof causes an increase in the temp. and favors the melting of the paraffin in the air. The addition of dextrin or the like insures adhesion of the powder under conditions of dew and wet weather. The product is claimed to serve especially in protecting plants against *Peronospora*, *Oidium*, or the like. In order that it may be applied also to protect against animal parasites, nicotine, Schweinfurth green, and other poisons, may be added when the CaO is slaked.

Ger., 282,461, Aug. 18, 1910. W. MATHEIUS and H. BLOME. From phosphorites, by fusion, compounds of citrate soluble phosphoric acid can be obtained if the chem. conditions are so controlled that the formation of a compd. of the formula $5\text{CaOP}_2\text{O}_5\text{SiO}_3$ may be formed.

Ger., 282,532, Mar. 19, 1914. L. WILKENING. Mfg. a permanent non-hygroscopic fertilizer which is easily strewn, by mixing peat with molasses distillers' slops, and subjecting the mixt. to bacterial fermentation to destroy the hygroscopic constituents. The fermentation of the slops is interrupted by the addition of dil. acids, in order to prevent a further decomp. The required bacterial solns. can be obtained by treating decomposed animal fertilizers with dil. slops. E. g., peat meal is satd. with molasses slops of about 10° Bé., inoculated with a pure culture or with a bacterial soln. produced from decomposed horse manure with dil. slops, or with a mass already in fermentation, and then the mixt. is enriched with slops of about 20° Bé. until the desired N content has been reached. The fermentation is discontinued by drying alone, or with the addition of dil. acids. A mixed fertilizer is obtained which contains N, K, P, Ca, in proper proportions.

Ital., 131,528, Apr. 15, 1913. G. CRIFFA. A fertilizer consists of a mixt. of Ca phosphate and chloride in varying proportions, dependent upon the nature of the soil to which it is to be applied.

16. FERMENTED AND DISTILLED LIQUORS.

ROBERT WAHL.

Increasing production of South American wines. LEO J. KEENA. Consul General, Valparaiso. *Commerce Reports* 161, 182-5(1915).—Statistics for 1913-4. E. H.

The formation and determination of the acids in malt and barley and their extracts. H. LÜERS AND L. ADLER. *Z. Nahr.-Genussm.* 29, 281-316(1915).—(1) *The formation of the acids: an enzymic process.* In the extn. of malt in barley meal with H₂O, acid-forming enzymes become active. The acid formed is for the most part phosphoric, produced by the action of phytase upon phytin. Expts., were conducted showing the influences of conc., temp., time, and conc. of H ion. An extn. period of 3 hrs. at the optimum temp. of 53° gives the greatest yield of acid. The proportion of malt to H₂O can be altered without affecting the result. The influence of the conc. of H ion cannot be definitely detd. on account of other influences, but it was found that a H ion conc. of more than 10⁻⁶ and smaller than 4 × 10⁻⁷ hinders the enzymic action. By treating with boiling alc. the action is completely stopped. (2) *Methods of detg. the acids in malt and barley.* There are 2 kinds of acids to be dealt with, those originally present and those formed by enzymic action during extn. *Detn. of acids originally present in malt.* Forty g. of the finely ground malt or barley are treated in a beaker with 40 cc. of 96% alc. which has been neutralized with NaOH; with barley 50 cc. is used. Should this amt. not be sufficient thoroughly to permeate the mass a little more is added. The beaker is heated on a water bath at 78-80° for 20 min. in the case of malt, and 30 min. with barley, stirring repeatedly to allow the most of alc. to escape. The mixt. should now have a plastic, doughy consistency; if not, the heating should be continued a few min. After cooling, 150 cc. of distd. H₂O and 10 drops toluene are added, the mixt. stirred and allowed to stand with occasional stirring for 3 hrs. or longer. The wt. is brought up to 240 g. with H₂O, the mixt. repeatedly filtered through a folded filter until the filtrate is only weakly opalescent. Fifty cc. portions are pipetted off for analysis and for a blank and titrated with 0.1 N NaOH, using phenolph. and the acidimeter of H. Lüers (cf. C. A. 8, 3613). *Detn. of total acids in extracts of malt and barley.* Forty g. finely ground malt or barley are mashed with 150 cc. distd. H₂O at 50°, treated with 0.5 cc. toluene and extd. at 53° for 3 hrs., stirring at definite intervals. It is then cooled to room temp., brought up to 240 g., and 50 cc. portions titrated as before. *Calculations.* The results are expressed as cc. N acid per 100 g.

dry substance. $Sr = 10 m. \{[R + W(C/100)]\} / \{F[C - W(C/100)]\}$; $Sr = \text{cc. } N \text{ acid per } 100 \text{ g. dry substance}$; $m = \text{cc. } 0.1 \text{ } N \text{ alkali required}$; $R = \text{added } H_2O \text{ in g.}$; $W = \% H_2O \text{ in the substance}$; $C = \text{g. substance weighed out}$; $F = \text{cc. filtrate used in titration}$. For the proportions used in the above procedure the equation is simplified to, $Sr = m \cdot (100 + 0.2 W) / (100 - W)$. The acid formed by enzymic action is found by difference. Taking the second formula above as a basis a table was worked out which permits the cc. N acid, which corresponds to a known H_2O content and cc. $0.1 \text{ } N$ alkali used, to be read off directly. As an av. example of several detns. which are given in a table, a certain malt showed an original acidity of 6.67 cc. N acid per 100 g. dry substance, total acidity 15.69 cc., and acids formed by enzymes 9.02 cc. L. D. ELLIOTT.

Enzymes in beer. ARMINIUS BAU. *Wochschr. Brau.* 32, 189-91(1915).—The mature bottom fermented beer used in the expts. was freed from suspended yeast-cells by filtration through filter paper (Schleicher and Schüll "Nr. 602 hard"). Biological control tests with samples thus treated proved conclusively the absence of wild yeasts and bacteria in each case. Positive results were obtained in the tests for invertase, melibiase, and amygdalase. Maltase, trehalase (most probably), emulsin, carboxylase, lipase, endotryptase, catalase, oxidase, reductase and yeast rennet do not occur in beer. L. W. HAAS.

Top-fermenting yeasts and their sugar transforming capacity. F. SCHÖNFELD. *Wochschr. Brau.* 32, 167-9(1915); cf. *C. A.* 9, 506.—In fermentation expts. with top- and bottom-fermenting yeasts, the latter attained in all cases higher attenuations. For all expts. a light, hopped, fresh wort served as fermentation liquid; it was dild. and beet sugar added in various proportions before pitching with the different yeasts. L. W. HAAS.

A new variety of hops, the "foundling." E. S. SALMON. *Brewers' J. (London)* 51, 343-5(1915).—The new hop appears to be distinct from all cultivated hops. Its characteristics are: good cropping qualities, high resin content (9.84 to 12.44%, av. 11.26%), marked resistance, if not total immunity from, the "nettle-head" disease, and lateness of season (coming after the "fuggles"). L. W. HAAS.

Melanoidins and the nomenclature of the coloring substances of malt. C. J. LINTNER. *Wochschr. Brau.* 32, 201(1915).—L. opposes Zikes' proposal (*C. A.* 9, 1221) to term Maillard's melanoidins (the coloring principles of malt) "orphneins" or "aterins." L. W. HAAS.

Computation of yield of extract. W. WINDISCH. *Wochschr. Brau.* 32, 149-51, 157-9, 165-7, 173-5, 181-5(1915).—A historic-critical representation of the calcul. of the ext.-yield of malt in breweries. L. W. HAAS.

Use of compressed air for tapping beer. F. SCHÖNFELD. *Wochschr. Brau.* 32, 185-6, 191-3(1915).—Beer tapped by means of compressed air held a satisfactory foam and preserved a fresh taste the first day. The detrimental effect on foam holding capacity and taste gradually increased until after 4 days the latter could be called "flat." The CO_2 content of beer in contact with compressed air gradually decreases. Employing compressed air under a pressure of 0.75 atm., beer retains (during the first day 95-98% of its CO_2 , provided the vol. of air in the cask is relatively small. The decrease in CO_2 was 6-10% if the cask was emptied to 0.5 its vol. during 2 days, and reached 30% if the cask was completely emptied after 3 days. The use of compressed air in place of CO_2 , therefore, can only be recommended where the beer is quickly consumed after tapping. L. W. HAAS.

Alcohol industry in Italy. S. CETTOLINI. *Boll. ist. int. agric.* 6, 16; *Ind. chim. min. met.* 2, 80-2(1915). CHAS. A. ROULLER.

Alcohol from cassava. A. E. COLLENS. Dept. Agr., Trinidad and Tobago *Bull.*

14, 56(1914); *J. Soc. Chem. Ind.* 34, 629.—Sweet cassava roots, when pulped, boiled, saccharified with malt, fermented, and distd., yielded a quantity of alc. corresponding to 75.6 gals. of 94% alc. per ton of dry material. In another expt., where the starch was saccharified with taka-diastase, the yield amounted to 81.5 gals. of 94% alc. per ton of air-dried slices.
E. J. C.

Dried yeast as stock food (CROWTHER) 12. New alcohol fuel 21.

Brit., 5,025, Feb. 26, 1914. E. CANTOR. Removing the bitter taste and burnt smell and taste from malt extracts and worts, particularly those prepd. from caramelized malt, by passing steam through the liquids.

Ital., 133,023, July 19, 1913. S. BOSIA. App. for the rapid determination of alcoholic content of wines, based upon the principle of cohesion of liquids, by means of which the % alc. is indicated directly on a graduated scale which measures the cohesive power of the wine by capillarity.

17. PHARMACEUTICAL CHEMISTRY.

M. I. WILBERT.

Guyot tar. N. PETKOW. *Z. öffent. Chem.* 20, 232-3(1914).—Analyses of Guyot tar, which contains 0.1% codeine, and of Goudron water made from wood tar and from Guyot tar, are given.
H. S. BAILEY.

Determination of oxychlorides and free acid in liquor ferri sesquichlorati. G. ROMIJN. *Ber. pharm. Ges.* 25, 142-5(1915); cf. *C. A.* 9, 1971.—The reagents required are: *N* thiosulfate soln. and CuCl_2 -starch (mix 1 g. CuCl_2 with 49 g. starch dried at 100°). Pour 2 cc. of the sample (liquor ferri sesquichlorati, Ger. Pharm.) into an Erlenmeyer and add cold CuCl_2 -starch soln. (0.5 g. dissolved in hot H_2O) and 5 cc. *N* $\text{Na}_2\text{S}_2\text{O}_4$. After decolorization, add methyl orange-methylene blue soln., which in the case of acid reaction develops a purple, in case of an alk. reaction a green color. If the reaction is acid, titrate with 0.1 *N* NaOH drop by drop but as quickly as possible, the color change being best recognized by observing the liquid vertically over a white surface.
W. O. E.

Legal protection of medicaments during the war, with particular reference to patent and trade mark law. J. MAGNUS. *Ber. pharm. Ges.* 25, 3-31(1915).
W. O. E.

Hydrargyrum oxycyanatum. J. HERZOG. *Apoth. Zig.* 30, 79-80(1915).—The suggestion is made that the above title be modified to include two preps., one: hydrargyrum oxycyanatum verum containing 98.2%, the other: hydrargyrum oxycyanatum with 33.2% $\text{Hg}(\text{CN})_2 \cdot \text{HgO}$.
W. O. E.

Manufacture of antipyrine. ANON. *Chem. and Druggist* 85, 37(1914).—A description is given of the com. process including the manuf. of PhNHNH_2 from C_6H_6 , the production of $\text{AcCH}_2\text{CO}_2\text{Et}$, the condensation of these and the methylation of the condensation product.
J. GAUB.

What is rice powder? CHARLES H. LAWALL. *Am. J. Pharm.* 87, 293-9(1915).—A statement of results of examn., together with information concerning the place of purchase, price and manner of labelling toilet powder commonly known as "Rice powder." Of the 16 samples examd. but 2 were genuine and only 6 contained rice starch at all. In 8 of the samples, corn starch was used in place of the more expensive rice starch, and in 2 samples no starch of any kind was present, the constituents being wholly of a mineral origin. Talc was present in 13 out of the 16 samples. The constit-

uents used in place of rice powder (chalk, talc, ZnO , $\text{Bi}(\text{NO}_3)_3$ and corn starch) are not harmful; some are cheaper and some are more expensive than rice powder would be.

W. G. GAESSLER.

The utilization of our own resources in producing dyestuffs and drugs. JOSEPH JACOBS. *Am. J. Pharm.* 87, 300-8(1915).—A discussion. W. G. GAESSLER.

Pituitary standardization. A comparison of the physiological activity of some commercial pituitary preparations. G. B. ROTH. U. S. Hyg. Lab. *Bull.* 100.—A comparison of the physiol. activity of some com. pituitary exts. by the blood pressure, intact uterus, and isolated uterus methods showed them to possess a wide range of physiol. activity, the ratio of variability between the strongest and weakest by the blood pressure method being 15 to 1, by the intact uterus method about 10 to 1, and by the isolated uterus method about 7 to 1. The isolated uterus method, using the young virgin guinea pig as a test animal and a standard of a 1 to 20,000,000 diln. of β -iminoazolyethylamine hydrochloride, is considered the most satisfactory. An arbitrary standard of activity for com. pituitary exts. making a 1 to 10,000 diln. of the ext. equal in activity to a 1 to 20,000,000 diln. of the standard when the isolated uterus of the virgin guinea pig is used, is suggested. A wide variability in the physiol. activity of com. pituitary exts. has been found, but no positive reason could be assigned for such differences in activity.

W. W. HANFORD.

The constituents of Kuromoji oil. RUKORO SHINOHARA. *J. Chem. Ind. Japan* 18, 417-34(1915).—The following classes of substances are present: esters, 11.41%; free alc., 20.21%; cineol, 7.71%; terpenes, 50.95%; phenol and free acids, trace; aldehydes and ketones, 9.70%. The alcohols are chiefly linalool, 11.43% and geraniol 7.16%. Cineol was detd. by the HBr method, linalool by fractional distn., and geraniol by the CaCl_2 and phthalic acid methods.

H. L. OLIN.

New method of preparing tincture of iodine. ETTORRE RICCOBONO. *Boll. chim. farm.* 53, 297-9(1914).—The procedure proposed by Courtot for preventing the formation of HI in tincture of I, i. e., by addition of 4% KI to a 10% tincture, is regarded as not being perfectly satisfactory because of the presence of an alk. salt. The same objection applies to the "iodoine" tablets now on the market. These tablets are of 2 kinds: 1 kind contains tartaric acid while the other is composed of a mixt. of NaI and NaNO_3 . One tablet of each kind dissolved in 10 cc. H_2O produces 0.5 g. free I, the latter passing at once into soln. because of the excess of NaI. This soln. has the further disadvantage of containing an alk. tartrate; the substitution of H_2O for alc. as a vehicle is also a disadvantage, inasmuch as the latter evaps. more readily from the skin, assists the absorption of the I and has an antiseptic action of its own. The most desirable procedure for preventing the formation of HI in tincture of I, or of destroying it if already formed, is furnished by the method mentioned by Roques, i. e., by the reaction of HI and HIO_3 to form I and H_2O . HIO_3 is prepd. as a powder by pptg. a cold satd., aq. HIO_3 soln. with alc.; 10 g. of this powder are then added to each l. of the tincture and the latter is shaken for 5 min. This proportion of HIO_3 is sufficient for the oxidation of the max. amt. of HI (1 pt. HI to 5 pts. I, according to Roques) which may be present in a tincture of I prepd., say 8-9 mos. previously. The presence of an excess of HIO_3 on the bottom of the containing vessel may be taken as an indication that all HI has been transformed. Any appreciable increase in the I content of the tincture due to the reaction of HI and HIO_3 may be readily corrected by titrating a portion of the tincture with 0.1 N hyposulfite soln. and adding the required amt. of 95% alc.

H. S. PAINE.

Extemporaneous preparation of solutions of sulfur dioxide. CHENEY. *Boll. chim. farm.* 54, 359(1915).—In a bottle of 250 cc. capacity provided with a ground-glass stopper are placed 5.7 g. dry Na_2SO_3 and 18 cc. dil. HCl; the bottle is then quickly

stoppered and set in a cool place. The contents are shaken cautiously so as to facilitate soln. of the salt; when effervescence has ceased 25 cc. H_2O are added and the mixt. is shaken for several mins. The vol. of the final soln. is 40 cc. and the SO_2 content is 6-6.4%.

H. S. PAINE.

Use of the Bettendorf reagent in tests of purity of medicinal antimony preparations.
ALFREDO PAGNIELLO. Turin. *Boll. chim. farm.* 53, 689-91 (1914).—This preliminary work was confined to tests of the Sb preps. (Kermes mineral, Sb_2S_3 , Sb and K tartrate, Sb_2S_3) occurring in the official pharmacopeia (Italian), 5 or 10 cc. of the Bettendorf reagent being employed for each test. Kermes mineral gave no ppt. and no coloration in 4 hrs. Sb_2S_3 in 10 min. gave a slight coloration which gradually became more intense; in 1 hr. the soln. became yellowish brown and, after 4 hrs., a slight black ppt. appeared, while the supernatant liquid remained brown in color. Sb and K tartrate gave no ppt. or coloration even after 4 hrs. Sb_2S_3 in 10 min. gave a slightly brown coloration which gradually became more intense and turned to brownish red in 1 hr.; in 4 hrs. a black ppt. had been produced, while the supernatant liquid was of a brownish color. In order to obtain greater amts. of the ppt. the tests were repeated with 3 g. of the preps. and 30 or 60 cc. of the Bettendorf reagent. The black ppts. which were obtained were washed and introduced separately into the Marsh app., rings (in reduction tubes) and spots (on porcelain) being obtained therefrom. The rings were grayish black in color and showed little luster or uniformity in tint, but appeared to consist of a deposit of a brownish black powder. The rings slowly disappeared when heated in a current of H; when heated in a current of air they yielded a white, amorphous, slightly vol. oxide insol. in boiling H_2O or $NaClO$ soln. A current of H_2S passing through the slightly heated tube changed the black color of the ring to orange. No odor was detected when a tube was broken at the ring and heated in a flame. The spots on porcelain were brownish black in color and were insol. in $NaClO$ soln. They dissolved in dil. HNO_3 (sp. gr. 1.2) with production of a white insol. oxide which gave no reaction in the cold with $AgNO_3$ soln. and NH_4OH ; when heated, reduction occurred with separation of Ag. The spots assumed an orange red coloration when moistened with $(NH_4)_2S$ and became sol. in HCl, but insol. in NH_4OH and $(NH_4)_2CO_3$. When exposed to Br vapor the spots became orange colored, but the coloration gradually disappeared on exposure to air; the orange coloration was restored by the action of H_2S . When exposed to I vapor the spots assumed a brownish crimson coloration which changed to orange on exposure to air. The spots were not affected by cold KIO_3 soln.; they gradually dissolved, however, in the hot soln. The substance constituting the spots dissolved readily in Na nitroprusside soln.; this substance was not affected by cold $KClO_3$ soln., but dissolved to a slight extent in the hot soln. The above tests indicate that the ppts. produced by the Bettendorf reagent are to be attributed to Sb and that the presence of As in these ppts. is excluded. Under the conditions of the test the Bettendorf reagent acts upon Sb compds. in a manner strictly analogous to that prevailing in the case of As compds. Certain tests given in the German pharmacopeia for Sb_2S_3 were also applied to all the pharmacopeial preps. tested above. Five-tenths g. of Sb_2S_3 were heated for 2 mins. at 50-60°, with const. shaking, with 5 cc. aq. soln. of $(NH_4)_2CO_3$ (satd. in the cold); the test for As (yellow flocculent ppt.) was given in 6 hrs. when HCl was added to the filtered soln. In order to apply the above test to the other pharmacopeial Sb preps. mentioned above, the latter were converted into Sb_2S_3 and this compd. was dissolved in $(NH_4)_2S$. The filtered soln. was treated with HCl in excess and the collected ppt. (still moist) was digested with $(NH_4)_2CO_3$. After complete digestion the filtered soln. was treated with HCl as in the foregoing test for the presence of As in Sb_2S_3 . No yellow ppt., or even turbidity, was observed with any of the pharmacopeial Sb preps. which

had given a positive reaction with the Bettendorf reagent. A positive reaction with the latter reagent cannot, therefore, without confirmation, be taken as an indication of the presence of As.

H. S. PAINE.

Acetanilide. KAUSERMANN. *Boll. chim. farm.* **54**, 359(1915).—A simplification of the usual procedure (prolonged boiling of AcOH and aniline for 6–8 hrs.) consists in the use of a small amt. of $ZnCl_2$. Pure aniline (75 g.), AcOH (75 g.) and $ZnCl_2$ (3–4 g.) are placed in a flask provided with a reflux condenser; the mixt. is heated to gentle boiling for 3 hrs. after which the product of the reaction is poured into H_2O . The acetanilide separates in cryst. form; it is then washed with H_2O and recrystd. from boiling H_2O .

H. S. PAINE.

Physical and chemical properties of oleoresin of aspidium. Detection of adulterations. A. G. DUMERZ. *Philippine J. Sci.* **8**, 523–38(1913).—The color of the ext. prepared from fresh rhizomes is yellowish green; that prepared from old material is brownish in color. Adulteration with chlorophyll or with Cu salts colors the ext. deep green; the former may easily be detected by the depth of color, the latter in the usual manner. Adulteration with castor oil lowers the sp. gr. of the ext., index of refraction, I and sapon. values. Its presence can most easily be confirmed by solubility tests. The presence of aspidin indicates the use of *Aspidium spinulosum* in the prepn. of the ext. in place of male fern. I and sapon, nos. vary with the filicin content and hence the detn. of these might be used instead of the rather long and expensive filicin assay. Ether is found to be superior to acetone as the extn. medium since the latter yields a product which seps. in 2 layers.

BERNARD RAYMUND.

Vanillin. M. LEHMANN. *Chem. Ztg.* **39**, 266(1915); cf. *C. A.* **8**, 2218.—A reassertion of statements in the previous article that vanillin from clove oil is purer than that prepd. from guaiacol; an answer to Boehringer and Söhne (*C. A.* **9**, 1365).

NORMAN A. SHEPARD.

Eudesmin and its derivatives. I. ROBERT ROBINSON AND HENRY G. SMITH. Univ. Sydney, Australia. *Proc. Roy. Soc. N. S. Wales* **48**, 449–63(1915); cf. *Chem. Zentr.* **1896**, II, 122.—Eudesmin, $C_{22}H_{36}O_6$ (a), is obtained, mixed with aromadendrin, from the kino of *Eucalyptus hemiphloia* by repeated extn. with Et_2O . A thick syrup is first prepd. by treating the pulverized kino with hot H_2O . (a) is extd. from the aromadendrin by treating the cryst. residue, obtained on evapn. of the Et_2O , with cold $CHCl_3$; prismatic needles or (occasionally) leaflets from MeOH, m. 107° . (a) may also be extd. from the kino directly with $CHCl_3$, when it is obtained unmixed with aromadendrin. The air-dried kino contains about 10% (a). The latter may be distd. *in vacuo*; $[\alpha]_D^{21}$ in $CHCl_3$ -64.4° . In H_2SO_4 with veratrole, it gives an intense crimson coloration. (a) is unchanged by boiling alc. KOH, NH_2OH , NH_2NH_2 , $PhNHNH_2$, $NH_2NHCONH_2$, $PhNH_2$, $AcCl$, $BzCl$, $PhNCS$, or hot Ac_2O and $AcONa$, indicating the absence of both CO and OH groups. It is recovered unaltered after treatment with Na-Hg in aq. alc. or by H in the presence of Pd; Br substitutes, but does not add. These reactions lead to the conclusion that (a) is satd. Oxidation with $KMnO_4$ gives a small amt. of 3,4-(MeO) $_2$ $C_6H_3CO_2H$. 5.0 g. (a) in 25 cc. AcOH, treated cold with a mixt. of 10 cc. HNO_3 (d. 1.42) and 15 cc. AcOH, gives a ppt. of dinitroeudesmin (b) in about 5 min.; almost colorless, slender needles from $AcOEt$, m. 214° . (b) may also be formed from (a) with cold 30% HNO_3 . It becomes yellow on exposure to light and gives a bright red soln. in H_2SO_4 . 1.0 g. (a), boiled for 10 min. with 10 cc. concd. HNO_3 , then dild. with H_2O and the ppt. recrystd. from alc., gave 4,5-dinitroveratrole (c); $(CO_2H)_2$ was found in the HNO_3 soln. On the assumption that (a) contains only one veratrole nucleus, the yield of (c) was larger than theoretical, but calcd. for two such rests, the yield corresponded to 90% of the theoretical value. This also accounts for the 4 MeO groups, for which (a) analyzes by the Zeisel method. Dichloroeudesmin

(d) is pptd. when Cl is passed into a well cooled soln. of 5.0 g. (a) in 50 cc. AcOH for 0.5 hr.; needles from AcOH, rectangular plates from AcOEt, m. 163° . In like manner, (a) treated cold with Br in AcOH gives *di bromocudesmin* (e), prismatic needles from AcOH, m. 172° , $[\alpha]_D^{22}$ in CHCl_3 69.4° . I does not attack (a); ICl, in AcOH, is used to produce *diiodocudesmin* (f). 5.0 g. (a) in 50 cc. AcOH is heated with 6.4 g. ICl in 50 cc. AcOH for 0.5 hr., decolorized with H_2SO_4 and the sticky residue dissolved in AcOH. This soln. slowly seps. needles, sol. in AcOEt, m. 175° . (e), oxidized by 3% KMnO_4 at 50° , is converted into *6-bromo-3,4-dimethoxybenzoic acid*, unmixed with any isomide. This fact, together with the formation of (c), indicates that both veratrole rests are linked at the 4-position, and (a) may be represented by $[\text{3,4}-(\text{MeO})_2\text{C}_6\text{H}_3]_2\text{C}_6\text{H}_3\text{O}_2$. Halogen and NO_2 groups in (b), (d), (e) and (f) are in the 5,5'-positions. Since (a) gives none of the reactions of the CO or the OH groups, R. and S. assume that the O in the remainder of the mol., $(\text{C}_6\text{H}_5\text{O}_2)_2$, must be linked as in ether and provisionally assign to (a) the

structure $(\text{MeO})_2\text{C}_6\text{H}_3\text{CH.O.CH—CH}_2$



although there is at present no evi-

dence to indicate the position of attachment of the veratrole rests or the relative positions of the two furane rings.

NORMAN A. SHEPARD.

The butyl ester of butyric acid occurring in some eucalyptus oils. HENRY G. SMITH. Sydney, Australia. *Proc. Roy. Soc. N. S. Wales* **48**, 464–8(1915).— PrCO_2Bu , found only in small amts. in most eucalyptus oils, occurs in some quantity in the oil of *E. perriniana*, both from Tasmania and N. S. Wales. This ester was identified by subjecting the fraction from the crude oil b. below 190° to sapon., the PrCO_2H being identified through its Ba and Ca salts, while BuOH was estimated by oxidation with $\text{K}_2\text{Cr}_2\text{O}_7$ and H_2SO_4 to PrCO_2H . That this ester constituted the greater portion of the total ester is shown by a comparison of the sapon. nos. of the crude oil and the fraction b. below 190° . PrCHO , present in most crude Eucalyptus oils, may be the precursor of this ester.

NORMAN A. SHEPARD.

The phenols occurring in some eucalyptus oils. ROBERT ROBINSON and HENRY G. SMITH. Univ. Sydney, Australia. *Proc. Roy. Soc. N. S. Wales* **48**, 518–9(1915).—Phenolic substances usually entirely absent or occurring only in traces in the essential oils of the various species of *Eucalyptus* have been obtained from *E. linearis* and *E. risdoni* in sufficient quantity to be isolated and described. *Tasmanol*, extd. from these crude oils by shaking with NaOH, b. $268\text{--}73^{\circ}$, inactive b_{44} 175° , d_{20} 1.077, n_D^{22} 1.5269, optically inactive, sol. in NH_3 , partly sol. in Na_2CO_3 , insol. in NaHCO_3 , contains 1 MeO group and appears to have 2 OH groups in *p*-positions. *Tasmanol*, which gives a persistent deep red color with alc. FeCl_3 , appears to be associated with the cineolpheallandrene oils; another phenol, which gives a green coloration with FeCl_3 , is found in certain phellandrene-free species.

NORMAN A. SHEPARD.

Method of preserving potassium iodide solutions. J. BOUYER. *Bull. soc. pharm. Bordeaux* 1914, Aug.-Dec.; *Reper. pharm.* **27**, 143–4(1915).—B. renders the iodide soln. slightly alk. with $\text{Mg}(\text{OH})_2$. This permits the keeping of iodide solns. in clear glass bottles, even in the light, without danger of decompn.

J. W. SHIPLEY.

Tests for hashish. WM. BEAM. Wellcome Trop. Res. Labs., Chem. Section *Bull.* No. 3, 2 pp.(1915).—The ordinary ext. of *Cannabis indica* of the Brit. Pharm. responds only very feebly to the ordinary test for hashish (the production of a rich purple color upon the addition of caustic alkali to a petroleum ether ext. of the substance). Tests on different samples grown in Greece, Egypt, Sudan, India, and Uganda gave negative as well as positive tests, showing that the influence of soil, climate, method of cultivation and curing was very great. An apparently characteristic test is obtained by making a petroleum ether ext. of the sample and evapg. it to dryness. The residue

is treated with abs. alc. satd. with dry HCl. In presence of *Cannabis* ext. a bright cherry-red color develops; this disappears on diln. with alc. or water. The same color is developed by H_2SO_4 in acetone or acetic acid solns. of the ext. Of the 200 alkaloids or plant exts. tested, not one responded to this test, although certain volatile oils (origanum and santal) gave a similar reaction but developed a far less intense color for similar amts. of material.

R. L. SIBLEY.

Pills and granules of pharmaceutical manufacture. M. FRANÇOIS. *J. pharm. chim.* 11, 275-9(1915).—Large scale prepn. in mass, *e. g.*, of 2,000,000 granules each containing 1 mg. strychnine sulfate, does not give uniform results. Even a mass of only 200 granules of As_2O_3 with flour as base, triturated by hand for a long time, when divided into 4 equal parts, assayed 0.0487, 0.0503, 0.0526 and 0.0487 g. As_2O_3 . Official granules should be prepared in mass of not over 200, with the excipients directed by the codex.

S. WALDBOTT.

Sulfates of magnesium and of sodium in plaster of Paris. E. CANALS. *J. pharm. chim.* 11, 286-90(1915); cf. C. A. 9, 1368.— $MgSO_4$ and Na_2SO_4 occurred in nearly all plasters examd., $MgSO_4$ varying from 0.13 to 0.981% and Na_2SO_4 from 0.10 to 0.97%; surgical plasters had but traces. Both salts hasten the setting, Na_2SO_4 more rapidly than $MgSO_4$. One % $MgSO_4$ reduced the time of setting from 30 min. for pure plaster to 21 min.; 1% Na_2SO_4 to 12 min. The temp. is raised only by 12.1° with a mixt. of 1% of each salt. The use of these salts is recommended for surgical dressings in the place of alum or NaCl. Cf. C. A. 8, 1328.

S. WALDBOTT.

Frangula substitutes, the barks of Rhamnus carniolica A. Kerner, and *Alnus glutinosa* Gaertn. O. TUNMANN. *Schweis. Apoth. Zig.* 53, 313-8, 325-32(1915).—Microscopically (cf. Mitlacher, *Z. allgem. Oest. Apoth. Ver.* 1906), the *Rhamnus* barks differ chiefly in the breadth of their medullary rays; those of *R. carniolica* are broadest (4-6, even 8 rows), of *R. frangula* the narrowest (1-2, seldom 3 rows). Anthraquinone derivs. are yielded by microsublimation of 0.001 g. of powdered dried bark in decreasing amts. from *R. carniolica*, *frangula*, *Purshiana* and *cathartica*. *R. carniolica* also yields large crystals by this and the EtOAc methods (C. A. 9, 476, 1660). It is a legitimate substitute for *R. frangula*; *Alnus glutinosa* is a worthless adulterant (L. Würfel, *Z. allgem. Oest. Apoth. Ver.* 1907). In chem. exam., emodin was extd. from all species of *Rhamnus* named; chrysophanol occurred only in *R. frangula* and *R. cathartica*, not in *R. purshiana* or *R. carniolica*. The latter showed small amts. of cinnamic acid by microsublimation. Cork cells and the rough outer bark of some *Rhamnus* species are free from anthraquinone derivs. The assay methods for *R. frangula* are reviewed. To assay *R. carniolica*, the gravimetric method of F. Daels (C. A. 7, 4042) is modified to det. only total anthraquinone derivs. Two specimens yielded 3.32 and 3.78%.

S. WALDBOTT.

Substitute for mucilage. BERGER. *Schweis. Apoth. Zig.* 53, 321(1915).—Dissolve the residues in the prepn. of tinct. of myrrh in twice their wt. of H_2O and strain through cloth; the soln. is a useful mucilage.

S. WALDBOTT.

Bismutum subnitricum containing chloride. FLEISSIG. *Schweis. Apoth. Zig.* 53, 341(1915).—A com. sample was yellowish, dissolved incompletely in 10% H_2SO_4 , almost entirely in 30% H_2SO_4 . It did not make a clear soln. with HNO_3 , and gave an abundant ppt. with $AgNO_3$.

S. WALDBOTT.

Transformation of antipyrine into diantipyrylmethane by means of formaldehyde. CHARLES ASTRE. *Bull. soc. chim.* [4] 17, 175-9(1915).—A. criticizes Patein's method for the detn. of antipyrine (A) in the presence of pyrimidone (B) (cf. *Ibid* [3] 33, 846) and suggests modifications. (A) may be rapidly and quant. converted into diantipyrylmethane by means of aq. HCHO free from all traces of alkali. The reaction may

be satisfactorily carried out in a boiling H_2O bath, in Pt pressure bottles or in glass bottles which have been thoroughly rinsed with hot HCl. Traces of alkali yielded by the glass containers are sufficient to retard the reaction and to render it incomplete even after 32 hrs. In the presence of (B), no reaction whatsoever takes place between (A) and $HCHO$, but the reaction proceeds normally provided (B) is first neutralized with HCO_2H , using helianthine as indicator. Under these conditions it is possible to estimate the amt. of (A) present in an (A)-(B) mixt. LOUIS E. WISE.

Commercial chrysarobin (EDER) 10. Determination of methyl alcohol in presence of ethyl alcohol (WILKS) 7. Use of adsorptive capacity of talcs and kaolins in the perfume industry (ROHLAND) 27. Detection of methyl alcohol in ethyl alcohol (PAZIENTI) 7.

U. S., 1,143,114, June 15. G. P. FULLER. Formaldehyde solution is made from polymerized CH_2O by mixing it with 3 to 4 times its wt. of H_2O and with 0.0005 to 0.003 of a mol. proportion of Na_2SO_3 . The latter may be separately added at the time of making up the soln. or a dry mixt. of polymerized CH_2O with Na_2SO_3 may be made for use as desired to avoid expense in transport and storage of CH_2O in the form of its aqueous soln. The Na_2SO_3 acts as an active catalyzer in promoting solution of the polymer.

U. S., 1,144,141, June 22. J. LAGUTT. Acid ferrocyanides of dimethyl-*p*-aminophenol and *p*-hydroxyphenyltrimethylammonium are made by adding $K_4FeC_6N_6$ to a soln. of $p-Me_2NC_6H_4OH$ and $p-HOC_6H_4Me_2N$ compds. (obtained by methylating $p-NH_2C_6H_4OH$) acidulated with H_2SO_4 , dissolving the pptd. compds. in NaOH and $Na_2S_2O_4$ soln. extg. the $Me_2NC_6H_4OH$ with C_6H_6 and recovering the base from the C_6H_6 by adding H_2SO_4 and finally acidifying the residual soln. to effect pptn. of the ferrocyanide, which seps. as shining yellowish white plates.

U. S., 1,144,237, June 22. W. H. PERKIN, C. WEIZMANN and H. DAVIES. Dihalogen derivatives of saturated hydrocarbons, *e. g.*, dibromoisopentane, are made by reacting on vapors of monochloro derivs., *e. g.*, isoamyl bromide or chloride with halogen which is supplied at such a rate that it is immediately used up in the reaction when it comes into contact with the vapors. By thus avoiding an excess of Cl at any time, the formation of tri- and tetrahalogen compds. is minimized. Cf. C. A. 8, 1190.

U. S., 1,144,270, June 22. R. F. VON WALTHER. 6-Chloro-1-methyl-3-hydroxybenzene-4-carboxylic acid is made by heating dry Na *p*-chloro-*m*-cresolate under a pressure of 5 atm. in CO_2 to 160° . The product is suited for use as a disinfectant. From H_2O it forms needles and from alc. flat prisms. It m. 205° .

U. S., 1,144,558, June 29. F. E. MATTHEWS and H. J. W. BLISS. 2,3-Dichloro-3-methylbutane is made by heating vapors of 1,2-dichloro-3-methylbutane at $324-36^\circ$. The product is subjected to fractional condensation and the unconverted portion returned for further treatment.

U. S., 1,144,829, June 29. G. FENDLER. Extracting egg yolks with acetone. See Ger., 272,057 (C. A. 8, 2459).

Brit., 5,369, Mar. 3, 1914. E. W. LUCAS and J. S. HILLS. A prepn. to be used in wet poultices and dry packs consists of kieselguhr, mixed with volatile oils or oleoresins, such as oil of turpentine and ext. of capsicum, or with substances yielding volatile oils or oleoresins, such as mustard or capsicum. An antiseptic such as Na_2BO_3 may be added.

Brit., 5,408, Mar. 3, 1914. H. HIBBERT. Prepn. of mesityl oxide from diacetone-alcohol, of dimethylbutadiene from pinacone, and of tetrahydrobenzene from cyclo-

hexanol. These and other reactions in which 1 or more mols. of H_2O are removed from a single mol. of an organic compd. are effected in the presence of small quantities of I with or without the use of reduced pressure.

Brit., 5,773, Mar. 6, 1914. R. MÜLLER and DEUTSCHE CELLULOID FABRIK. Organic acid anhydrides, mixed or not with the corresponding acid, are prepd. by passing N_2O_4 alone, or other N oxides mixed with air or O, over dry salts of organic acids in the solid state or dissolved or suspended in inert liquids. The resulting anhydride may be freed from the nitrate formed by heating *in vacuo*, or by extrn. Mixts. of acetates, butyrates, propionates, etc., give mixed anhydrides.

Ger., 281,148, Nov. 28, 1911. E. LANGER. In the manuf. of a readily sol. stable disinfectant for the prepn. of a mouth wash and rinsing water, preparing exact portions, in tablet form, of the strongly disinfecting and bactericidal NaF and Na_2SiF_6 , rendered stable by admixt. with tartaric acid and Na_2CO_3 or $NaHCO_3$, equivalent in strength to a 0.1% sublimate soln. E. g., 30 parts Na_2CO_3 or $NaHCO_3$, 15 of Na_2SiF_6 or NaF, and 15 of tartaric acid are ground separately with alc. to which have been added the oils, and the like, to render the product palatable, together with a small amt. of soap as an emulsifying agent. The alc. is then expelled by drying, all the constituents are intimately mixed, as by bolting, and compressed to tablets of 0.6 g. each. If only 5 parts of NaF are used, from 5 to 10 parts of succinic acid are added. The tablets are dissolved in H_2O or may be allowed to dissolve in the saliva.

Ger., 281,547, Dec. 4, 1913. Addition to 257,138 (C. A. 7, 2455). H. DECKER. In the manuf. of hydrohydrastinine, employing polymerized HCHO (in the presence of a solvent or diluent) instead of aq. HCHO soln., as specified in the principal patent. The operation can then be carried out in an open vessel and at temps. above 100° .

Ger., 281,553, July 4, 1911. G. A. RANFT. In the evolution of formaldehyde gas or the production of aq. HCHO solns. from polymerized HCHO, the latter is heated in admixt. with H_2O and an alkali or alk. earth chloride, or mixts. thereof, in open vessels, or heated H_2O , or steam, is conducted through the mixt. By means of a boiling soln. of 20 g. $CaCl_2$ in 100 cc. H_2O , a mixt. of 30 g. trioxymethylene is converted quant. into an aq. HCHO soln., and simply by warming on the H_2O bath a very general depolymerization results. If steam be blown through a mixt. of 15-30 g. $CaCl_2$ and 30 g. paraformaldehyde, HCHO gas is formed.

Ger., 281,603, July 9, 1912. CHEM. FABRIK AUF AKTIEN (v. E. SCHERING). Tasteless homologs and substitution products of 2-piperonylquinoline-4-carboxylic acid are obtained by condensing homologs or substitution products of aniline (e. g., *p*-toluidine, *p*-aminophenol, *o*-anisidine) with piperonal and pyroracemic acid, in the usual manner. Cf. C. A. 8, 2780.

Ger., 281,801, Dec. 5, 1913. F. HOFFMANN-LA ROCHE & Co. Mfg. lipid compounds containing phosphorus from high molecular fatty acid derivatives by allowing H_3PO_4 , alone or in soln., to act upon higher mol. keto fatty acids and their derivs. E. g., 30 parts 10-ketostearic acid (from stearyl acid) are boiled with 15 parts crystd. H_3PO_4 and 30 parts glacial HOAc, under a reflux condenser with external temp. of 160° . Or the hydroxyphosphinic acids, or their derivs., obtained according to 280,411 (C. A. 9, 1372) from the higher mol. keto fatty acids and their derivs., are treated with mild oxidizing agents, and the free acids are converted into the salts in the usual manner. E. g., hydroxystearinphosphinic acid is mixed. in alc. soln. with warm alc. $HgCl_2$ soln.

Ger., 281,802, Aug. 3, 1913. H. LECHER. In mfg. aromatic or fatty aromatic hydrocarbons or ketones, instead of $AlCl_3$ as catalyzer, ordinary com. P_2O_5 is employed, at $150-200^\circ$ in splitting off the HCl; e. g., for the production of benzophenone,

0.2-0.3 parts of P_2O_5 , 14 of $BzCl$, and 30 of C_6H_6 , are heated in the autoclave up to 200° .

Ger., 281,902, Sept. 18, 1913. J. D. RIEDEL, AKT.-GES. Splitting off water from hydroxy compounds by distn. of the substances, such as glycerol, tartaric acid, terpineol, together with glycollic acid or glycollide, under the ordinary or reduced pressure. In this manner secondary reactions are prevented and foaming is reduced, since glycollic acid and glycollide act as solvents or diluents.

Ger., 281,912, Apr. 3, 1913. F. HOFFMANN-LA ROCHE & Co. Mfg. acyl compounds from *p*-hydroxyphenylethylamine and 2-imidazolylethylamine by coupling the amines or their hydrochlorides, such as in alk. soln. with halogenacyl chlorides, as chloroacetyl, bromopropionyl chloride, and treating the resulting halogenacylamines with NH_3 . The aminoacylamines so obtained are less poisonous than the amines themselves.

18. ACIDS, ALKALIES, SALTS AND SUNDRIES.

T. LYNTON BRIGGS.

Potash salts, 1914. W. C. PHALEN. U. S. Geol. Survey, *Separate from Mineral Resources of U. S. 1914*, Part II, 25 pp.—Production statistical. Cf. C. A. 8, 3706.

R. S. MCBRIDE.

Potash from kelp. FRANK K. CAMERON. Bur. of Soils, U. S. Dept. Agr., *Rept.* No. 100, pp. 122, plates 40(1915).—The report consists of 5 parts as follows: I. **Pacific kelp beds as a source of potassium salts.** FRANK K. CAMERON. pp. 9-32.—C. discusses sources of supply of potash, especially the German deposits, and shows the amt. of various potash salts received into this country during the 12-month periods ending June 30, 1912, and 1913, resp. The desirability of an American source of potash is dwelt upon and the investigations along this line referred to. Chief among these investigations is that on the various species of kelp. A comparison of the potash and other constituents occurring in leaves and stems is given, but nothing further than a tentative conclusion is justified. There is a final discussion concerning the commercial side of the kelp question. II. **The kelp beds from Lower California to Puget Sound.** W. C. CRANDAU. pp. 33-49.—A survey is given of the kelp groves in the region, along with observations on the growth of different varieties. III. **The kelp beds of Puget Sound.** GEORGE B. RIGG. pp. 50-58.—This investigation was along the same line as that described in Part II. IV. **The kelp beds of Southeast Alaska.** T. C. FRYE. pp. 59-72.—Discussion similar to that of II, and III. V. **The kelp beds of Western Alaska.** pp. 105-22.—Weather and harbor conditions are given, how beds were mapped, etc. Similar to Parts I, II, III and IV. B. E. B.

The production of potash in California. T. H. NORTON. *Mining Eng. World* 42, 1159-61(1915); cuts.—A brief description of the production of K_2O from the Pacific coast kelp. The salines of Searles lake and the alunite of Utah are touched upon.

F. W. SMITHER.

The solidification of concentrated magnesium chloride liquors. H. HOF. *Chem. Ztg.* 39, 15(1915).—Hof points out that his process (C. A. 8, 2924) differs from that of Forcke (C. A. 8, 3706) in that the solidification is brought about by the conversion of calcined $MgSO_4$ to $MgSO_4 \cdot 4H_2O$, whereas Forcke's process depends upon the formation of $MgO \cdot MgSO_4$, the latter salt being produced by the partial decompn. of $MgCl_2$ in the process of heating the conc. liquors with residues (containing $MgSO_4$) from the leaching tanks. Hof admits that $MgSO_4 \cdot 4H_2O$ and not $MgSO_4 \cdot 7H_2O$, as originally stated, is formed in his process.

A. F. SEEKER.

The waste liquor question of the potash industry. BERGER. Bunzlau. *Z. angew. Chem.* 27, 1, 660-2(1914).—It is shown how the problem of disposing of the enormous amt. of end liquors containing $MgCl_2$ embarrasses potash works. Permission to run them into streams is no longer granted by the authorities and the consumption of $MgCl_2$ concentrates for road sprinkling, for the textile industry, and for the manuf. of cement floors is extremely small as compared to the output. Ger. patent 278,106, which provides for the manuf. of MgO and HCl by heating an infusible mixt. of $MgCl_2$ and $MgO \cdot MgCl_2$ in a rotary tube furnace, appears to offer the most hopeful way out of the difficulty, provided a sufficient market can be created for the disposal of $MgO \cdot MgCl_2$ into which, for economical reasons, part of the waste liquor concentrate must be converted by means of the MgO obtained in the first operation. Possible uses for $MgO \cdot MgCl_2$ are: the manuf. of cement floors, for clarifying factory waste liquors, as an absorbent for disinfectants like phenol and tar oils, for conditioning the soil in dry regions; and making it hygroscopic, and for transporting to the tropics where it can be converted into HCl by heating, this being a much more convenient procedure than transporting the acid itself. A return of 1.2 to 1.5 marks per 100 kg. for $MgO \cdot MgCl_2$ would enable technically As-free HCl of 20° Bé. to be delivered at the works for 1 mark per kg.

A. F. SEEKER.

Chemical analysis of the mother liquors of the salt-mine of Comacchio. MARIO ASQUINI. Padova. *Ann. chim. applicata* 3, 284-95(1915).—The analysis, expressing the components as ions, in grams per kg. H_2O at 16° was as follows: Na 49.858, K 3.952, Ca 0.301, Mg 13.362, Fe 0.0243, Al 0.00008, Li 0.00007, Ba 0.00223, Sr 0.00216, NH_4 0.00092, Cl 105.213, Br 0.621, SO_4 19.501, I 0.00003, BO_3 0.00371, HCO_3 0.15212, totaling 192.991 g. The direct detn. of residue at 160° was 193.809. Li was detd. spectroscopically as follows: 500 cc. of the H_2O were evapd. on the salt bath with excess of pure Na_2CO_3 . The residue was digested with EtOH, the alc. soln. evapd., and the residue taken up with a mixt. of abs. EtOH and Et_2O . Mg was pptd. with CaO and the Ca sepd. by $(NH_4)_2C_2O_4$. The NH_4 salts were driven off by ignition and the residue dissolved in 5 cc. H_2O , slightly acidulated with HCl . Then the liquid was successively dild. until the Li line α disappeared in the spectrum, and this limit found from known titrated solns. of $LiCl$.

S. LEVY.

Preparation of sodium hypochlorite. MARIO RICCI. Rome. *Ann. chim. applicata* 3, 282-4(1915).—Criticism of the paper of Cattania and Ranucci (*C. A.* 9, 1670), calling attention to arithmetical and other errors. It is shown that the percentages of active Cl given are impossible, that deposition of $NaCl$ would not take place when indicated, and that its gradual removal even if deposited would not tend to prevent decomp. of the $NaOCl$, because artificial addition of $NaCl$ to a $NaOCl$ soln. has absolutely no effect in causing decompn., which depends only upon the concn. of the OH and OCl ions, upon the temp., and upon light.

S. LEVY.

Ammonia as a gas for filling air ships. A. SANDER. Darmstadt. *Chem. Ztg.* 39, 325-6(1915).— NH_3 having been proposed as a noncombustible gas for filling balloons, S. points out that not only does it form explosive mixts. with air (16.5 to 26.8% by vol. of NH_3) but that on a basis of buoyancy it costs ten times as much as H, requires a special envelope to prevent corrosion of the fabric, has an extreme tendency to absorb moisture when passing through clouds or mist, is likely to suffocate the operators, and necessitates the use of an envelope of more than double the size of that required for a vol. of H of the same lifting power.

A. F. SEEKER.

The manufacture of hydrogen for inflating balloons. A. FOURNIOLS. *Rev. gén. sci.* 26, 339-45(1915).—A review of the methods that have been proposed for the com. production of H. The hydrogenite, hydrolith and silicol processes are discussed at

some length with cuts illustrating app. for field use. Cf. Jaubert, *C. A.* 8, 477; Seeker, *C. A.* 8, 3619. F. W. SMYTH.

Substitutes in industry, commerce and trade. C. KIPPENBERGER. *Ber. pharm. Ges.* 24, 495-526(1914); 25, 32-63(1915).—An address, first taking up the project for the Brazilian coffee valorization and later dealing with substances and commodities more commonly used as substitutes or surrogates, which for convenience of treatment are divided into 4 groups: (1) indigo, diamond, caoutchouc, etc.; (2) oleomargarin, artificial silk, artificial semi-precious stones, etc.; (3) lupines, chicory, artificial wool, alloys, medicaments, etc.; (4) alc.-free beer, soft drinks, etc. W. O. E.

Transportation of dangerous articles on vessels. *Commerce Reports* 158, 115 (1915).—A summary is given of rulings made by the United States Steamboat Inspection Service with reference to the transportation on passenger vessels of thermit, fuming H_2SO_4 , "Kilsum" insecticide, "Luxo" flash powder and "Sun" metal polish. E. J. C.

Some aspects of industrial chemistry. L. H. BAEKELAND. *Smithsonian Report* 1914, 223-47.—An address given at Columbia Univ. to inaugurate the Charles F. Chandler lectureship. E. H.

The relation and value of chemistry to industry. H. B. GORDIN. *Agr. and Mechanical College of Texas, Bull.* 1, No. 3, 14 pp.(1915). E. H.

Chemical industry in Germany and England. H. G. *Chem. Ind.* 38, 5-9(1915). F. W. SMYTH.

The weakness and latent energy of the Italian chemical industry in the repercussion of the European war. GIOVANNI MORSELLI. *Ind. chim. min. e met.* 2, 161-9 (1915).—A conference. E. J. WITZEMANN.

U. S., 1,142,795, June 15. R. B. LLOPART. **Zinc sulfate** is made by heating a mixt. of blende containing sulfides of Fe and Zn with ZnO or $ZnCO_3$ or calamine to 400-500° in an oxidizing atm. Strong air currents are not allowed to come into contact with the material during the heating. The product is leached with hot H_2O and the $ZnSO_4$ obtained is suited for the manuf. of lithopone. Cf. *C. A.* 9, 1849.

U. S., 1,143,132, June 15. S. PEACOCK. **Fixing atmospheric nitrogen.** A mixt. of Al_2O_3 with a sufficient excess of C to prevent the formation of CO_2 during the process is fed into an inclined rotary kiln and as the mixt. travels through the kiln a burning mixt. of oil or C injected with air is passed through the kiln in the same direction. Free N is fixed by combining with the Al_2O_3 to form $Al_2C_2N_6$, Al_2N_3 and $Al_2(CN)_6$. CaO or SiO_2 may also be used as fixing agents.

U. S., 1,143,343, June 15. J. C. WOODRUFF. **Nickel hydroxide** is made by treating a 1% soln. of $Ni(NO_3)_2$ at 90° or higher with the theoretical amt. of NH_4OH to effect the pptn. Complete pptn. of flocculent hydroxide (suited for reduction on an inert support to form a catalyzer) is effected.

U. S., 1,143,366, June 15. F. W. DEJAHN. **A catalyzer for use in the synthetic production of ammonia** is made by reducing NiO on pumice, with H at 550°, adding a small amt. of metallic Na and heating in anhydrous NH_3 to 450°. With this catalyzer, a yield of 4.5% of NH_3 is obtained from H and N under 80-90 atm. pressure at 520-40°.

U. S., 1,143,482, June 15. A. BADIN. **Aluminium nitride** is made by passing a mixt. of bauxite 30 and C 12 parts through a coal dust flame fed with just sufficient air to produce CO to the nearly entire exclusion of CO_2 by the combustion.

U. S., 1,143,614, June 22. B. H. CRISWELL. **Mixture for cleaning glass**, etc., composed of $NaCl$, $MgSO_4$, oleic acid, petrolatum, NH_4OH , glycerol, tripoli, whiting and H_2O . This mixt. is used to impregnate cloth used to scour the glass.

U. S., 1,143,621, June 22. W. L. GEDDES. Fiber-board is made from the residue obtained in making ext. of licorice root, after treating the residue with NaOH to remove resin and non-cellulosic constituents, and washing.

U. S., 1,143,622, June 22. G. GERDOM. Plastic mixture for making the cores of obturators of breech-loading ordnance; formed by mixing tung oil 10, tallow 14, petroleum jelly 7 parts, after separately heating to 205° and then incorporating about 17 parts of finely shredded asbestos after the mixt. has cooled to about 120°. When cold, the mixt. is pressed into the required form.

U. S., 1,143,625, June 22. I. HECHENBLEIKNER. Liquid calcium nitrate is collected in small molds, each of which is cooled by H₂O around the mold to cause solidification of the nitrate into cakes. The latter are then broken up by a coarse crusher and pulverizer while passing an air blast over the material to prevent undue heating and the finely divided nitrate produced is carried to the point of collection on the air blast.

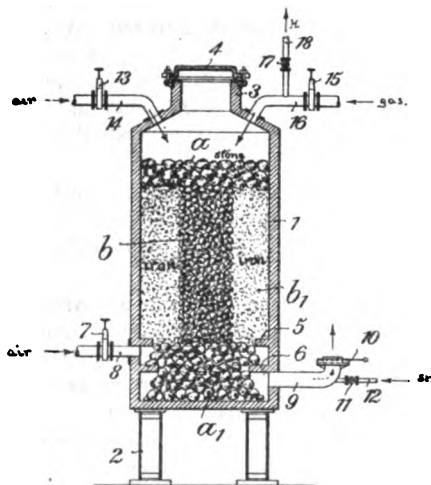
U. S., 1,143,893, June 22. R. DODD and H. B. P. HUMPHRIES. A plastic material from soy bean. See Brit., 15,316, 1913 (C. A. 9, 132).

U. S., 1,143,952, June 22. H. FREEMAN. High-grade cyanide, *e. g.*, NaCN, is made by treating the crude cyanide in soln. with Fe(OH)₂ and heating to form ferro-cyanide, purifying the latter by crystn. and then converting it back to cyanide by heating on a bath of molten Pb with Na or other metal corresponding to the cyanide under treatment.

U. S., 1,144,338, June 22. J. W. AYLSWORTH. Matrix for forming fac-similes of intaglio or relief plates, half tones, set type, etc., formed of hard infusible condensation product of PhOH with CH₂O and (CH₃)₂N₂.

U. S., 1,144,457, June 29. C. BEINDL. Cyanogen is made by passing a mixt. of NH₃ and C₂H₂ over a network of wire formed of Ag, Au, Ir, Pd, Rh, Co, Cr, Cu, Fe, Mn, or alloy of Cu and Zn, heated to 480°. Nitrides may also serve as catalysts. The gases from the reaction are absorbed with NaOH soln. Cf. C. A. 9, 1981.

U. S., 1,144,730, June 29. K. SCHAEFER. Producing hydrogen. Reducing gas



and steam are alternately supplied through the pipes 16 and 12, resp., to a filling of tubular Fe rods and loose pieces of Fe, b and b₁, within the chamber. The outer portion of the Fe filling is composed of smaller pieces than the central portion to equalize the flow of the gases. The H is drawn off through the pipe 18.

Brit., 5,145, Feb. 27, 1914. NORSK TANGSYNDIKAT. Leaching seaweed with H₂O at a temp. not exceeding 50°, the direction of flow of the H₂O being opposite to that of the weeds. The lye is evapd, at a reduced pressure, preferably lower than half an atm. The product contains I compds., Mg compds., mannitol, mucous substances, and "kreftin," a substance considered to be a carbohydrate, of the formula $nC_6H_{10}O_6 + mH_2O$. The ingredi-

ents may be sepd., or the product used in the prepn. of baths for the treatment of rheumatism and skin diseases.

Brit., 5,146, Feb. 27, 1914. **NORSK TANGSYNDIKAT.** Alginates are obtained from the stalks of seaweeds by removing the outer skin by grinding, cutting, or other mechanical means, cutting the stalk into small pieces, leaching with warm H_2O , bleaching, and finally extg. the desired substance with chemicals in the known manner.

Brit., 5,147, Feb. 27, 1914. **J. S. LUCOCK.** An anti-rust composition for maintaining the brightness of steel and other metal surfaces consists of liquid paraffin, starch, and alum. The starch and alum are mixed with H_2O , the H_2O is evapd., and the residue is mixed with the paraffin at about $110^\circ F$. The liquid is strained when cool.

Brit., 5,798, Mar. 7, 1914. **E. N. LAINE.** Purifying natural graphite. The graphite after preliminary purification and classification by mechanical means, is washed first with dil. acid, then with H_2O , and dried; it is then intimately mixed with alkali or alkali carbonates, such as Solvay soda, a mixt. of Na_2CO_3 and K_2CO_3 , or $NaOH$, and heated to a high temp., preferably 1050° ; the product is then washed first with H_2O , then with dil. acid, and finally with H_2O , and dried. HCl is the acid specified.

Brit., 5,830, Mar. 7, 1914. **E. HOWL and F. PERRY.** Recovering sulfuric acid from waste pickle by concg. to such a degree that substantially the whole of the $FeSO_4$ is pptd. in the anhydrous form.

Brit., 5,859, Mar. 7, 1914. **V. HERENG.** Artificial lithographic stones are made by a process similar to that described in 12,640, 1913 (*C. A.* 8, 3706), with the addition of white sand to the other materials used, namely cements, oölitic limestone, and trass, these materials being mixed in somewhat different proportions to those given in the principal process. A mixt. of 3 parts of cement and 1 part each of limestone, trass, and white sand is sifted, mixed, and compressed in a mold formed with fine perforations, and is left in H_2O for a day and then submitted to the action of the air for about 2 days. The stone is then placed in H_2O for 4 months in a cool chamber free from the action of air currents. Cf. *C. A.* 8, 2787.

Fr., 468,535, Apr. 26, 1913. **L. C. BONNEAU and V. E. HASENFRATZ.** In the treatment of crude ammonium salts, after the drying and removal of the S by means of C_2HCl_3 , the material is subjected, in a diffusion battery, to extrn. by means of condensed water containing NH_3 from the drier. The residue is worked up, with the aid of hot milk of lime, into $Ca_2Fe(CN)_6$, which can be pptd. by KCl as the double salt.

Fr., 468,879, May 5, 1913. **A. LABBÉ.** In the manuf. of plastic products from dihydroxy- and trihydroxybenzene, resorcinol, hydroquinone, pyrogallol, pyrocatechol, and their derivs. are dissolved in $HCHO$ solns. in the presence of very small amts. of dil. mineral acids which appear to act as catalyzers, whereupon the mass solidifies, after several hrs., to an elastic product, the hardness of which increases with the diln. of the $HCHO$, and which can be rendered transparent by the addition of acetone or glycerol to the $HCHO$. The product is permanent, fireproof, and easily worked.

Ger., 279,474, Oct. 8, 1912. **S. C. BOND.** In mfg. cork products from ground cork, the cork particles are mixed with a binder, pressed in molds, and heated.

Ger., 281,528, Aug. 24, 1913. **ALPINE MASCHINENFABRIK-GES. M. B. H. v. HOLZHAÜßERSCHÉ MASCHINENFABRIK G. M. B. H.** App. for etching metal.

Ger., 281,792, Aug. 30, 1912. **W. HENTSCHEL.** Process of dehydrating alkali lyes, depending upon the observation that completely dehydrated KOH has no oxidizing action on Fe heated to redness, and that this is practically true of KOH with 1% H_2O , while, on the contrary, alkali of 1-4% H_2O content acts energetically on Fe heated to redness. The dehydration of the lyes is effected by allowing them to flow through a system of Fe retorts of different temps., wherein the alkali of 96-99% dehydration

is maintained at a temp. below red heat, while the residual H_2O is removed in retorts heated to redness. The lye is passed in a thin layer over the flat bottoms of the retorts.

Ger., 281,806, June 14, 1913. P. DEGENER and W. BERNDT. **Mummifying stuffed animal and anatomical preparations.** After the specimen has been prepd. for preservation it is treated with $HgCl_2$ as a hardener, then dehydrated in alc. baths of increasing concn., and then immersed in a bath consisting of a volatile hydrocarbon or a deriv. thereof (xylene, $CHCl_3$). The specimen is then immersed in warm (liquid) paraffin and finally in a mixt. of paraffin 3 and light resin (colophonium citrinum) 1. After complete satn. the excess liquid is allowed to flow off and the specimen allowed to cool. By this treatment the milky-opaque, half transparent appearance of the muscles of fish, amphibia, and the like, is simulated on drying. The slimy-transparent luster of the surface is imitated by a layer of resin-alc. varnish. Anatomical specimens may be prepd. in like manner.

Ger., 281,926, Feb. 27, 1913. BADISCHE. Catalytic production of ammonia from the elements under pressure. Cf. Fr., 466,303 (C. A. 9, 1230).

Ger., 281,996, Feb. 2, 1913. BADISCHE. Mfg. chromium salts from chromite or other O-Cr ores. Cf. C. A. 9, 1536.

Ger., 282,213, July 11, 1912. C. KRAUSS, P. STAHELIN and A.-G. FÜR STICKSTOFFDÜNGER. Continuous production of nitrogen compounds from metal carbides and N. Cf. Fr., 464,750 (C. A. 8, 3356).

Ger., 282,226, Feb. 22, 1913. Addition to 278,868 (C. A. 9, 1096). HENKEL & Co. In mfg. **magnesium perborate**, instead of Mg salts in fusion with alkali perborate, the alkali peroxides can be employed directly, and need not be converted first into the alkali perborates. The Mg salts are mixed with alkali peroxides, borax, and corresponding amts. of substances (of an acid character) to neutralize excess alkali. This mixt. is allowed to take up the necessary amt. of H_2O (about 25%). The mass is then fused at about 60° , with stirring. After the melt has been held at the specified temp. for some time, it is allowed to solidify by cooling. The choice of added bodies is detd. by the purpose for which the end product is to be used. Of the Mg salts, only those are considered whose anions form with the alkali of the peroxide, salts containing H_2O of crystn. E. g., 1 mol. $MgSO_4 \cdot 7H_2O$, 2 mols. Na_2O_2 , and 0.5 mol. borax, are mixed dry with sufficient H_3BO_3 to neutralize the excess alkali. This mixt. is allowed to absorb about 25% moisture, exercising care. The resulting mixt. is allowed to melt on the H_2O at about 65° , and is stirred for some time; it solidifies, on cooling, to a solid cake which is readily comminuted and which can be pulverized after complete drying. By this process, loss of active O is said to be prevented, with the formation of a uniformly high grade product of great stability.

Ger., 282,252, June 1, 1913. R. FLEISCHER. Constructional details of an app. for decomposing and dissolving potassium salts and the like in continuous operation. Cf. C. A. 8, 3225.

Ger., 282,433, Mar. 25, 1914. A. E. STRIPPEL. In the manuf. of a stencil sheet material, long-fibered material is treated with a soln. containing an animal colloid (gelatin), glycerol, a Cr salt ($K_2Cr_2O_7$), and a hygroscopic nitrate ($NaNO_3$). Preferably the following proportions are used: gelatin 450, glycerol 510-620, $NaNO_3$ 42.5, and $K_2Cr_2O_7$ 9-13.6 g. After drying, the material is satd. with a soln. of glycerol alone or of glycerol with alc. and $AlCl_3$, e. g., with 5 parts glycerol, 1 of alc., and 1 of $AlCl_3$. Cf. C. A. 8, 1849.

Ger., 282,489, Mar. 20, 1913. M. LEISTICO. Process of preventing the scum on boiling salt solutions, consisting in adding to the soln. before or during the boiling

process, $MgCl_2$, solid or in soln., or as the end- or mother-liquor from KCl or sulfate manuf. The amt. of this admixt. is detd. by the content of organic substances in the soln., or by the firmness of the scum.

Ger., 282,505, Nov. 19, 1913. BADISCHE. Removing carbon monoxide from gas mixtures by means of ammoniacal cuprous chloride soln. under pressure. The solns. contain, in 1 liter, considerably more than 60 g. NH_3 gas in the form of free base or carbonate. Fe app. or parts in motion are not injured by this soln. so that high pressure can be employed, where stoneware and Pb are not suitable. NH_3 is supplied as it is lost, the soln. is kept in circulation between the absorption and a lower pressure chamber where the CO is removed, and any oxidation of Cu is corrected by the CO before it is removed. A suitable soln. is prepd. by mixing 200 kg. Cu_2Cl_2 , 250 kg. NH_4Cl , 500 kg. 25% NH_4OH , and 500 kg. H_2O . Operating at pressures above 100 atm., very small amts. of CO may be removed from gases (such as H containing CO) in a short time.

Ger., 282,657, Nov. 17, 1911. M. SPETER. In a process for the direct separation of scandium from mixtures with other rare earths, the minerals are decompd. with H_2SO_4 , HCl, or the like, or fused with alkali and then dissolved in acid. The acid soln. is pptd., boiled, with H_3PO_4 , filtered off or expressed, the ppt. again dissolved in H_2SO_4 , and pptd. as oxalate. The crude Sc oxalate differs from the other trivalent earths in that it forms with H_3PO_4 and its salts in acid soln., an insol. compd.

Ger., 282,665, Aug. 31, 1911. H. BARSCHALL. App. for obtaining high percentage oxygen by the rectification of liquid air in counter current to the vapors therefrom. From 100 cu. m. of liquid atm. air, 13-14 cu. m. O, of standard purity, are said to be produced by this app. The liquid air flows within a large number of narrow, long tubes of about 5-9 mm. internal diam. in a small stream, in a downward direction. The tubes are wound helically around a longitudinal axis, and at such an inclination that the flow of liquid air is slow, care being exercised that only liquid flows from the exit so that the vapors always rise counter to the liquid. If a warm gas is allowed to rise in contact with the outer surface of the tubes, the temp. is maintained, at the lower end of the tubes, at about -184° , and the liquid air, during its downward flow, is freed from almost all its N, so that O of a purity up to 99.5% flows out, while the N, with but very little O, passes out at the top of the system (about 7% O). If the O produced is allowed to bathe the outer surface of the tubes, a further purification is effected, and such difficultly removable constituents as A can be sepd.

Ital., 134,253, June 30, 1913. A. KRUMM and A. BONELLI. A solid laundry product consists of a mixt. of $CaOCl_2$ and gelatinous silica.

19. GLASS AND CERAMICS.

G. E. BARTON, A. V. BLEININGER.

The pottery industry. U. S. Bur. of Foreign and Domestic Commerce, *Miscellaneous Ser.* No 21(1915).—This rept., prepared with the coöperation of the Bur. of Standards, besides the statistical tables as to costs, wages, numbers of workmen, output, etc., usually found in such documents, contains a great deal of technical matter, covering the origin, compn., and rôle of the various raw materials of the pottery industry in the U. S., England, Austria and Germany. The processes of manuf., the machinery, structure and organization of the factories are discussed. Conditions of labor as to organizations, and their rules, and wages paid, are given and freely criticized. The methods of manuf. seem to be largely "rule of thumb" and there is room for great improvement by the introduction of rigid methods of control. W. B. JOHNSON.

A study of the Atterberg plasticity method. CHARLES S. KINNISON. *Bur. Standards, Tech. Paper* 46, 18 pp. (1915); cf. *C. A.* 8, 3712.—The practical significance of the Atterberg factor and the rating of clays based on shrinkage or water of plasticity are discussed. The Atterberg factor when used alone is of little significance but when coordinated with the water of plasticity, as recommended in this paper, it appears to be possible to differentiate between the nonsticky or safe working clays and the sticky varieties which are difficult to work. R. S. McBRIDE.

U. S., 1,142,829, June 15. F. J. MAYWALD. **Making heat-insulating tubing from sodium or potassium silicate** by atomizing the silicate into a heated cylindrical mold rotated at sufficient speed that the material is uniformly distributed by centrifugal force so that a homogeneous cellular tube, free from large bubbles, is gradually built up.

U. S., 1,143,104, June 15. W. R. CAMPBELL. **Apparatus for drawing glass.** Cf. *C. A.* 9, 519.

U. S., 1,143,112, June 15. E. T. FERNGREN. **Glass-furnace.**

U. S., 1,143,317, June 15. L. W. PROEGER. **Method of handling molten glass.** Cf. *C. A.* 8, 2931.

U. S., 1,143,732, June 22. O. SCHOTT. **Glass for chemical ware, containing at least 50% SiO_2 , Al_2O_3 4–15%, H_3BO_3 5–15%, alkali 4–14%, MgO 7.8% or less, ZnO 15.9% or less, BaO not over 30%, and CaO 2% or less.** The proportions may be SiO_2 61.8, Al_2O_3 12, H_3BO_3 10, alkali 13, MgO 1.1, ZnO 2.1, and BaO , ZnO and CaO may be omitted. Cf. *C. A.* 9, 1103.

U. S., 1,143,788, June 22. H. A. SCHNELBACH. **Semi-translucent glass for diffusing light** is formed by mixing cryolite 4%, CaSO_4 1% and Al_2O_3 12% with a foundation bath which itself would produce colorless glass and which is free from any reducing agent which would reduce the CaSO_4 . The foundation mixt. may be formed of sand 346, PbO 57, Na_2CO_3 86, KNO_3 32 and borax 8 parts.

U. S., 1,143,826, June 22. A. C. HESSELMAYER. **Pure kieselguhr bricks** are made by grinding the kieselguhr to a point just short of destroying the cell structure, to improve its bonding properties, then moistening and molding under pressure and firing at a temp. just short of sintering.

U. S., 1,143,885, June 22. H. M. BROOKFIELD. **Increasing the lime content of glass.** Ground cullet formed from glass containing 10–15% lime is mixed with about 30% its wt. of CaO and heated to about 1400° to fuse the mixt. The glass thus formed is very tough and especially suitable for insulators.

U. S., 1,144,234, June 22. P. J. PAQUET. **Glass-drawing apparatus.**

U. S., 1,144,395, June 29. C. W. THOMAS. **Vitrified bricks, tiles and insulators** are made by mixing sand 66 with glass 34 and H_2O 6 parts, pressing the mixt. into clots, drying successively under oxidizing and reducing conditions at 980 – 1150° , and then pressing the clots into their final form without greatly reducing their volume.

U. S., 1,144,615, June 29. C. H. SEAMAN. **Refrigerator linings** are formed from calcined magnesite 33.3, powdered glass 16.3, powdered quartz 16.3, marble dust 16.3, feldspar 14.3 and light calcined MgO 3.3 parts, mixed with MgCl_2 soln.

Brit., 5,487, Mar. 4, 1914. S. KIRKLAND and H. S. KIRKLAND. **In a process of ornamenting pottery, earthenware and other articles, before or after glazing, are wholly or partly covered with one or more colors by spraying, and other colors are sprayed on top of or between the first colors through seaweed, wood wool, straw, or other weeds or fibrous material, which may be held in front of the ware by wire clips or other suitable means. Firing and glazing are then performed in the usual way. Articles pro-**

vided with underglaze decorations may be finished by spraying one or more colors over the glaze through fibrous material, the underglaze color showing through the fibers of the overglaze colors.

Ger., 281,207, May 16, 1913. W. HAPPE. In the manuf. of a basic lining in rotary furnaces, a basic mass, worked up with tar, is stamped in place behind a shell formed of sheet Fe segments, or unburned pressed blocks of a basic mass with tar as a binder are fitted in place.

Ger., 281,348, June 14, 1913. C. HERZOG. Preventing the crumbling of the rims of thin porcelain apparatus by putting the article back into the gypsum form, after being loosened therefrom, and shaping the rim while in a semi-hard condition.

Ger., 281,388, Aug. 1, 1913. DYNAMIDON, G. M. B. H. A lining for the sintering zone of rotary furnaces includes an inner lining with a high content of molten clay and an insulating outer lining.

Ger., 281,464, June 18, 1913. R. HEIN. Construction of a transporting device for use in conveying ceramic masses to the kiln, adapting it to complete the drying of the shaped articles.

Ger., 282,348, Aug. 10, 1912. VEREINIGTE CHEM. FABRIKEN LANDAU, KREIDL, HELLER & Co. In iron enamels the practice has been to apply first to the Fe a ground enamel (clear-colored glass) and then a surface coat (turbid glass), the adhesion of the enamel being effected by the content of CoO or NiO. In order directly to enamel Fe in white, a substitute for CoO and NiO (which color the enamel) has been found in the compds. of the elements of the Ce group, especially CeO₂, alone or in admixt., or in combination with other metal compds., especially of the rare earths. These compds. also impart adhesive properties to the enamel without coloring it.

20. CEMENT AND OTHER BUILDING MATERIALS.

C. N. WILEY.

Production of sand-lime brick in 1914. JEFFERSON MIDDLETON. Separate from U. S. Geol. Survey, *Mineral Resources for 1914*, 11, 7 pp.—Statistical.

R. S. MCBRIDE.

Report of committee on (wood) preservatives. E. BATEMAN, *et al.* *Proc. Am. Wood Preservers' Assoc.* 1915, 131-40.—The report contains the standard method of analysis of the ZnCl₂ adopted by the association in 1912, specifications for a thermometer for use in creosote oil distn. and definitions of tar and creosote oil. *Zinc chloride analysis:* Weigh 10-14 g. sample into a 600 cc. Jena beaker, add 400 cc. cold H₂O and stir until soln. is complete. Allow basic Zn chloride to settle overnight, filter through a weighed paper (12.5 cm.), collecting the filtrate in a liter graduated flask. Dry the insol. material overnight at 100°, cool and weigh between clipped watch glasses. To each of 3 100 cc. portions of the filtrate add 15 g. NH₄Cl and 5 cc. concd. HCl and dil. to 350 cc. with hot H₂O. Heat nearly to boiling and titrate with K₄Fe(CN)₆, using U acetate as external indicator. If MnCl₂ exceeds 0.3%, modify the method as follows: to the 100 cc. portions of filtrate add 1 cc. H₂O₂ (2.5-3%) and 10 cc. 1:1 NH₄OH. Let stand on steam bath until settled. Filter, wash the beaker and paper twice with hot H₂O, dissolve the ppt. in smallest amt. of 1:1 HCl in original beaker, reppt. as above, filter and wash well with hot H₂O. Add the filtrate to that obtained from the first pptn. To the combined filtrates add 15 cc. HCl, just neutralize with NH₄OH and add 5 cc. HCl Add 25 cc. satd. H₂S soln., dil. to 325 cc., heat to 180° F. and titrate as above. *Estimation of iron and aluminium:* Weigh 10 g. sample into a beaker and dissolve in 100 cc. H₂O. Add dil. HCl to dissolve all basic Zn chloride, add Br-H₂O and boil off excess. Add

dil. Na_2CO_3 until a slight permanent ppt. is formed, add 3 drops glacial HOAc and 2 g. NaOAc and boil. Filter, wash, redissolve the ppt. in the original beakers with hot 1:1 HCl . Reppt. Fe and Al with a slight excess of NH_4OH , filter, wash free from chloride, ignite in Pt and weigh as Fe_2O_3 and Al_2O_3 . To prep. standard $\text{K}_4\text{Fe}(\text{CN})_6$ soln. dissolve 43.25 g. $\text{K}_4\text{Fe}(\text{CN})_6$ and 14 g. cryst. Na_2SO_3 in H_2O and make up to 1 l. Standardize against a known Zn soln. and keep in dark bottles. Prep. the indicator by dissolving 4.4 g. U acetate (free from Na) in 100 cc. hot H_2O and adding 2 cc. glacial HOAc . Wash water should contain 10 g. NH_4Cl and 10 cc. concd. NH_4OH per l. *Standard thermometer*: The thermometer shall be of glass and shall undergo no serious change at the zero point when heated to 400° . The space above the Hg column shall be filled with CO_2 or N . The scale shall read from 0° to 400° in 1° graduations, etched on the stem. The tip of the thermometer shall carry a ring for the purpose of attaching tags. The dimensions are to be: total length 375 mm., tolerance 10 mm., bulb length 14 mm., tolerance 1 mm.; distance from 0 to bottom of bulb 30 mm., tolerance 4 mm.; scale length 295 mm., tolerance 5 mm., diam. of stem 7 mm., tolerance 1 mm.; diam. of bulb 6 mm., tolerance 1 mm. The accuracy of standardization should be: up to 200° to the nearest 0.5° ; 200 – 300° to the nearest 1.0° ; 300 – 360° to the nearest 1.5° . *Tar* is defined as the non-aq., liquid product obtained in the destructive distn. of complex org. matter. Tars are classified as follows: Class A. Tars consisting principally of aromatic compds. and containing well-defined amts. of phenoloids. Class B. Tars consisting principally of aromatic compds., but lacking phenoloids. Class C. Tars consisting principally of aliphatic compds. *Creosote oil* is defined as any and all distillate oils b. 200 – 400° , which are obtained by distn. from tars of Class A. E. H.

U. S., 1,142,989, June 15. H. S. SPACKMAN and E. W. LAZELL. **Hydrated lime plaster** is made by crushing together a mixt. of 85 parts of hydrated high- Ca lime, containing about 5% of unhydrated CaO , 10–15 parts of a fused Ca aluminate mixt. containing a low % of lime and about 12% of NaHSO_4 or KHSO_4 . The crushing reduces the original volume of the mixt. by about 10–15% or more and increases the rapidity of drying and hardening of the mixt.

U. S., 1,143,004, June 15. C. WESTERGARD. **Artificial stone, tiles, etc.,** are made by molding a mixt. of sand 77, cement 21 and S 2% with soapy H_2O , allowing the product to stand in a kiln for 12 hrs. while kept moist by spraying with H_2O to prevent too rapid hardening, then supplying steam to the kiln for 3 hrs. at a temp. of 42° and then raising the temp. to about 100° for 1 hr. The use of soap gives a product of finer texture, more fire-resistant than if H_2O is used alone.

U. S., 1,143,670, June 22. W. WEILER. **Artificial stone.** See Brit., 3,720, 1913 (C. A. 8, 2613).

U. S., 1,144,669, June 29. G. B. SHIPLEY. **Apparatus for treating wood with liquid preservatives.** The wood is placed on a platform within a vertical cylindrical tank and the platform is mounted on a rod raised and lowered by a piston actuated by hydraulic pressure, to raise the platform for loading and unloading and lower it to submerge the wood to the desired depth in the treating liquid. Cf. C. A. 8, 565.

Brit., 4,928, Feb. 25, 1914. T. G. PARK and F. R. HILL. **Processes of mfg. artificial marble.** In one process, colored cementitious fluid is poured into a mass of cementitious material without being mixed, and the combined mass is then poured in a succession of streams on to a polished surface and manipulated to modify the distribution of the color, the product being backed with a thin layer of cement and subjected to pressure. Two or more colored cementitious fluids may be separately poured into the cementitious mass so as to avoid intermingling of the colors. When making pilasters, molding, etc., a smooth, flexible sheet, such as moistened paper, is placed

upon the polished surface to receive the cement, and a woven fabric is applied to the backing before it sets. The complete mass is then removed from the polished surface and the flexible sheet from the molded surface; the plastic mass is then transferred to a mold by means of the woven fabric, and a backing of cement is applied to the molded marble. The figured face may be polished with spirit polish or putty powder (SnO_2). When it is desired to apply the artificial marble to walls, a canvas backing is employed. The product may be secured in position by means of a paste consisting of white lead, gold size, and Parian cement.

Brit., 5,242, Feb. 28, 1914. J. H. AMIES. Cements. See U. S., 1,087,914 (C. A. 8, 1495).

Brit., 5,989, Mar. 9, 1914. E. J. LOVEGROVE, N. G. CROMPTON. Clinker or ash, such as refuse-destroyer clinker, is ground and mixed with 10–20% of a bituminous material to form a paving composition suitable for ramming. Alternatively, clinker ground to an impalpable powder may be employed with a grit composed of sand, stone, or the like, and 10–20% bituminous material added. The clinker may be ground as it leaves the destructor or after it has cooled, and is mixed with the bitumen at a temp. of 275–375° F., the heat for drying, mixing, etc., being supplied by the destructor or otherwise.

Ger., 281,588, Sept. 5, 1912. O. KRANER. In mfg. artificial stone slabs, or the like, from the recovered material of the paper and asbestos manuf., and oxychloride cement, with or without filling, the wet material is mixed with MgCl_2 , the H_2O -content of which is detd. by the amt. of H_2O in the material, and then the oxide is added, as in the manuf. of sorel cement. The wet material consists essentially of kaolin, $\text{Al}_2(\text{SO}_4)_3$, fiber, glue, and other binders.

Ger., 281,694, Oct. 28, 1913. GRUBENHOLZ-IMPRÄGNIERUNG, G. M. B. H. A wood preservative. Those derivs. of the nitrated phenols and naphthols in which the H of the OH is substituted by alkyl or organic acid radical (Ac, HCO, Bz, Me, Et, etc.), have been shown to possess, in general, a higher preservative action than the corresponding nitrophenols or nitronaphthols. Furthermore, the acid derivs. of the nitrophenols (as the Ac deriv.), possess a low m. p., are liquid at the temp. (about 70°) used in impregnation, and form emulsions with H_2O . Consequently, larger amts. can be incorporated in the wood. Finally, the substituted compds. are not explosive, so that the dried wood containing the solid compds. can be used freely in mines, for building, etc. $(\text{NO}_2)_2\text{C}_6\text{H}_4\text{OAc}(a)$ is especially suited for the preservation of wood. It may be produced by boiling $(\text{NO}_2)_2\text{C}_6\text{H}_4\text{OH}(b)$ with 4 times its wt. of Ac_2O and 0.25 times the amt. of fused NaOAc , for a long time under a reflux condenser, pouring the melt into well cooled H_2O , and filtering off the rapidly crystallizing (a) . This compd. is readily sol. in all organic solvents other than ligroin, and is purified by soln. in C_6H_6 and pptg. with ligroin. $(\text{NO}_2)_2\text{C}_6\text{H}_4\text{OOCH}$ is prepd. by melting (b) with 3 times its amt. of anhydrous HCOOH and allowing $1/2$ mol. POCl_3 to drop into the melt gradually. The resulting mass is then heated to about 80° until the evolution of HCl ceases. The reaction product is poured into H_2O and crystallized from indifferent organic solvents such as C_6H_6 . Cf. C. A. 8, 2471.

Ger., 281,793, Oct. 3, 1913. M. RÜPING. Process of preparing wood for impregnation, consisting in forcing needles into the wood and withdrawing them, thereby forming openings which admit the impregnating liquid to the interior of the block.

Ger., 282,368, Jan. 14, 1914. C. FLEISCH. Mfg. a slaked lime of smooth texture and moisture proof, with the aid of beef tallow and a carbohydrate. The CaO is slaked by boiling H_2O and intimately mixed with beef tallow, with the addition of crystd. sugar, while the mass is hot. The sugar increases the hardening properties of the CaO .

tallow mixt. Hot H_2O , of the temp. of the slaking heat of CaO is added, and the tallow is added while the mass is still hot. The sugar is added to restore to the product the hardening properties which are to an extent destroyed by the tallow. When applied and allowed to harden, the surface is porous and resistant to moisture.

21. FUELS, GAS, TAR AND COKE.

J. D. PENNOCK.

Furnace curves. R. J. WEITLANER. *Met. Chem. Eng.* 13, 425-8(1915).—A number of curves are given and their significance discussed. It is concluded that furnaces have individual curves, their fuel consumption being a function of their production in a certain time period. These furnace curves should be used to det. whether fuel has been wasted or saved during a certain working period and to serve for comparing furnaces as well as fuels. A bonus system can be based upon such curves.

F. W. SMYTH.

Note on coal analysis. A. G. STILLWELL. *Chem. Analyst* 13, 9(1915).—For the detn. of volatile matter, the use of 2 Pt crucibles, one inside the other, with a pack of fine asbestos in between them, is suggested.

H. M. LANCASTER.

A new briquetting method for the recovery of high value briquets from a low value brown coal. HERBING. *Feuerungstechnik* 3, 190-1(1915).—H. reviews the present methods of making briquets and states that all previous briquets made of the Austrian brown coal broke up in the fire and no better results were obtained than with the raw coal. The binder used in the new method is a petroleum residue or a cell pitch, the latter being cheaper, particularly in localities where paper is manufactured, although it is lower in heating value. The coal before briquetting is distd. until approx. 3% H_2 , with respect to total combustible matter, is retained in the residue, corresponding approx. to that contained in anthracite coal. About 20% of the volatile constituents is retained in the coal. The by-products of the distn. are recovered and the residue after the addition of 10% of petroleum residue is briquetted. The resulting briquet is similar in its av. comp. to a good bituminous coal. The best results are obtained when the C content of the raw coal on an ash- and moisture-free basis is increased from 75 to 86% in the partially coked coal, and the H_2 content reduced from 5.4 to 3.7%, while the vol. matter is reduced from 47.7 to 21.4%. Analyses are shown of the raw coal, partially coked coal and the finished briquets.

H. R. GUNDLACH.

A new alcohol fuel. ANON. *Chem. Trade J.* 56, 554(1915).—A test of a new fuel known as "Natalite," said to consist of $EtOH$ about 60%, and ether 40%, showed its consumption to be 1 gal. per 26.2 ton miles. The engine started easily either from cold or warm and the valve caps and heads were found to be clean after the trial. A trace of NH_3 is added to correct any tendency towards acidity under running conditions. It is to be manufactured in Natal, South Africa, from waste molasses.

H. L. OLIN.

Apparatus for the determination of sulfur in gas. E. R. WEAVER AND J. D. EDWARDS. *Bur. Standards. J. Ind. Eng. Chem.* 7, 620-1(1915).—Combustion method.

ISADOR MILLER.

An investigation on spent oxide residues. ANON. *Gas World* 62, 719-21(1915).—Little information has been published regarding the material arising from the combustion of spent oxide of iron. Attempts have been made to use it in haematite furnaces and for the lining for blast furnaces. Considerable attention has been given to the disposal of this material in purple ore briquettes. With 3% of the burnt oxide added to the purple ore it is possible to secure a briquet of satisfactory mechanical condition and chem. compn. When used for purification purposes the burned spent oxide to be

effective should have a slight alkalinity made by adding slight excess of CaO or NaOH. The red oxide residues scarcely ever show the presence of FeS. The black oxides show an increase of extractable matter by CS₂ and the development of sol. Fe salts on exposure. The quantity of residue resulting from burning spent oxide varies from 16% to 35%, according to the nature of the original purifying agent. Appreciable quantity of CaSO₄ in the oxide decreases efficiency and increases back pressure. Sketches and tables are shown.

M. L. TROWBRIDGE.

The composition of gas in relation to the performance of the Bunsen burner. ROBERT FRENCH PIERCE. *Am. Gas Light J.* 103, 1-5(1915).—The efficiency of gas as a fuel is a function of the flame temp. and the latter quality is not always a function of the calorific value of the gas. The light output of an incandescent mantle was used as an indication of the relative flame temp. of the gases in an incandescent gas lamp. A Welsbach burner was adjusted for max. incandescence, and the horizontal candle-power measured daily from Aug. 3, 1911 to Nov. 21, 1911. The gas was tested daily for calorific value, sp. gr., and candle power. The temp. and humidity of the air in the room were also detd. Carburetted water gas was used. Numerous tables and curves show that the incandescent gas lamp, adjusted at all times for max. incandescence, tends to be essentially a const. consumption, const. light output app., independent of charges of gas, quality, calorific value, sp. gr. etc.

P. J. COLE.

A preheater for use in tar distillation. TAIZO KURODA. *J. Chem. Ind. Japan* 18, 413-7(1915).—A description with a drawing is given of the construction of a preheater in which the tar to be distd. is heated by the hot distillates that come over. It is maintained that this device gives a smoother and more efficient run and a larger yield of light oils than with the ordinary water-cooled app.

H. L. OLIN.

Gasification of tar. A. R. WYATT. *Gas World* 62, 756(1915).—The crude tar is pumped into an overhead tank and flows by gravitation down the coil around the ascension pipe, by which means it is heated by the time it reaches the retort. The tar valve is opened and also the steam at about 80 lbs. pressure, the tar is injected into the retort in the form of spray. The steam is condensed in the usual way, the residue being a dense, hard coke, which may be removed after letting the retort stand for an hour. The rate of flow of the tar is about 40 gals. in 6 hrs. and should produce 2400 to 3000 cu. ft. of 20 candle gas. It is advisable to scatter some fine coke dust upon the retort to facilitate the removal of the residue. The steam keeps the ascension pipe perfectly clear. Sketches explain the operation.

M. L. TROWBRIDGE.

New continuous tar dehydrating plant. *Gas World* 62, No. 1602, 20(1915).—Illustration of plant and results obtained are shown.

M. L. TROWBRIDGE.

Carbolic acid in Japan. G. H. SCIDMORE. *Commerce Reports* 159, 139(1915).—A plan is under way for starting a semi-official factory for producing carbolic acid from coal tar. Expts. conducted by the Tokyo Gas Co. on the production of benzene, naphthalene, carbolic acid and aniline from coal tar have shown good results.

E. J. C.

Effect of different methods of crushing on the determination of the ash of coke. F. A. EASTAUGH. *Inst. Min. and Met.*, May 20, 1915; *advance proof* 3 pp.; *J. Soc. Chem. Ind.* 34, 602-3.—Four samples of coke were prepd. by different methods. No. 1 was broken by means of a wooden mallet, reduced in size by quartering, then ground in a stone mortar to pass a 60-mesh screen. No. 2 was broken on an Fe plate by means of a steel hammer and reduced to 60-mesh on a bucking plate. No. 3 was broken in the same manner as No. 2, but the final grinding was done in a hand Weatherhead mill. No. 4 was passed through a Taylor crusher, and ground in a Braund disk mill. Two g. were taken from each dried sample and burned, and the amt. of Fe oxide detd. in the

ash. The % of ash found (uncorrected and corrected for Fe_2O_3 , resp.) was: Sample No. 1, 17.79, 17.79; No. 2, 20.78, 17.52; No. 3, 19.58, 17.88; No. 4, 18.25, 17.11. It was assumed that the amt. of Fe found in the ash of No. 1 was a natural constituent of the coke, and the other results were corrected on this basis. No. 4 seems to be the best result, the amt. of foreign matter introduced during the crushing being probably less than in the other 3 samples. E. J. C.

The use of gas coke in central heating plants. H. RIES. Munich. *J. Gasbel.* 58, 198-201, 213-6(1915).—Gas coke and by-product coke were tested in 2 school heating plants. The useful heat was detd. by leading the steam into a surface condenser and measuring the amt. and temp. of the cooling H_2O . All details of tests are given in full. Analyses of the fuels gave for (a) gas coke, (b) by-product coke: total combustible matter, (a) 89.4, (b) 90.0; ash, (a) 7.10, (b) 9.3; H_2O , (a) 3.2, (b) 0.7; calorific value, (a) 12909 B. t. u. per lb.; (b) 12897. The 1st set of expts. were on a cast Fe boiler so arranged that the hot gases were drawn up through the descending column of fuel. The results for gas coke were—load in B. t. u. per sq. ft. heating surface (1), 2480, 2738; useful heat (2), 68.8, 70.0%; loss in heat in stack gases (3), 8.6, 10.2%; loss in stack gases due to incomplete combustion (4), 9.1, 3.8%; loss in unburned residue and ash (5), 3.7, 2.9%. For by-product coke (1), 2434, 2694; (2), 72.6, 74.8; (3), 10.6, 11.0; (4), 4.6, 4.3; (5), 1.1, 0.6. The 2nd set was carried out on a return tubular boiler, and gave for gas coke (4 expts.): (1), 1818 to 3278; (2), 85.0 to 79.6; (3), 8.3 to 12.3; (5), 2.0 to 2.7. For by-product coke: (1), 1825 to 3360; (2), 86.1 to 76.4; (3), 9.5 to 14.5; (5), 0.9 to 1.3. No products of incomplete combustion were found in any test with this boiler. With the higher loads here carried, the trouble from clinker formation was so serious as to make it certain that loads much above 3000 B. t. u. per sq. ft. could not be carried in practice. The conclusion is that there is no choice between the 2 varieties of coke in heating plants. W. L. BADGER.

The use of coke in gas producers. HENRY MARKGRAF. *Stahl u. Eisen* 35, 373-5 (1915).—Producers operated at the Lothring Works, using only coke, furnish a gas which compares very favorably with producers using coal. CARLE R. HAYWARD.

Battery-bell signaling system (WHEELER) 4.

U. S., 1,142,914, June 15. P. G. SCHMIDT. Gas-producer. Cf. C. A. 8, 1198; 9, 144, 1991.

U. S., 1,143,319, June 15. T. RIGBY. Obtaining gas and by-products from peat. Primary distn. and decarbonization are carried out in separate, successive steps, the gases from the former being passed through a condensing coil for recovery of waxy substances produced by the distn. while the gases from the decarbonization of the solid residue of distn. are separately treated for the recovery of NH_3 . A wax yield of 8% may be obtained by distg. for 50 min. at 500° .

U. S., 1,143,497, June 15. H. BRUNN and H. HORST. Drying raw peat by cutting into small pieces without crushing the fibers, mixing with ashes, sand, gravel or small coke and pressing the mixt.

U. S., 1,143,951, June 22. M. EKENBERG. Fuel briquets from peat are made by heating the wet, raw peat under pressure to about 150 – 250° , drying the wet carbonized peat at 100 – 120° until it contains at most only about 2% H_2O , heating to above 120° to increase its binding properties and molding under pressure.

U. S., 1,144,250, June 22. T. RIGBY and N. TÆSTRUP. Utilizing peat for fuel. The peat is filter-pressed, partly pulverized, and further dried while suspended in hot, gaseous products of combustion of gas generated by the gasification of part of the peat. A portion of the peat used to supply the gas is formed into briquets before gasification

and the combustion of the gas is used to generate power in an internal combustion engine, the exhaust gases from which are used for drying the peat. Cf. *C. A.* 8, 1498.

U. S., 1,144,782-3, June 29. A. RECTOR. Apparatus and method for burning natural or other gas with air in a partial vacuum to insure complete combustion in a Bunsen burner. The combustion gases formed are withdrawn by suction, which prevents any back draft such as might interfere with the combustion.

U. S., 1,144,784-5, June 29. A. RECTOR. Combustion of gas or oil vapor with air in a partial vacuum is maintained by bringing together cross jets of gas or vapor and air, both rarefied, in a combustion chamber previously partly evacuated, burning the mixt. and maintaining suction to withdraw the combustion gases.

U. S., 1,144,977, June 29. H. BRUCE. Coal-gas retort and stand-pipe structure.

Brit., 5,051, Feb. 26, 1914. E. HOWL and F. PERRY. In the purification of combustible gas, tar fog and finely divided impurities are sep'd. by subjecting the gas to the action of a stream of particles electrostatically charged by means of an influence machine, high-tension dynamo, or induction coil. The gas passes upwards through a tower of conducting material, at the top of which is an insulated water-tank connected to a dynamo, etc. Fine spray escapes through jets and the tar or other particles coalesce and collect in the sump.

Brit., 5,142, Feb. 27, 1914. D. D. BARNUM, H. A. CARPENTER and RITER-CONLEY MFG. CO. Gas retorts are arranged in vertical rows, and the retorts of each row, or the retorts of pairs of adjacent rows, have, extending from the mouthpieces, sep., valve-controlled connections with a vertical off-take pipe leading to a main located either at the top or bottom of the retort bench. Where a sep. off-take pipe is provided for each vertical row of retorts, the pipes may be arranged in pairs between pairs of rows of retorts, and the pair of pipes may be replaced by a single conduit with a central dividing partition. Cf. *C. A.* 8, 2938.

Brit., 5,730, Mar. 6, 1914. H. STRACHE. A mixture of distillation and water gas is obtained in an app. comprising a fuel bed and retort, through which coal passes to the fuel bed. During the hot blast, air is admitted by a pipe, the CO produced is burned with air supplied by a pipe, and the combustion gases, after heating the retort, escape by another pipe. Distn. gas collects in a space above the retort, and during the run when steam is admitted, the distn. gases are displaced into the gas-outlet pipe which is kept open during the following hot blast until the mixt. of H_2O and distn. gas still in the retort is displaced by the combustion gases.

Brit., 5,734, Mar. 6, 1914. R. PEARSON and CHALK FUEL POWER GAS & BY-PRODUCTS CORPORATION. Gas, lime, and other by-products are obtained in a producer by feeding on to a bed of incandescent fuel briquets containing chalk, solidified tar, naphtha oil, and small coal or peat, or both, the mixt. being subjected to steam in the prepn.

Brit., 5,764, Mar. 6, 1914. D. KOECHLIN. Purifying coal gas and increasing its CH_4 content by passage of the gases evolved in the latter stages of the distn. of coal, first over Fe_2O_3 heated to 120° , and then over Ni heated to 300° ; water-gas may be added to the gases treated. The Fe_2O_3 and Ni are arranged in 2 chambers which are heated by flue gases from the ovens or by generator gas, the heating gases first heating the Ni and then the Fe_2O_3 . The Ni can be regenerated continuously by mixing a small proportion of air with the gas. The Fe_2O_3 is obtained by calcining pptd. $Fe(OH)_3$ and the Ni by reduction of its oxide. The enriched gas is finally mixed with the gas obtained by passing the gases of the 1st stage of distn. through a red-hot chamber.

Brit., 5,813, Mar. 7, 1914. E. RHODES and W. GLOSSOP. Tar filters for use in connection with tar-spraying app. for roads, comprizing a vertical casing containing

(1) a tubular sieve, through which tar passes from an inlet to an outlet, (2) a rotary device for scraping or brushing the inner surface of the sieve to dislodge the solid matter, and (3) a removable cup at the base for holding the dislodged solid matter.

Brit., 5,845, Mar. 7, 1914. **INTERNATIONAL NITROGEN & POWER CO. and E. A. BUCKLE.** Constructional details of app. for heating pulped peat and the like.

Brit., 5,853, Mar. 7, 1914. **T. RIGBY, N. TESTRUP and WETCARBONIZING, LTD.** A peat-heating apparatus is supplied in winter from one or more reservoirs near the plant, filled in summer, and worked by the bog excavator. Hot waste liquor from the plant may be discharged into the reservoir near the excavator, to counteract freezing. Preferably the reservoir is connected by a cutting with the excavation in the bog, so that fresh peat can be transferred in barges without pulping. Cf. C. A. 8, 1498.

Brit., 5,858, Mar. 7, 1914. **A. R. BELLAMY.** A charcoal kiln is built up in sections and is provided with a conical bottom, below which is a sliding grate for regulating the air supply and a hinged discharging door.

Brit., 6,061, Mar. 10, 1914. **N. SCHUSTER and BRITISH COKE OVENS, LTD.** Distilling ammoniacal liquors obtained in purifying coal and like gases, by a current of gas which is withdrawn from the gas-main after it has been freed from heavy hydrocarbons and is reheated, and the resulting mixt. of gas and NH_3 is returned to the gas-main at a point where the pressure is lower than that of the gas containing NH_3 , the whole of the gas and the NH_3 passing together to a saturator.

Ger., 281,557, Nov. 8, 1912. **K. KILLING.** Increasing the illuminating power of inverted incandescent mantles by so regulating the supply of air and dividing the mouth of the burner that a plurality of small, green, downwardly directed inner cones are formed, and disposing the mantle in close proximity to the cones.

Ger., 282,076, Jan. 4, 1914. Addition to 281,275 (C. A. 9, 1841). **O. BUSSE.** Constructional details of a muffle furnace.

Ger., 282,217-8-9-20, Jan. 17, 1914. Additions to 281,611 (C. A. 9, 2146). **WESTF. GASGLÜHLICHTFABRIK. F. W. and C. KILLING.** Process and app. for the manuf. of inverted incandescent mantles.

Ger., 282,373, Dec. 7, 1913. Addition to 278,776 (C. A. 9, 1109). **J. BECKER.** Destroying obnoxious gases and vapors in the distillation of ammonia water. In order to render the principal process applicable where the water is treated and removed from the process or returned to the retort, so that H_2S is formed again in the products from the NH_3 distn. the S is washed out by means of ordinary H_2O . By this process not only the H_2S can be removed, but the S can be pptd. and recovered, and all in a small app. The process consists in mixing the SO_2 formed by burning H_2S over a contact mass, with another portion of H_2S and conducting this mixt., at a higher temp., into a reaction tower where the following conversion takes place: $2\text{H}_2\text{S} + \text{SO}_2 = 3\text{S} + 2\text{H}_2\text{O}$. In the heat the S vapor is aggregated and cooled in the upper portion of the tower from which it is led into the washer and thoroughly washed. As the wash water is kept in circulation through the app., the S aggregates increase in size until they can be readily removed.

22. PETROLEUM, ASPHALT AND WOOD PRODUCTS.

F. M. ROGERS.

Relations among the physical constants of the petroleum distillates. **W. F. RITTMAN and G. EGLOFF.** *J. Ind. Eng. Chem.* 7, 578-82(1915); cf. C. A. 9, 1991. Detns. were made of the distn. range, sp. gr., refractive index, viscosity, surface tension, capillary constants, mol. wts. and ultimate analyses. The first two are the

most important constants and with the refractive index are sufficient for identifying an oil. The refractive index varies in the same direction as the sp. gr. The value of the other factors is problematical.

ISADOR MILLER.

Temperature coefficient of expansion of petroleum residuums. H. ROSSBACHER. *J. Ind. Eng. Chem.* 7, 577-8(1915).—The sp. gr. is first detd. at the standard temp. in a Hubbard pycnometer. The latter is then filled with the sample, warmed sufficiently to allow the stopper to be seated, and suspended in a glycerol bath, the top of the stopper projecting slightly from the surface of the glycerol. The bath is heated slowly, the stopper being kept firmly seated and wiped clean as the residuum expands. When the desired temp. is reached it is kept constant until the sample reaches the temp. of the bath (shown by absence of exudation). The pycnometer is then removed, cleaned, cooled and weighed. The coeff. is calcd. by means of formulas given. I. M.

Condensation of gasoline from natural gas. G. A. BURRELL, F. M. SEIBERT AND G. G. OBERFEL. U. S. Bur. Mines, *Bull.* 88, 106 pp.(1915); see *C. A.* 8, 2052, 3854; 9, 1106. F. M. ROGERS.

The petroleum of S. Giovanni Incarico. B. GALDI. *Ind. chim. min. e met.* 2, 187-94(1915).—A description of this region. E. J. WITZEMANN.

The industry of the bituminous schists in Italy. GUIDO PULLE. *Ind. chim. min. e met.* 2, 209-17(1915).—An account of the present state of this industry in Italy. E. J. WITZEMANN.

The indicator in pyroligneous acid. J. M. JOHLIN. *J. Ind. Eng. Chem.* 7, 596 (1915).—J. believes that the indicator present in pyroligneous acid consists of the volatile ethers of pyrogallallic acid and its homologs. ISADOR MILLER.

Bleaching action of Kambara earth (UGNO) 27.

U. S., 1,143,153, June 15. A. WARRELL. Plastic lubricant and packing for axle journals, composed of soapstone asbestos tailings 24 and mineral lubricating oil 1 part. Cf. *C. A.* 9, 1245.

U. S., 1,143,466, June 15. J. W. VAN DYKE and W. M. IRISH. Distilling petroleum. Petroleum composed largely of hydrocarbons b. above 315° is vaporized and the vapors are passed upward through tubes surrounded by air, maintained at such a temp. that 25% or more of the vapor is condensed and drawn off without condensing the lighter hydrocarbons. Cf. *C. A.* 9, 1113.

U. S., 1,143,724, June 22. L. D. PETTIT. Lubricant for steam engines, formed of crude petroleum 41, lime H₂O 41, graphite 2.75, paraffin 25, "red engine oil" 1, resin 13 and kerosene 1 part. Cf. *C. A.* 8, 570.

U. S., 1,144,171, June 22. I. S. CLOPE. Extracting soluble constituents from resinous woods. Chips of pine or similar resinous wood are treated *in vacuo* with vapor of the distillate of pine or other coniferous wood which distills at 170-185° (and which has a sp. gr. of 0.875-0.880 at 15°). The vapor is allowed to condense in the chips and the soln. thus formed is drawn off and distd. to sep. the solvent for further use in the process.

U. S., 1,144,193, June 22. L. HAAS. Deodorizing waste gases from internal-combustion engines by passing through a foam and liquid spray formed from a 15% soln. of soap.

U. S., 1,144,304, June 22. A. MCD. McAFEE. Regenerating aluminium chloride used in treating oil. The sludge- or coke-like residues from the oil refining are centrifuged and burned or treated with gasoline to remove the oil which they carry, then treated with sufficient H₂O to hydrate the AlCl₃ and form a concd. soln. The latter

is heated until decompd. into Al_2O_3 and HCl , the Al_2O_3 is mixed with raw coke-like residue and the mixt. is acted on with HCl at a low red heat. Cf. *C. A.* 8, 2801.

U. S., 1,144,522, June 29. W. P. BENDING. Apparatus for drying asphaltic oils.

U. S., 1,144,788, June 29. F. M. RITES. Apparatus for making fuel gas by vaporization and partial combustion of oil with steam.

U. S., 1,144,789, June 29. F. M. RITES. Gaseous fuel from crude oil is made by partly distg. the oil in a vaporizing chamber, drawing off the vapor, draining off and partially burning the residue to supply heat for distn. and mixing the gas and vapor from the partial combustion with the vapor from the distn.

U. S., 1,144,800, June 29. B. VAN STEENBERGH. Carbureted-hydrogen generator, utilizing hydrocarbon oils. The generator is formed of several similarly constructed sections with elec. granular C resistance heaters which pass through the sections horizontally. The walls of the sections are formed of an outer metal shell, an intermediate insulating layer, *e. g.*, asbestos, and an inner refractory brick lining. The elec. heaters are enclosed in a mixt. of SiO_2 , $CaCO_3$ and Na silicate.

U. S., 1,144,801, June 29. B. VAN STEENBERGH. Electric resistance heater for hydrocarbon generators such as that of pat. 1,144,800 (*supra*). A resistance packing of granular C is placed in a metal tube lined with cardboard and coated with a mixt. formed of SiO_2 , $CaCO_3$ and Na silicate.

Brit., 5,434, Mar. 3, 1914. C. WHITE. In a process of cracking oils, etc., mineral oils and residues are brought in a liquid state and without addition of steam or H_2O on to CaO , or CaO containing C, heated to a temp. of 400–650°. The operation is conducted under reduced pressure in order to prevent the formation of gas. The vapors are condensed and fractionated for the production of petrol, the remaining heavy oils being subjected to a further cracking. The CaO may be regenerated by removing the deposit of C by heating it in a current of air.

Brit., 5,847, Mar. 7, 1914. O. H. VALPY and O. D. LUCAS. Catalytic bodies are prepd. by heating to reduction and sintering a mixt. comprizing a metal oxide, and a metal compd. of the organic type composed of metal C, and O with or without H and which, when heated, evolves CO or CO_2 . If it is desired to complete the reduction to the metallic state, a reducing agent which is solid or becomes so on heating is added. Suitable organic compds. are carbonates, oxalates, tartrates or acetates, and in examples the following mixts. are used: Ni and Fe oxalates and oxides, and C; red oxide of Fe, $MnCO_3$, $Fe(OCO)_3$, C and Al; Fe_2O_3 and NiO , Fe tartrate and Ni acetate and Al. The C and Al act as the reducing agent, and it is found that the production of the material is facilitated by the addition of Al, Ce, Mg, or other alk. earth metals. The mixt. is briquetted with the aid of a suitable binding material such as tar, which may form all or part of the reducing agent. The catalysts produced according to the above examples are suitable for use in cracking hydrocarbon oils. Cf. *C. A.* 9, 711.

23. CELLULOSE AND PAPER.

A. D. LITTLE.

The [British] Empire's resources in paper-making materials. S. C. PHILLIPS. *J. Roy. Soc. Arts* 63, 613–36(1915).—A very thorough paper on the subject, followed by an interesting discussion. E. J. C.

Arsenic content of modern wall-papers. A. F. SCHULZ. *Arb. kais. Gesundh.* 48, 303–20(1915).—Of 311 samples of com. wall-paper examd. 80% were found to contain As. Quant. exam. showed that the As was present in such quantity as might be ascribed to the unavoidable impurities present in the colors employed in the manuf.

The small amts. of As found cannot be considered harmful from a hygienic standpoint. Whenever it is desirable to det. whether a wall paper may or may not be injurious to health the As present must be detd. quant. The manner in which As poisoning is brought about through wall papers has not been satisfactorily established, but it appears that the As-containing dust present in the air of the room is responsible for it. There is a lack of evidence to show that As poisoning as a result of wall papers has taken place of late, and the proofs in the cases described are not sufficient to warrant such an assumption.

C. A. NOWAK.

Equivalent weights per ream. SINDALL AND BACON. *Paper Makers' Monthly J.* 53, 146-7 (1915).—The authors review briefly 6 different methods used at present for detg. the equiv. wts. per ream, and suggest the use of a definite relation between unit area and unit weight.

Sulfite waste liquors and their utilization. W. KIBY. *Chem. Ztg.* 39, 212-4, 261-3, 284-5, 307-8, 349-52 (1915).—A general discussion. J. H. MOORE.

Explosions of paper dust 24.

U. S., 1,141,510, June 1. R. WILLSTÄTTER. Dissolving cellulose. See Ger., 273,800 (C. A. 8, 2948).

U. S., 1,141,951, June 8. A. A. DUNHAM. Mixture for coating paper for lithographers use, etc., formed of hydrolyzed starch (neutralized with NH_4OH) 25, casein 2.5, Na_2HPO_4 0.4, kaolin or other mineral filler 100 and H_2O 150 parts.

U. S., 1,142,922, June 15. M. C. WHITAKER and J. S. BATES. Separating fiber and other constituents of resinous wood by treating chips with a dil. NaOH soln. at the boiling point under 20 lbs. pressure per sq. in. and then adding NaOH to the resulting soln. to bring the total NaOH present to about 6% and to cause sepn. of resin soap. During the boiling under pressure the turpentine vapors are led off and condensed.

U. S., 1,143,401, June 15. J. L. JARDINE. Obtaining paper pulp or fiber from bamboo. See Can., 160,045 (C. A. 9, 1246).

U. S., 1,143,587, June 15. M. W. MARSDEN. Recovering fiber from waste portions of the cotton plant by comminuting and mechanically sepg. the light and heavy portions by a blower or "cyclone separator," treating with H_2O and steam under pressure to ext. the sugar, tannin, coloring matter, etc. and then treating with an alk. soln. under high pressure to remove incrusting substances. Paper formed from the fiber possesses great strength and uniformity.

U. S., 1,143,979, June 22. W. G. LINDSAY. Solvent for acetylcellulose (such as is also freely sol. in acetone) formed of EtOAc 60-70 and MeOH 30-40 parts. Cf. C. A. 9, 1546.

Fr., addition 18,345, Oct. 21, 1913, to 417,274. BAYER & Co. Mfg. cellulose esters. Not only acid sulfates of the primary aromatic amines, but also neutral sulfates thereof (e. g., *o*-toluidine sulfate) and of the other amines (methylamine), serve to effect the production, in the acetylation process, of acetone-sol. products.

Fr., 468,380, Apr. 22, 1913. P. JOLIOT. In mfg. lustrous cellulose threads, the stretched yarns are converted into alkali-cellulose by means of NaOH, and then subjected, while stretched, to the mild action of CuO-NH_3 or CS_2 , whereupon the regeneration of the cellulose follows in the known manner.

Ger., 281,225, Nov. 29, 1913. BADISCHE. The acyl compds. of completely hydrogenated aromatic amines, which are readily accessible technically, serve very well for the manuf. of celluloid-like masses. They possess an exceptional softening and solvent power for nitrocellulose and the like, and the products obtained with their

use are odorless and colorless, and stable to heat and air. They possess, also, uniformly, a low sp. gr. *E. g.*, 35 parts of acetyldicyclohexylamine (obtained by acetylizing dicyclohexylamine, and forming colorless crystals *m.* 103°) are mixed with 100 parts of nitrocellulose, with the addition of alc., and worked in the usual manner. The product is a beautiful, colorless, celluloid-like mass.

Ger., 281,374, Nov. 24, 1911. Addition to 256,922 (*C. A.* 7, 2116). BAYER & Co. In the manuf. of liquid solutions of acetyl celluloses, alc. solns. of ZnCl_2 or thiocyanates need not be employed, as specified in the principal patent. Aq. solns. of the metal salts mentioned, as well as of other metal salts, dissolve acetylcellulose much more readily, if such solns. are concd. *E. g.*, 5 parts acetylcellulose may be dissolved in a soln. of 70 parts ZnCl_2 and 40 parts H_2O . Additions, such as 5 parts of triacetin, or dyes, as 2 parts diamond black, may be made to the resulting clear soln. Or 5 parts of acetylcellulose are dissolved in a soln. of 70 parts SnCl_4 and 30 parts H_2O , a clear soln. being obtained. Also 80 parts SbCl_3 and 20 parts H_2O make a good soln. with 5 parts acetylcellulose. The resulting clear solns. can be dild. with the corresponding metal salt solns. or even with alc. or other solvents, within wide limits, and permit of ready filtration (as by filter press) and purification. The solns. are physiologically indifferent, so that the operators are not injured. By dild. with H_2O or other pptnt., the acetylcellulose seps. out at once in the form of a gelatinous or flocculent mass. Cf. *C. A.* 8, 2060.

Ger., 281,515, Feb. 2, 1913. W. SCHACHT. In the manuf. of sizing for paper, the completely cooked resin soap, with added colloidal substances, is acted upon by liquid or gaseous acids or acid salts, preferably with the simultaneous introduction of a current of air, whereby the material is more or less decomposed. As colloidal substances are specified starch, casein, animal glue, saponified or unsaponified oils or fats, vegetable protein, water-glass and the like. As gaseous acids are used SO_2 and CO_2 , and as acid salts are specified bisulfates, bisulfites, and bicarbonates of the alkalis. The colloidal resin size must be rendered alk. separately, and then added to the other ingredients in the mixing cylinder. A complete sizing effects a saving of resin and alum or $\text{Al}_2(\text{SO}_4)_3$.

Ger., 282,050, June 14, 1913. C. G. SCHWALBE. Disintegration of wood and similar vegetable fiber for the manuf. of cellulose, with the use of Ca sulfite lyes (satn. hot or cold), followed by steaming to remove the soln. *E. g.*, the comminuted wood is soaked for 3-5 hrs., at 70-100°, with one of the ordinary Ca sulfite solns. of about 3% by wt. of SO_2 , the liquid is drawn off, and gaseous SO_2 is added until the acid contained in the wood is doubled. The lye still present is then removed, and the material is steamed.

Ital., 129,729, Feb. 27, 1913. C. BENIAMINO. Process of mfg. wood pulp, consisting in heating the wood by means of steam (without pressure) and then exhausting the vat. After having absorbed a solvent (basic salts) it is cut up into fine fibers.

24. EXPLOSIVES AND EXPLOSIONS.

C. E. MUNROE.

Permissible explosion-proof electric motors for mines; conditions and requirements for test and approval. H. H. CLARK. U. S. Bur. Mines, *Tech. Paper* 101, 14 pp. R. S. MCBRIDE.

Explosions of paper dust and how they may be prevented. ANON. *La sicurezza e l'igieno nell'industria* 1914, 186; *Ind. chim. min. met.* 2, 83-4 (1915).—In the paper

works of Jules Petit, Turcoing, in which are manufd. paper tubes to cover the spindles of cotton spinning machines, the edges of the paper must be smoothed off before pasting; this is done in special machines, called "gratteuses," and in this operation is formed a dense powder which is drawn by a ventilator into a chamber and collected on jute filters; at the end of the week, workmen enter the dark chamber and empty the contents of the filters into bags. On one such occasion, the workmen being provided with lanterns with good glass globes, there was a most violent explosion and the whole chamber became a furnace. Analysis of the dry dust showed that it contained 17.55% ash and 82.65% org. matter, with a mean moisture content of 4.50%. Inflammability tests showed that a cloud of the dust blown over the igniter gave a flame 17 cm. long per g. dust. The only safe lights to use in the presence of such dusts are incandescent elec. bulbs.

C. A. ROULLER.

Battery-bell signaling system (WHEELER) 4.

U. S., 1,143,330, June 15. C. M. STINE. Dynamite is made with the addition of nitrated ivory nut to the usual constituents of dynamites. The proportions may be: nitroglycerin 35, nitrated cotton 1, nitrated ivory nut 5, NaNO_3 52 and wood meal 7 parts. The nitrated ivory nut is insol. in nitroglycerin and its use as a substitute for an equal amt. of nitrated cotton produces an explosive which is more easily detonated.

U. S., 1,143,623, June 22. W. M. GROSVENOR. Preventing explosions of vapors of ether, benzene, etc., given off in drying celluloid or other materials. The drying is carried out in 2 separate stages in different compartments. During the first stage, the % of inflammable vapor in the compartment is kept so high as to form a non-explosive mixt. and during the second stage the % is kept so low as also to prevent formation of an explosive mixt.

U. S., 1,144,076, June 22. H. STAIGER. Composition for match heads composed of KClO_3 , sulfide of P and other usual ingredients of match heads with a binder of "feculose."

U. S., 1,144,077, June 22. H. STAIGER. Match-head composition composed of usual ignitable ingredients including KClO_3 and sulfide of P united with a binder of glue 70% and gum ammoniac 30% with sufficient H_2O to form a pasty mixt. Cf. C. A. 8, 1872.

Brit., 5,736, Mar. 6, 1914. H. STOLTZENBERG. The use, as explosives or ingredients of explosives, of compds. of betaine with acids rich in O such as HNO_3 , HClO_3 , HClO_4 , H_2CrO_4 , picric acid, and $\text{H}_2\text{Mn}_2\text{O}_8$. One example contains 25% nitroglycerin, 30% betaine nitrate, 38.5% wheat flour, and 0.5% betaine. The following compds. of betaine are described: Two with HNO_3 —one $\text{Bet.}_2\text{N}_2\text{O}_5$ obtained as white crystals by passing N_2O_5 into an ice-cooled soln. of betaine in MeOH, and another $\text{Bet.}_2\text{N}_2\text{O}_5$ obtained by the action of HNO_3 on betaine for a long time under pressure; $\text{Bet.}_2\text{HNO}_3$ obtained as white, lustrous plates by evapg. betaine down with HNO_3 or by repeatedly evapg. the hydrochloride with conc. HNO_3 in excess; $\text{Bet.}_2\text{H}_2\text{Cr}_2\text{O}_7$ crystallized by evapg. betaine down with H_2CrO_4 in aq. soln.; $\text{Bet.}_2\text{HClO}_3$, white crystals from betaine and HClO_3 ; and $\text{Bet.}_2\text{HMnO}_4$ from betaine and $\text{H}_2\text{Mn}_2\text{O}_8$.

Brit., 5,737, Mar. 6, 1914. H. STOLTZENBERG. The use, for stabilizing nitro explosives, of betaine and compds. of betaine with acids rich in O and with salts, such as HNO_3 , H_2CrO_4 , HClO_3 , NaBr , and BaI_2 . One example of explosives so stabilized contains 25% nitroglycerin, 36% betaine nitrate, 38.5% wheat flour, and 0.5% betaine.

Fr., addition 18,487, Oct. 17, 1913, to 410,239. C. CLAESSENS. In mfg. smokeless powder, the nitro derivs. of benzene, toluene, phenol, naphthalene, di- or tri-

nitrotoluene (20-30%), used instead of nitroglycerin for gelatinizing nitrocellulose, can be employed with the use of volatile solvents.

Ger., 280,820, Jan. 8, 1913. W. KRAUSHAAR. Electric miners' lamp for the automatic detection of fire-damp or other combustible gas. In circuit with the lamp is arranged a wire heated by catalytic combustion of definite cross-section and length, of an especially high positive or negative temp. coefficient such as Fe or B, so that simply by the temp. change caused by the presence of the gas mixt. sought to be detected, a change in the resistance of the lamp circuit results sufficient to cause an appreciable change in illumination.

Ger., 280,962, Oct. 3, 1912. H. SCHÜRMANN. Device for preventing the propagation and action of coal-dust and fire-damp explosions.

Ger., 281,157, May 22, 1913. BADISCHE. Quantitative gas analysis by the acoustic method, whereby the gas mixt. under exam. is set in vibration, and the resulting tone is compared with a tone of definite pitch. The resulting waves are transmitted telephonically or microphonically to a set of reeds which correspond to certain wave numbers. The set of reeds may be selected with reference to a few detd. % constitutions of the gas mixt. The reeds, when caused to vibrate, actuate a registering or alarm device. E. g., the presence of CH_4 (0-10%) in air may be detected with the aid of a tone of 980 vibrations per sec. The analysis-pipe is made to vibrate with air with a frequency of 1000 per sec., so that with 0% CH_4 there are 20 waves, 22 waves in the presence of 1% CH_4 , and 43 waves in the presence of 10% CH_4 .

Ger., 281,906, Oct. 21, 1913. CENTRALSTELLE FÜR WISSENSCHAFTLICH-TECHNISCHE UNTERSUCHUNGEN, G. M. B. H. Mfg. hexanitroethane by subjecting the solns. of $\text{C}_2\text{H}_5(\text{NO}_2)_4$ obtained by treating its salts in concd. acids (e. g., 100 g. of the K salt in 500 cc. concd. H_2SO_4 of sp. gr. 1.84), to the action of nitrating agents (e. g., 30 cc. of a mixed acid of equal parts by vol. of H_2SO_4 of sp. gr. 1.84, and HNO_3 1.52), at about $+10^\circ$. The $\text{C}_2(\text{NO}_2)_6$, m. 141° , can be used as an explosive.

Ital., 132,194, Apr. 24, 1913. SOC. ANON. "LA SABULITE." Increasing the power of explosives by the addition of alk. earth silicides. NH_4NO_3 is also added if the explosive is fresh.

25. DYES AND TEXTILE CHEMISTRY.

L. A. OLNEY.

Revival of the use of natural dyestuffs. E. S. CHAPIN. *J. Ind. Eng. Chem.* 7, 625-8(1915).—An address before the National Assoc. Cotton Manufacturers. Methods and recipes are given.

ISADOR MILLER.

British national dye scheme. D. G. ANDERSON. *J. Ind. Eng. Chem.* 7, 538-41 (1915).

ISADOR MILLER.

Turkey red oils from fatty acids. F. CERBAN. *Seifenfabr.* 35, 477-9(1915).—Castor oil fatty acids were prepd. from the oil in the usual manner. A low degree of sulfonation was obtained at a temp. of 30 to 35° by mixing 101 g. of the fatty acids with 15 g. of 66° Bé. H_2SO_4 and allowing to stand for 2 days with stirring, after which 161 cc. of 10% NaOH were added. The oil remained clear. A moderate degree of sulfonation was effected under the same conditions, using 25 g. of 66° Bé. acid. After standing 20 hrs. 100 cc. cold H_2O were stirred in and then 100 cc. hot H_2O , so that the temp. of the mixt. was 45° ; after one day the acid H_2O was drained off and the H_2SO_4 detd. The amt. taken up by the oil was 6.1 g. After neutralization the oil was dild. till it contained 50% fatty acids. It remained unaltered for several months. A high degree of sulfonation was produced by using 35 g. of acid with the same amt. of

oil as above. The sulfonated oil contained 11.8 g. of H_2SO_4 and was somewhat darker than the moderately sulfonated.

E. SCHERUBEL.

Cottonseed crushed and linters obtained 27.

U. S., 1,143,543, June 15. J. L. JARDINE. Preparing jute and similar textile materials for bleaching by treating each 24 oz. of the material with 1 gal. of a soln. of $\text{Mg}(\text{HSO}_3)_2$ containing 1.4% combined SO_2 and 2.1% free SO_2 at about 143° for 20 hrs. while allowing sufficient escape of SO_2 to prevent rise of pressure and adding H_2O as required during the heating to compensate for that lost by escape of steam.

U. S., 1,143,569, June 15. B. BORZYKOWSKI. Viscose threads are "set" by treatment with a soln. formed from *p*-nitrosodimethylaniline or similar nitroso compd. 0.5, $(\text{NH}_4)_2\text{SO}_4$ 10, NaCl 15 and H_2O 100 parts. The nitroso compd. prevents liberation of free S by decompn. and a stable product of great luster and transparency is obtained.

U. S., 1,144,181, June 22. A. ERLNBACH and K. MARX. Dyes for furs, hair, etc., are formed by mixing *p*-aminodimethyl- (or diethyl) aniline sulfate or hydrochloride with *m*-diaminoanisole or *m*-diaminophenetole sulfate or hydrochloride. The mixt. dyes deep blue-black from an aq. soln. with NH_4OH and H_2O_2 .

U. S., 1,144,325, June 22. A. ERLNBACH. A dye for hair, furs, etc., is made from sulfates of $(\text{NH}_4)_2\text{C}_6\text{H}_4\text{Me}$ and $(\text{NH}_4)_2\text{C}_6\text{H}_4\text{OMe}$ in the proportions of 2:1. The product is sol. in H_2O and when oxidized with H_2O_2 gives a full bluish black on furs or hair previously mordanted with FeSO_4 .

U. S., 1,144,577, June 29. E. WRAY and F. HESS. Dark blue or black vat dyes are made by condensing α -isatin derivs. with derivs. of aminonaphthols; e. g., 2-benzoylamino-5-hydroxynaphthalene with isatin- α -anilide, 5-hydroxy-1-phenylnaphthylamine with 5-chloroisatin-2-*p*-chloroanilide or 5-hydroxy- μ -phenyl-1,2-naphthimidazole with isatin- α -chloride.

U. S., 1,144,655, June 29. G. HEBERLEIN. Producing pattern effects on mercerized cotton fabrics. See Ger., 280,134 (C. A. 9, 1396).

Brit., 5,011, Feb. 26, 1914. FARBW. V. M. L. & B. Printing fabrics with reduction dyes, such as vat or S dyes, by lithographic or typographic processes, by applying the dye, finely ground, with a varnish or oxidizable oil to the fabric, which has been prepd. with an alk. reducing agent, and fixing by steaming. In a modification, the alk. reducing agent is applied to the fabric after the color has been printed on. A mixt. of helindone violet R and printers' varnish is specified as the color, and a mixt. of hydrosulfite NF, Na_2CO_3 , wheat starch, and H_2O , as the alk. reducing agent.

Brit., 5,238, Feb. 28, 1914. F. STEINIG. Threads, films, etc., are manufd. from viscose by squirting into a warm and highly concd. soln. of a neutral salt, to which a small % of a sol. NH_4 salt has been added, and allowing the thread so formed to rest in the air to regenerate the cellulose. The bath referred to consists of a soln. of Na and NH_4 sulfates, and is employed at a temp. of 30 – 40° . Cf. C. A. 8, 3373.

Brit., 5,569, Mar. 5, 1914. A. R. WHITEHEAD and J. FARRAR. Constructional details of a dyeing machine.

Fr., 467,887, Jan. 30, 1914. E. T. J. WATREMEZ. Bleaching vegetable fibers. See U. S., 1,133,769 (C. A. 9, 1395).

Fr., 468,821, Feb. 23, 1914. HEBERLEIN & Co. In the manuf. of a wool-like cotton fabric, 51° Bé. H_2SO_4 (and stronger) exerts upon the cellulose a gelatinizing and parchmentizing action, whereby the cellulose is weakened, while acid of a strength below 51° Bé. is almost without action within 15 mins. If the cellulose (cotton)

were previously mercerized and therefore fast to acid, the luster is destroyed by acid of 49–51° Bé. (49.5–50.5° Bé.), the parchmentizing effect is not produced, and the fabric is softer, denser, and more like wool. The same effect is produced by compression. The period of action is several secs. to several mins. H_3PO_4 of 55–57° Bé., HCl of 1.19, HNO_3 of 43–46° Bé., ZnCl_2 of 66° Bé. at 60–70°, and a short period of action of CuO-NH_3 produce the same effect.

Ger., 280,710, May 10, 1913; addition 18,674, Dec. 20, 1913, to Fr., 451,798. BADISCHE. New derivs. of dibenzanthrone and vat dyes derived therefrom. The green vat dyes formed according to the principal process of Fr., 451,798, may be converted, by treatment with Br, into new vat dyes having more desirable properties, and showing greater resistance to b. soap- and soda-water.

Ger., 281,571, Nov. 5, 1911. Addition to 258,638 (C. A. 7, 3546). LANDAU & Co. and I. KREIDL. Of the salts of the rare earths used according to the principal patent for weighting silk, only those are applicable which, in the hydrated form, do not oxidize in the air, since the silk suffers by the oxidation process. By admixt. with such salts of the rare earths as do not possess these disadvantages, Ce salts can be rendered suitable for weighting silk. In the waste product from incandescent mantle manuf., Ce is sepd. until the mixed material, in the hydrated form, does not oxidize in the air.

Ger., 281,581, Dec. 23, 1910. W. MATHESIUS and M. FREIBERGER. In bleaching cotton goods, the material, bucked in the usual manner, is immersed in a heated alk. ice bath, preferably in a continuous operation. The Cl-content of the material after treatment is reduced to $\frac{1}{16}$ by rinsing with a more dil. Cl liquor. The material is then passed through a similar app. in which an acid Cl soln. is allowed to act. The material is then washed in the usual manner. The baths are heated to facilitate the bleaching action. In order that the Cl baths shall not be heated too strongly, a heating agent is employed whose temp. is but slightly above that of the desired temp. of the Cl baths (e. g., warm H_2O). In this process the alk. Cl bleaching process need not be carried to the formation of oxycellulose.

Ger., 281,797, Oct. 23, 1912. H. EICHELER. Perforated yarn spool of metal, for dyeing, spinning, and weaving purposes.

Ger., 281,911, Aug. 13, 1913. BAYER & Co. Mfg. sulfonyl chlorides of the anthracene series. Anthraquinone or β -chloroanthraquinone are converted, by the action of chlorosulfonic acid, into the chlorides of the dichloroanthracenedisulfonic acids.

Ital., 129,734, Feb. 27, 1913. A. BARDELLI. In a process of mfg. artificial silk from com. mercerized cotton, the decompn. of the collodion during the treatment at ordinary temp. is prevented by rendering the Schweitzer reagent alk. with NaOH before bringing it into contact with the mercerized cotton.

26. PAINTS, VARNISHES AND RESINS.

A. H. SABIN.

North Dakota paint and oil laws. ANON. *Drugs, Oils and Paints* 31, 17–8 (1915).—Copy of law regarding the sale of boiled linseed oil and the adulteration of paints. Linseed oil must comply with the U. S. Pharmacopeia tests for purity and boiled linseed oil must be heated to 225° F. All white lead or compds. intended for use as a substitute thereof must be labeled to clearly show the % of each mineral constituent. All mixed paints must show their true compn. unless made of pure linseed oil, lead carbonate, oxide of Zn, turpentine, Japan driers and pure colors. The presence of

rosin spirits, C_6H_6 , benzine, or other than spirits of turpentine or turpentine driers shall be clearly shown on the label with the % thereof. The presence of not more than 1.5% of H_2O will not be considered as adulteration. Western Zn oxides carrying not more than 5% of $PbSO_4$ will be considered as commercial ZnO. The term "white lead" may be used only for the basic carbonate. Substitutes for linseed oil must be shown on the label.

E. W. BOUGHTON.

Prohibition of lead paints in Great Britain. ANON. *Oil, Paint and Drug Rep.* 87, No. 22, 18(1915); cf. *C. A.* 9, 1999.—This article includes a report of the expert testimony before the govt. committee, and a minority report which urges a trial of regulation before prohibiting the use of lead paints. Also in *Drugs, Oils and Paints* 31, 57-60(1915).

E. W. BOUGHTON.

Determination of moisture in shellac. A. C. LANGMUIR, *et al.* *J. Ind. Eng. Chem.* 7, 633(1915).—Official method worked out by a committee of the Am. Chem. Soc. and approved by several manufacturing companies.

ISADOR MILLER.

The condensation products of phenol and formaldehyde with special reference to bakelite. GORO MATSUMOTO. *J. Chem. Ind. Japan* 18, 434-80(1915).—M. classifies the various condensation products of $PhOH$ and CH_2O in 3 groups, *viz.*, crystallizable, sol. and fusible, insoluble and infusible. He sums up the results of his investigations on bakelite as follows: (1) the whole process may be divided into 3 stages: the initial condensation, the concn. of the products, and the hardening. Reactions in all stages are accelerated by certain reagents: (2) CH_2O which combines with phenol in the initial stages may be well estd. by Lemme's method. (3) The following may be used as condensing agents: H_2SO_4 , HCl , NH_4OH , $(CH_3)_4N_4PhNH_2$, Na_2SO_3 , Na_2CO_3 and $NaOH$. Neutral salts have no effect. (4) As a hardening agent only basic substances as $NaOH$ or NH_4OH can be used, of which the latter is the better. (5) The combination of $NaOH$ as the condensing agent and NH_4OH as the hardener gives the best results both in yield and quality. (6) With the use of cresol instead of phenol an analogous substance is obtained.

H. L. OLIN.

Bakelite suit decision. ANON. *Met. Chem. Eng.* 13, 411-4(1915).—A full review of the decision in favor of the plaintiff in the case of the General Bakelite Co. *versus* the Geo. J. Nikolas & Co. varnish and lacquer manufacturers. The case is not only of com. importance, but very instructive in various of its legal and chemical aspects. The bakelite patents in question were held valid and infringed.

F. W. SMITHER.

Constituents of the fruit of the Osage orange (MCHARGUE) 12.

U. S., 1,143,110, June 15. C. ELLIS. Composition for removing paint and varnish, composed of denatured alc. 40, $MeEtCO$ 25, propionic acid 6 and ceresin wax 0.25 parts; or acetone 30, C_6H_6 25, propionic acid 4 and ceresin wax 1 part. Kerosene, toluene, CCl_4 , C_6H_5Cl , amyl acetate, starch, etc., may also be added. Cf. *C. A.* 9, 1849.

U. S., 1,143,111, June 15. C. ELLIS. Paint- and varnish-remover formed of acetone 30, C_6H_6 25, butyric acid 4 and ceresin wax 1 part. This mixt. is suitable for spreading on the surface under treatment; for dipping articles in the remover, the latter is formed of denatured alc. 40, $MeEtCO$ 25, butyric acid 6 and ceresin wax 0.25 parts.

U. S., 1,143,130, June 15. A. E. NIENSTADT. Composition for removing paint and varnish, composed of $MeOH$ 7.5, acetone 7.5, C_6H_6 15, castor oil 2, NH_4OH ($26^\circ Be.$) 2, $C_{10}H_8$ 4 and NH_4 stearate 8 parts.

U. S., 1,143,387, June 15. L. HAMBROCK, JR. Composition for removing paint or varnish, formed of copal 6, tung oil (polymerized by heat) 4, beeswax or ceresin

wax 4 and oil from the distn. of copal 8 parts. This forms a pasty mixt. which may be diluted with C_6H_6 or MeOH.

U. S., 1,143,714, June 22. O. W. KNIGHT. A plastic phenol resin mixture (suited for making varnish or insulation) is formed by fermenting waste sulfite liquor, adding $Na_2Cr_2O_7$ or $K_2Cr_2O_7$ to convert into aldehyde at least part of the alc. produced, mixing with phenol and heating to effect condensation. $FeCl_3$, $FeSO_4$ and $Fe_2(SO_4)_3$ may be used as condensing agents and by omitting the dichromate the alc. may be distd. off and recovered during the condensation.

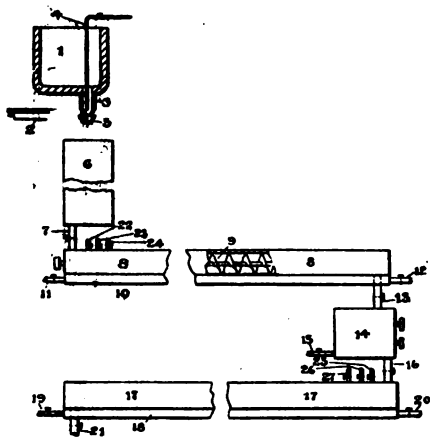
U. S., 1,143,877, June 22. W. ALEXANDER. Composition for removing paint, formed of a 50% aq. soln. of glucose 4, pyroxylin varnish 57, acetone 10, C_6H_6 17, H_2O 10 and a C_6H_6 soln. of paraffin 0.1 part.

U. S., 1,143,878, June 22. W. ALEXANDER. Composition for removing oil- or water-paints, formed of a 50% aq. soln. of glucose 10, a 10% acetone soln. of nitro-cellulose 70, C_6H_6 20 and H_2O 15 parts.

U. S., 1,144,599, June 29. H. JAMSON. Paint which will withstand repeated washing, is made from linseed oil 1 pint, powdered size 8 oz., turpentine 8 oz., Paris white 10 lbs., "patent" drier 8 oz., a pigment such as Zn white or red or white Pb 2.5 lbs. and H_2O 2 qts.

U. S., 1,144,701, June 29. C. ELLIS.

Apparatus for making white lead. Molten Pb from the receptacle 1 is atomized with air and steam and the fine solid Pb formed is passed through the tube 8 by a screw conveyor. Air, steam and CO_2 are brought into contact with the finely divided Pb in the tube 8 and the hydrated material then passes through the tube 17 where it is treated with CO_2 . Cf. C. A. 9, 2000.



Brit., 5,432, Mar. 3, 1914. G. CUNEO. Anti-fouling coating compositions for ships, etc., contain inorganic compds. of F derived from HF or H_2SiF_6 as the anti-fouling ingredients. These ingredients may be added also to ordinary paints to increase the hardness of the coating. An example of a comp. for coating submerged structures comprizes 50% of varnish consisting of resin and benzene, 25% of F compd., and 25% of pigment such as ZnO or Fe_2O_3 .

Ger., 280,074, Mar. 3, 1914. E. ROLFFS. Process of transferring pigment pictures on rolls, especially for polychrome printing.

Ger., 281,452, Feb. 28, 1913. Addition to 272,465 (C. A. 8, 2628). E. F. WERNIG. In the manuf. of a linseed-oil-varnish substitute from animal oils, such as train and the like, the process of the principal patent is modified in that the oil is at first heated to a moderately high temp. and then, without further application of heat, but with prevention, as much as possible, of radiation, it is allowed to stand for some time.

The splitting up of the readily hydrolyzed glycerides proceeds then with comparative rapidity. Furthermore, during this period, small amts. of fatty acids, hydrocarbons, traces of glycerol and acrolein distil over. In these interposed periods of rest, in which the application of external energy is suspended, considerable time is saved. A white fat is obtained as the product of distn. The period of treatment

for the distn. is shortened to about 6 hrs. *E. g.*, fish oil is heated first in the still at about 280° . The fire is then removed, and the draughts closed for 1–2 hrs. In this period a spontaneous heating of the oil to about 350° takes place, and small amts. of fatty acids, hydrocarbons, and traces of glycerol and acrolein, together with some H_2O , distil over. During the breaking down of the glycerides incident to this action, the temp. gradually falls. At a temp. of $260\text{--}85^{\circ}$ the distn. with steam (of about 375°) is begun, with or without vacuum, in order to shorten the operation as much as possible. The final product is an almost white distillate. A thick oil or varnish substitute equally as valuable as the product of the principal patent is obtained. Cf. *C. A.* 8, 3128; 9, 726.

Ger., 281,483, Aug. 12, 1913. A. EIBNER. Light and dark cinnabar. See U. S., 1,137,467 (*C. A.* 9, 1696).

Ger., 281,504, May 29, 1913. C. G. BÖSSENROTH. Mfg. paste tempera colors in tubes or boxes. The ordinary oil colors as well as the tempera colors turn dark in time (brown) because of the high oil content. The products of this process contain no fats or oils, are insol. in H_2O after drying, and are unaffected by atm. influences. They are obtained by working pigments up to an emulsion with binder consisting of gelatin soln. and blood fibrin, and then adding $HCHO$ or other hardener for the binder. So long as these colors remain away from the air no change takes place in the paste and its spreading property. After application and drying the coatings cannot be wiped or washed off, and they are unaffected by H_2O , air, or bacteria. *E. g.*, 1 kg. Zn-white, 100 g. gelatin soln. (10%), and 70 g. fibrin, are ground up in a drum- or ball-mill, and the resulting emulsion is mixed with 30 g. $HCHO$ (40%). Cf. *C. A.* 9, 158.

Ger., 281,594, Dec. 12, 1913. ÖL- UND FARBFILM-AKT.-GES. In mfg. oil- and paint-films, a suitable breadth and length of weakly sized, strongly absorbent, firm paper, such as pattern paper, is stretched upon a smooth surface and impregnated, on the upper surface, with water-glass. The paper is then removed and satd. on the back with oil varnish. Therefore, after another application of water-glass to the surface, no more moisture is taken up, and the surface becomes smooth. After impregnation the paper is clamped firmly upon a surface, with the water-glass surface up. Oil-varnish or oil-paint is then applied to this surface, with or without a drier, liquid rubber, or the like, by spraying. After 5–10 hrs. a film of oil or paint has formed on the water-glass surface, with its surface free from gumminess, while the under surface does not adhere to the water-glass surface because of the saponifying action of the alkali, and the film can therefore be removed readily. The under side, however, will adhere readily to suitable surfaces, and serve as substitutes for rubber in the manuf. of dust- and water-proof sacks, packing material, wall coverings for building, etc.

Ger., 281,688, Apr. 2, 1914. Addition to 281,687 (*C. A.* 9, 2156). CHEM. FABRIK GRIESHEIM-ELEKTRON. The manuf. of tech. valuable products from organic vinyl esters, according to the principal process, is facilitated by means of catalytic substances, such as organic peroxides, the ozonides, the organic acid anhydrides, in combination with O or agents yielding O (perborates, percarbonates) as well as certain metallic oxides, such as Ag_2O . These agents also influence the properties of the products. *E. g.*, 0.5–1 g. benzoyl peroxide is mixed with 1 kg. vinyl chloroacetate, and the mass is heated carefully in a large vessel provided with a reflux condenser. At $80\text{--}100^{\circ}$ the polymerization is instituted with rapid rise of temp., so that the reaction vessel must be cooled. If the contents are dild. with an indifferent solvent, such as C_6H_5Cl (300 g.), the violent progress of the reaction is moderated. The reaction product is a thick syrup which can be worked further in various ways. *E. g.*, by illumination of the sirup, the valuable solid masses specified in the principal patent

are obtained in a short time, inasmuch as the unaltered vinyl ester polymerizes. These solid masses can also be obtained by driving off the vinyl ester and the diluent *in vacuo*.

Ger., 281,758, Apr. 12, 1913. A. GOTTSCHALK. App. for dissolving dried oils and varnishes and paint films, as well as for softening hard paint brushes, comprizing a hermetically sealed chamber wherein is built a container for the solvent to be volatilized. Below or within the liquid container is a tube system adapted to contain hot H₂O or steam. A porous plate is provided, to be satd. with the liquid.

Ger., 281,759, June 12, 1913. P. HEINRICH. Color atomizer (air brush). Cf. C. A. 9, 2011.

Ger., 281,939, June 27, 1913. CHEM. FABRIKEN DR. KURT ALBERT and DR. LUDWIG BEREND. In mfg. oil-soluble formaldehyde resins, adding to the condensation products from phenols and HCHO or substances which split off such products, all of which are insol. or difficultly sol. in fatty oils, solubilizing agents which are sol. in the resulting HCHO-resins formed, as well as in fatty oils. Resins or resin compds., such as resin acids, resin esters, resinsates, and the like, find application as solubilizing agents. The condensation products from phenols and HCHO or the like are heated for a long time with the resins or the like. Suitable phenols are cresols, naphthols, and their derivs., halogen compds., carboxylic acids, etc., and instead of HCHO, its polymers (trioxymethylene, hexamethylene), or other aldehydes. E. g., 100 g. com. phenol are heated with 70 g. HCHO (40%), and 0.1 g. HCl, for 3 hrs. under a reflux condenser, whereupon the H₂O and excess phenol are removed. To the resin, still in the liquid state, are added 30 g. of colophony, and the mass is heated for about 2 hrs. The resulting yellow resin is sol. in linseed oil, turpentine, benzene, alc., and like solvents, and m. at about 150°. A similar product is obtained with crude cresol and trioxymethylene.

Ger., 282,306, June 1, 1912. Addition to 272,465 (C. A. 8, 2628). E. F. WAENTIG. In the manuf. of linseed-oil and varnish substitutes from animal oils, such as train and the like, the process of the principal patent is modified, with the production of a higher yield, by operating *in vacuo* or at least in a partial vacuum. The temp. in the still is maintained at about 270-85°. At a lower temp. the distn. is protracted materially, and at a higher temp. the breaking down of the glycerides which constitute the varnish may result, thereby decreasing the yield. Air cannot be used in the removal of the finished product from the still on account of the danger of gelatinization. This objection is met by adding to the contents of the still, as soon as the satd. fatty-acid content becomes low, such organic acids or their esters as may remain in the finished product without disadvantage, and serve as diluents or dispersing agents and are also difficultly or not at all volatile. Acids of the unsatd. series, such as linoleic acid, are suitable; also resin may be used. The treatment of train oil with steam of a very high temp. cannot be continued until satd. acids begin to go over, but the heating is discontinued as soon as the formation of the varnish has begun. Since, however, in this case the contents of the still always contain satd. acids, they are after-treated with steam of low temp. (at most 315°), whereby the satd. acids are driven over. The thick oil is always viscous until it finally gelatinizes in case it is boiled too long. In order to prevent gelatinization, organic acids or esters thereof which can remain therein may be added to the varnish. Cf. 281,452 (*supra*).

Swed., 37,362, Dec. 4, 1912. J. AKTSCHOURIN. In the production of colophony from colophony resin, the usual extrn. of the wood by means of alkali, and subsequent breaking of the colophony resin or extrn. of the colophony by means of benzine or ligroin, is effected in the presence of a reducing agent, such as SO₂, sulfite or hydrosulfite.

27. **FATS, FATTY OILS AND SOAPS.**

E. SCHERUBEL.

Behavior of some oils and fatty acids in Mackey's cloth oil tester. W. McD. MACKEY. *J. Soc. Chem. Ind.* 34, 595-7(1915).—Four tables are given showing expts. with olive oil, raw linseed oil, cottonseed oil, olein, and semi-hardened cottonseed oil spread upon cotton wool. Results show that the I no. alone does not give reliable indication as to the behavior of an oil as regards liability to induce spontaneous heating when spread on fiber. E. SCHERUBEL.

The Kambara earth and its bleaching action on oils. S. UENO. Tokyo. *J. Ind. Eng. Chem.* 7, 596-600(1915).—Lab. expts. on Kambara earth (Japanese) which has a marked bleaching action on fatty and mineral oils. This action is affected by the presence of impurities in the oils and varies with the temp. and duration of treatments, the longer treatment being more effective at low temp., and *vice versa*. The presence of air during treatment influences the color of the bleached oil. Contact with H or CO₂ during treatment does not lessen the bleaching power; this is decreased by the presence of free H₂O, strong inorg. acids (except H₃PO₄), or alkalis in the earth as well as by the action of heat. The chem. properties of the oil are not changed by the bleaching action. The spent residual earths have no bleaching power but can be revived. Kambara earth gives a bluish green coloration on admixture with cod liver oil; this may perhaps serve for the identification of the latter. I. M.

Cottonseed crushed and linters obtained. ANON. Bur. Census, *Preliminary report*, March 18, 1915.—The number of establishments crushing cottonseed, the quantity of seed crushed and linters obtained from the crops of 1912, 1913, and 1914 are given. In 1914 there were 880 cottonseed mills in operation; 5,493,899 tons of cottonseed were crushed and 772,270 running bales of linters obtained. R. S. MCB.

The menhaden industry of the Atlantic coast. ROB. L. GREER. Bur. Fisheries, Doc. 811 from Appendix III of Annual Report U. S. Commissioner of Fisheries, for 1914. 27 pp.—Statistical summary, including a description of processes used for cooking, pressing, and drying of material and statement of properties of the oil and scrap. R. S. MCBRIDE.

Large scale treatment of salmon cannery waste. J. W. TURRENTINE. U. S. Bur. of Soils. *Pacific Fisherman* 13, No. 2, 14-5.—A discussion of the relative merits of large scale, centrally located plants and small plants erected as integral parts of or contiguous to a cannery. Large scale operations are described. Cf. C. A. 9, 836. W. H. FRY.

Utilization of salmon cannery waste. J. W. TURRENTINE. U. S. Bur. of Soils. *Pacific Fisherman* 13, No. 1, 15-16.—Salmon cannery waste, consisting of fish other than salmon, and refuse remaining after cleaning, may be used to produce a good quality of oil and dry scrap of satisfactory compn. and appearance. Cf. C. A. 9, 836. W. H. FRY.

Lathering numbers. M. STEFFAN. *Seifensieder Ztg.* 42, 1-3, 23-5, 68-70, 137-8(1915).—A large number of detns. were made on various hard soaps, powders and soft soaps with Stiepel's app., and the influence of saponin and hard water detd. The lathering no. of a saponin soln. is diminished when soap is added and the same is true of a soap soln. when saponin is added. The addition of hard water decreases the lathering properties in proportion to the amt. added because of the formation of Ca and Mg soaps. Hard water does not influence the lathering of a saponin soln. and it is of advantage to add saponin where soaps are used with hard water. The observations of Schrauth, to the effect that free castor oil fatty acids increase the lathering,

were confirmed. Hard water also interferes with the lather under these circumstances. In the case of Dr. Thompson's washing powder the max. lather is obtained with a 0.4 to 0.5% soln., although stronger solns. give more lather, which, however, disappears rapidly. The limit at which lather will appear is about a 0.01% soln. but in the case of Minlos' powder it is 0.1%. The soft soaps are similar to the soap powders, the max. lathering no. being found between 0.3 and 0.5% solns. E. SCHERUBEL.

The adsorptive capacity of talcs and kaolins and their use in the perfume and soap industry. P. ROHLAND. *Seifenfabr.* 35, 459-61(1915).—Talcs adsorb animal and vegetable colors to some extent but to a greater degree blue, violet and red aniline colors, greens and yellowish reds and yellows and brown in the order given. In general the more colloidal a color the more quickly it is adsorbed. The colors contg. the groups NO_2 , NH_2 or $\text{N}=\text{N}$ are poorly adsorbed. Acid colors are well adsorbed. Mixts. of 2 colors may sometimes be sepd. by talc, e. g., aniline red and wool black, the former being adsorbed. In the soap and perfume industries talcs are of advantage because of their power to adsorb and hold odors of all kinds. Kaolins have properties similar to those of talcs. Cf. C. A. 9, 1102. E. SCHERUBEL.

Detection of paraffin wax in beeswax and determination of a new constant for East Indian and European beeswaxes. M. S. SALAMON AND W. M. SEABER. *J. Soc. Chem. Ind.* 34, 461-2(1915).—All pure beeswaxes of European or Indian type yield a clear soln. after sapon. with 0.5 N alc. KOH. If 15% or more of paraffin wax is present, insol. oily droplets are found. If the % falls below 15, the paraffin appears sol. in the soaps present and hence a special method is necessary for its detection. As the paraffin wax would be less sol. in the hot alc. soln. than the hydrocarbon natural to the beeswax, by observing the temp. at which the alc. soln. becomes turbid, some indication is obtained as to the presence or absence of paraffin wax. The limits of temp. at which cloudiness appeared in the hot alc. soln. were 59.5° to 60.5° for European waxes and 56° to 57° for Indian waxes. These points are disturbed by as little as 5% of paraffin wax. They may be detd. as follows: One g. of wax is sapond. over a flame for 1 hr. with 10 cc. of 0.5 N alc. KOH and 10 cc. alc. The flask is removed from the flame, a thermometer inserted and the liquid stirred until the soln. becomes cloudy, when the temp. is read. Carnauba, stearin, insect or Japan waxes do not interfere. Three tables are given. E. SCHERUBEL.

Bleaching of carnauba wax. BELA LACH. Vienna. *Chem. Rev. Fett.-Harz.-Ind.* 22, 40-1, 49-51(1915).—Gray-brown and even "fat gray" quality of Carnauba wax is difficult to bleach; 69-80% white paraffin is added to facilitate bleaching action. The resinous coloring matter is removed by partial sapon. with 8% of a 40% Bé. NaOH soln. at 100° , which yields a second grade product; a subsequent treatment with bleaching blacks or silicates or a mixt. of both and final filtration yields a perfectly white wax. The app. and its operation are described in detail. To facilitate recovery of the wax from the press cake by extn. with some solvent, it is mixed with sawdust while still warm from the press. P. ESCHER.

Detection of phytosterol in animal fats (KÜHN) 12. Constituents of the fruit of the Osage orange (McHARGUE) 12. Turkey red oils from fatty acids (CERBAN) 25.

U. S., 1,143,332 June 15. N. SULZBERGER. A catalyzer for use in hydrogenating oils is formed by reducing Ni silicate by heating with H or hydrazine. Small amts. of Pd may be added.

U. S., 1,143,339, June 15. D. WESSON. A catalyzer for use in hydrogenating oils and fats is made by treating a soln. of $\text{Ni}(\text{NO}_3)_2$ or other sol. Ni compd. with

NH₄OH, applying the ppt. to an inert carrier such as asbestos, heating to drive off volatile compds. and then reducing the Ni by heating in H.

U. S., 1,143,499, June 15. C. BÜCKEL. Water-miscible emulsions for use in lubricants, ointment bases, etc., formed of Na palmityl-*p*-toluenesulfonamide 6, soap 7, olein 40 and H₂O 1000 parts, or palmityl-*p*-toluenesulfonamide 1 and vaseline 5 parts, or stearyl-*p*-toluenesulfonamide, olive oil 10 and H₂O 3 parts.

U. S., 1,144,186, June 22. J. T. FREESTONE. Detergent for washing clothes, etc. See Brit., 24,625, 1913 (C. A. 9, 1257).

Brit., 5,709, Mar. 6, 1914. D. ADAMSON. Extracting oils from fish refuse in a rotary spherical vessel of the kind described in 17,330, 1904, provided with hollow trunnions leading to 3-way conduits. Solvents, such as benzene, and steam to remove final traces of solvent, may be supplied from either side of the vessel and led away from the other. The grid may be covered with a filtering material.

Brit., 5,967, Mar. 9, 1914. G. CALVERT. A mixing app. for use in the hydrogenation of oils, and similar processes.

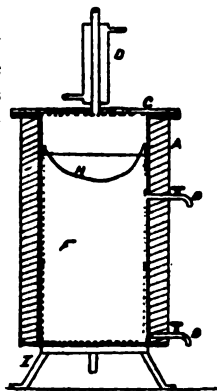
Fr., 468,426, Feb. 9, 1914. G. CALVERT. Constructional details of an app. for hydrogenating oils.

Ital., 131,521, June 24, 1913. F. GRÜNER. Bleaching and thickening oils and fats by subjecting them to illumination.

28. SUGAR, STARCH AND GUMS.

A. HUGH BRYAN.

Determination of sugar in bagasse. NOEL DEER. *Intern. Sugar J.* 27, 213-5 (1915).—D. modifies the usual detn. by using larger quantities of material and by concg. the dil. aq. ext. The extractor, shown in the fig., consists of a cylinder 6 in. in diam. and 12³/₄ in. long, having draw-off cocks *B* fitted at the bottom and at 8¹/₄ in. from the bottom. The flat lid *C* carries a reflux condenser *D* and is made to fit tightly by means of a rubber washer and large sized letter clips. The bagasse is contained in a basket *F*, 5¹/₄ in. in diam. and 10¹/₂ in. high, made of centrifugal screen. *H* is a handle. A perforated Pb sheet rests on top of the bagasse to keep it submerged during digestion. To make a detn. fill the extractor to the level of the upper cock with boiling water containing a little Na₂CO₃; drop in the basket, containing 495 g. bagasse; place the lid with the condenser in position and boil the mixt. for 1 hr.; cool to 95°, remove lid, stir the liquid and draw off into a graduated flask 1027 cc. (corresponding to 1000 cc. at lab. temp.). Evap. to less than 200 cc., make up to 200 with Pb(OAc)₂ soln., filter and polarize. With a 40 cm. tube the reading multiplied by 0.2 gives the polarization of the bagasse. In the evapn. an elec. low-water alarm is used to prevent over-concn.



A. GROSS.

The plurality of amyloses. C. TANRET. *Compt. rend.* 159, 530-2 (1914).—T. studied the amt. of sol. starch formed by heating various starches with H₂O to different temps. (45-90°) and comparing these with the amt. formed on heating to 100°. He concludes from the fact that every starch forms a different amt. of sol. starch when treated the same way, that there must be a variety of sol. starches corresponding to each species.

E. M. FRANKEL.

Reduction of copper oxide in reducing sugar determinations (WEDDERBURN) 7.

Brit., 5,900, Mar. 9, 1914. J. J. EASTICK, J. C. N. EASTICK and A. G. EASTICK. In the manuf. of invert sugar or starch glucose, decolorizing C containing little acid-sol. matter is added during inversion. The liquid is preferably agitated by means of a current of air or O, and may be filtered before treatment.

Ital., 132,083, July 24, 1913. A. GUADAGNINI. In a process of extg. from beet roots and other sacchariferous vegetable matter a fermentable liquid as a source of alc., the triturated roots are treated in an open autoclave at 100° until all volatile products have been driven off, the autoclave is closed, and the pressure is raised in such manner that the temp. is brought to 128° during a period of about 1 hr., under which conditions the sugar is converted into glucose. The autoclave is opened to allow the accumulated gases to escape. The liquid product is suitable for alc. fermentation.

29. LEATHER AND GLUE.

LLOYD BALDERSTON.

The artificial leather industry during the war. H. ARMIN. *Kunststoffe* 5, 133-4 (1915).—A discussion of conditions in Germany. F. W. SMITHER.

Tannery chemistry in 1914. W. FAHRION. *Z. angew. Chem.* 28, I, 257-9, 268-72, 277-9 (1915).—A review with references to current literature and patents. E. H.

Determination of water-solubles in leather. C. C. SMOOT, III, AND L. E. STACEY. *J. Am. Leather Chem. Assoc.* 10, 363-5 (1915).—The sample to be extd. was packed in an alundum thimble, and the temp. and rate of flow of the water controlled by special app. (described and illustrated). Results can be duplicated within 0.2%. L. B.

How high results in tannin may be obtained. H. G. BENNETT. *Collegium (London)* 1915, 97-102.—Causes of high results are (1) weighing residues only once instead of drying to const. weight, (2) imperfect drying of residues due to too low temperatures, (3) use of too concd. infusions, (4) insufficient cooling of dishes. The first produces high results because the non-tannin residues become dry sooner than the sol. solids. The third cause operates through relatively greater absorption on the part of the hide-powder than in the case of more dil. infusions. In support of the 4th, B. shows that results are more concordant when dishes are cooled 1 hr. than when the time is 20 or 40 min. Cooling overnight is recommended. B. suggests evapg. only 25 cc. of soln. for total and sol. solids, elimination of volatile acids by adding 0.025 g. tartaric acid in soln. to each dish, cooling dishes a uniform time (1 hr.), and the adoption of a narrower range of tannin strength for the infusion. B.'s general conclusion is that where analyses differ in tannin %, the lower is more likely to be correct. L. B.

Analysis of tanning materials for fish nets. G. C. A. VAN DORP. *Collegium (London)* 1915, 71-2.—Cutch has been generally used for tanning fish nets. Another material, probably mangrove ext., showing by the hide-powder method higher tannin content than cutch, gave poor results. Very little material was absorbed by cotton from the mangrove, but much from the cutch. The author suggests that in estg. the value of tanning materials for fish nets a method be adopted which shows the absorption by cotton instead of by hide-powder. L. B.

Detection of sulfite-cellulose extract in mixtures. Committee report. A. C. ORTHMANN. *J. Am. Leather Chem. Assoc.* 10, 359-63 (1915).—Three exts. were analyzed by 4 collaborators, 2 being mixts. containing sulfite-cellulose. The analyses were made by the hide-powder method and by means of "reagent 33" (cf. C. A. 7,

1305, 1820, 3249). Difference in "tannin" detd. by the 2 methods affords a means of estg. % of sulfite-cellulose present.

L. B.

"Alum loading" in raw stock. G. J. LAEMMLE. *J. Am. Leather Chem. Assoc.* 10, 351-8(1915).—Discussion of the practice by hide dealers of adding $\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$ to green-salted skins to prevent loss of water.

L. B.

Bleaching leather. Two methods with oxalic acid and potassium oxalate. *Le Cuir; Leather Manufac.* 26, 187-8(1915).—The leather is first placed in a tank containing an alkaline soln. which turns the phlobaphenes a dark brown color. A subsequent acid bath neutralizes the alkali and removes the dissolved phlobaphenes. A pure water bath follows and a coat of oil, if necessary, before the usual drying and finishing. Three tanks are used: the first contains a 4% soln. of calcined Na_2CO_3 ; the second a 4% soln. of oxalic acid; and the third, fresh pure water. Dry tanned skins are plunged, thick parts first, into the first tank (130° to 140° F), where they remain 5 min., are allowed to drip, plunged into the third tank (pure water), then placed butts first into the acid soln., where they remain 5 min., are then returned to the pure water tank, are rinsed thoroughly and allowed to drip on a horse. For very defective leather 6% solns. may be used, the first one heated to 150° F. and the time extended to 10 min. With careful work the grain will not become brittle, but the grain side can be set out with a stone or metal when partly dry and given a coat of linseed oil to avoid trouble. With the $\text{K}_2\text{C}_2\text{O}_4$ the method is analogous to that with oxalic acid but the action is less pronounced. It may be used on light or sensitive leathers or when a fine finish is desired. The leathers are immersed for 10 min. in the alkaline bath, a 6% soln. of ammoniacal Na_2CO_3 , at 130° F. The second, or bleaching bath proper, contains 2% $\text{K}_2\text{C}_2\text{O}_4$ and 6% HCl . The time is from 5 to 10 min. A pure water bath precedes and follows the second soln. The leather would become hard and brittle if the time were prolonged. There is no free acid in the finished leather, because the acid entering in the acid bath was neutralized at once by the alkali from the alkaline bath.

J. S. ROGERS.

Purification of tannery effluents and recovery of by-products. F. P. VEITCH. *J. Am. Leather Chem. Assoc.* 10, 126-44(1915).—Review of methods employed in various places.

L. B.

Recovery of sludge from the sulfide process of depilating skins. JOHN HELFRICH. *J. Am. Leather Chem. Assoc.* 10, 367-9(1915).—The sludge is pptd. by adding 0.12% H_2SO_4 and 0.02% $\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$, and filtered on a sand bed. The product has 15% H_2O . Of the dried sludge, 8.53% is N, of which 3.9% is available as fertilizer.

L. B.

Notes on the alundum thimble. F. H. SMALL. *J. Am. Leather Chem. Assoc.* 10, 366-7(1915); cf. G. A. 8, 1031.—Difficulties previously met in using the alundum thimble in a Teas extractor, due to steam passing between the thimble and the walls of the extractor, are overcome by making the thimble with a tapering top and fitting a rubber gasket to the annular space.

L. B.

U. S., 1,142,953, June 15. F. B. GALLIVAN. Waterproof leather-board is made by mixing a pulp formed of fibers of tanned leather with 10% of the gelatinous ppt. formed by the reaction of Na_2CO_3 with $\text{Al}_2(\text{SO}_4)_3$, FeSO_4 , MnSO_4 or $\text{Cr}_2(\text{SO}_4)_3$. Vegetable fiber, e. g., jute, may be added.

Brit., 5,863, Mar. 7, 1914. F. HIRSCH. Chrome tanning. See Ger., 274,549 (C. A. 8, 3136).

Ger., 281,453, Feb. 24, 1912. M. HÖNIG. In mfg. a tanning extract from sulfite cellulose back water, adding to the water so much acid, forming insol. salts with Ca

(H_2SO_4 , $\text{H}_2\text{C}_2\text{O}_4$), that all the ligninsulfonic acids in the liquors are liberated, together with the volatile acids, and all the Ca combined with these acids is pptd. The resulting ext. is low in ash, so that alkalinity of the tanning liquors obtained therefrom is not to be feared. Furthermore, the ext. is rich in substances which are taken up by the skin and which are not colloidal. By reason of its high content of free organic acids it effects, in the first stages of tanning, a rapid and complete deliming of the skins, together with an active swelling and a prompt tanning action. If it is employed in combination with vegetable tanning materials for complete tanning, it aids in securing a more complete utilization of the vegetable material on account of its solvent action, and shortens the tanning process because of its soft, swelling action. Cf. C. A. 8, 591.

Ger., 281,484, May 18, 1913. BADISCHE. Tanning animal skins by treating them with H_2O -sol. amorphous aromatic, hydroxy compds. containing in the mol. 2 or more aromatic nuclei which contain not more than 1 OH group in a nucleus, which are united with each other by 1 or more at. groups or polyvalent ats., which contain, besides OH, 1 or more other salt-forming acid groups and which ppt. glue or gelatin soln. Other tanning or indifferent substances may be added also. E. g., the well limed and soaked hides are immersed in an approx. 2.5 % aq. soln. of sulfonated dimethyldihydroxydiphenylsulfone rendered moderately acid. After about 10 days the tanning process is completed. A single or repeated dyeing follows. The finished leather is neutralized, oiled, and dried. For the production of the sulfonated dimethyldihydroxydiphenylsulfone, 50 parts dimethyldihydroxydiphenylsulfone (obtained by heating *o*-cresol with H_2SO_4) at the ordinary temp. are stirred with 200 parts of 23% alum until the product has become sol. in H_2O . The reaction product is poured upon about 200 parts ice, and the excess H_2SO_4 is removed from the soln. by lime or baryta. The resulting soln. is employed either directly or after further concn. Cf. C. A. 9, 1857.

Ger., 281,717, Nov. 5, 1909. Addition to 200,519. O. RÖHM. In tanning hides, the neutralization of the skins obtained according to the principal patent can be effected by allowing the enzyme of the pancreas to act on the skins in a liquid containing salts and in a state of decompn. or fermentation. The resulting acids have a neutralizing action, and the skins taken from the soaking tank need only a short rinsing to prepare them for tanning.

Ital., 131,163, Apr. 4, 1913. P. L. MARTY and F. M. PRADON. A dye may be extd., in the usual manner, from *Rhus pentafilla*, which, when decolorized, serves as a tanning agent.

30. RUBBER AND ALLIED SUBSTANCES.

R. T. STOKES.

Tabular review of patents relating to synthetic rubber and the manufacture of the materials necessary therefor. O. KAUSCH. *Kunststoffe* 5, 123-5, 137-8(1915); cf. C. A. 8, 1514. F. W. SMITHER.

Increased rubber yield in Malay States. CASPAR L. DREIER. Vice Consul, Singapore. *Commerce Reports* 157, 92-3(1915).—Comparison of 1914 production with that of 1913. E. H.

A new machine for the preparation of vulcanized rubber for analysis. R. WHEATLY and B. D. PORRITT. *J. Soc. Chem. Ind.* 34, 587-8(1915).—Because of the great variation in phys. properties, shape and character of rubber goods careful selection and prepn. of the sample, fine division, and thorough mixing are necessary to ensure reliable analytical results. The methods heretofore proposed for the reduction of

samples to a fine state of division are briefly reviewed. As a result of experience in dealing with a large variety of samples of different qualities the authors have decided that rasping is in general the most satisfactory method. A machine for accomplishing this has been devised. The abrasive surface consists of a circular file, made from a 1-inch diam. rod of file steel, the cutting edges being parallel to the axis. This is mounted in bearings set on a bed plate, and has a double pulley keyed to one end. A small elec. shunt-wound motor, of $\frac{1}{8}$ h. p., furnishes the power to drive the file at 1200-2400 revolutions per min. These rotational speeds correspond to peripheral speeds of 314 and 628 ft. per min., resp. The rasped rubber falls into a detachable tray placed below the file. For the harder qualities of rubber the low speed gives the more satisfactory results, while a better result is obtained by increasing the rate of revolution when dealing with soft material. The comp. of the rubber was found to be unaltered by the heat developed during treatment. Care must be taken to protect the finely divided material from oxidation if not immediately used for analysis or if preliminary drying is required, and to prevent oxidation during the course of analysis. The present app. is ineffective in the case of raw rubber and reclaimed rubber.

E. J. C.

The function of litharge in the vulcanization process. H. P. STEVENS. *J. Soc. Chem. Ind.* 34, 524-6(1915); *India Rubber J.* 49, 846-8(1915).—Analyses of mixes containing 100 parts rubber, 5 parts S, and 0 to 70 parts PbO cured 2 hrs. and 3 hrs. at 132° , show that the curing effect is due to the heat generated by the reaction $4\text{PbO} + 2\text{S}_2 = 3\text{PbS} + \text{PbSO}_4$. (Cf. *Gummi-Markt.* 1911, 123; *Gummi-Zig.* 15, 710, 748; 29, 424, which give the method for the detn. of these reaction products). S. concludes that a max. curing effect is obtained with a mix containing $17\frac{1}{4}$ parts PbO in which the amt. of S is just sufficient to cure the rubber fully, and to convert the whole of the litharge into PbS and PbSO₄. Analysis shows a max. of S combined with rubber in both cures of this mix, the S being distributed as follows: combined S 3.37, free S 0.33, S as PbS 1.05 and S as PbSO₄ 0.25 parts. Further additions of PbO cause a reduction in the coeff. of vulcanization, larger amts. of PbS and PbSO₄ being formed. The free S drops suddenly with both cures in the sample containing $17\frac{1}{2}$ parts PbO. Even with large amts. of PbO a little free S always remains. S. states that the cured samples containing $17\frac{1}{2}$ parts and more of PbO showed no sign of "bloom" after standing several months.

E. L. DAVIES.

Specification of vulcanized rubber gum by volume and its determination by a new solution method. F. GORRSCH. *J. Ind. Eng. Chem.* 7, 582-6(1915).—Methods of the Mt. Prospect Lab., Dept. Water Supply, Gas and Electricity of the City of N. Y. The methods cover acetone ext., free S (new), org. acetone ext., mineral fillers (new), total S, alc. KOH ext., CHCl₃ ext., carbonaceous matter, and sp. gr. I. M.

Defects in vulcanization of rubber shoes. ANON. *India Rubber J.* 49, 871-2 (1915); see C. A. 9, 255.

EDWARD J. KELLEY.

The recovery of solvents from the machine processes in the rubber industry. P. HOFFMANN. *Kunststoffe* 5, 121-3, 134-6(1915).—A description with cuts of patented processes. F. W. SMITHER.

U. S., 1,143,152, June 15. R. T. VAN VALKENBURG. A composition for closing punctures in pneumatic tires is made by heating a mixt. of asbestos 4.75, "alabastine" 5.5, NaCl 10, charcoal 1, Fe₂O₃ 1 and H₂O 55 parts at about 113° until thick, adding flour 2 and corn meal 1.5 parts and agitating the mixt. while boiling.

Brit., 4,955, Feb. 25, 1914. W. E. MUNTZ. The fabrics used as foundations in vulcanized rubber goods are preserved from the effects of SO₂ and H₂SO₄ by impreg-

nating the fabric or the rubber coating or the coated fabric with any of the following substances: (1) additive compds. of NH_3 with salts such as ZnSO_4 and MgSO_4 ; (2) HOAc or other organic acid, which is afterwards acted on by NH_3 or other alkali; (3) NH_3 and CO_2 applied together or in succession, preferably under pressure during vulcanization; (4) NH_3 applied alone, preferably during vulcanization. Cf. C. A. 9, 2008.

Brit., 5,464, Mar. 3, 1914. P. M. MATTHEW. Vulcanizing rubber goods, such as belting, and, if desired, calendering and compressing them with patterns, by leading the goods in a sinuous path around and between the surfaces of heated rotary cylinders.

Fr., 468,493, Feb. 16, 1914. W. E. MUNTZ. Rubberized cotton fabric is protected from the destructive action of the SO_2 and H_2SO_4 which form gradually in contact with the air, by treating the fabric, before impregnating it with rubber, with a soln. of $\text{Ba}(\text{OH})_2$ (3%) or with salts of Ca, Zn, Cd, Pb, or Al, and then with $(\text{NH}_4)_2\text{CO}_3$. Cf. Brit., 4955 (*supra*).

Ger., 281,966, Aug. 2, 1913. BADISCHER. In the manuf. of polymerization products from butadiene, its homologs and analogs, the polymerization by means of Na and like metals results in the rapid production of a new Na-caoutchouc which in many respects differs in its properties from the product obtained according to 249,868 (C. A. 6, 3200), if the said metals are allowed to act with the addition of metal hydroxides or organic hydroxyl compds. E. g., 100 g. isoprene are shaken up with 3 g. Na in wire form and 4-5 g. finely powdered anhydrous NaOH , for 2-3 days in a closed vessel at the ordinary temp., until the Na is finely divided and the liquid has begun to thicken. The mass is then allowed to stand, when the Na and a portion of the NaOH settle to the bottom. The supernatant mass thickens rapidly and is solid after about 6 days, so that it cannot be removed from the vessel in a solid mass. The mass is separated from the small portion containing Na and freed from a small amt. of volatile constituents *in vacuo*, and, if necessary, from alkali by washing. Cf. C. A. 8, 435.

Norw., 24,923, July 22, 1913. M. BARRICELLI. In mfg. an elastic mass as a rubber substitute, 4 kg. bone glue, 1 kg. gelatin, 3 kg. H_2O and 3 kg. glycerol are melted together to a sludgy mass, which is mixed with 0.05 kg. S, and 500 cc. glacial HOAc is added later. The resulting mass is then warmed for some time on the H_2O bath, and immediately before molding, 500 cc. HOAc and 1 liter formalin are added. The amts. of H_2O and of glycerol can be altered according to the desired elasticity of the final product. A very strong mass consists of 10 parts gelatin, 5 of crude glycerol, 2 of pure glycerol, 3 of H_2O , 0.25 of $\text{K}_2\text{Cr}_2\text{O}_7$, 0.25 of $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$, 2 of sirup, 0.05 of S, and 0.1 of Al powder.

Swed., 36,863, July 31, 1912. H. K. A. S. VON EULER-CHELPIN. Mfg. isoprene by conducting turpentine oil vapors over an ignited mass consisting of finely divided Ni to which has been added 2-15% Mn or Os.

Swed., 37,268, Mar. 19, 1912. J. OSTROMISSENSKIL. In the manuf. of isoprene and its homologs, the crude material is converted into the gaseous form in the presence of readily condensable and sufficiently stable hydrocarbons, such as aromatic hydrocarbons, benzene, toluene, xylene, naphthalene, benzine, petroleum ether, etc., and then heated to high temps. Cf. C. A. 9, 396.

CHEMICAL ABSTRACTS

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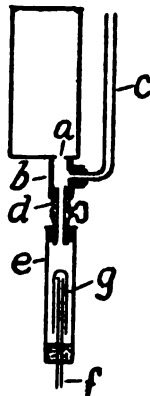
No. 17.

I. APPARATUS.

L. C. JONES.

Modern apparatus for the preparation of hydrogen. OSKAR KAUSCH. Berlin. *Chem. App.* 2, 125-8, 141-4(1915).—A review, with 16 cuts. J. H. MOORE.

An automatic filter washer. J. M. PICKEL. *Chem. News* 112, 3-5(1915).—P. describes improved forms of an app. previously reported (cf. *J. Am. Chem. Soc.* 23, 589(1901)), for washing out fertilizers, water-sol. ammoniates, phosphates, etc. The app. may consist of any number of elements for the simultaneous washing of more than one filter. In one form each element (a 300 cc. percolator with its siphon) is separate and distinct, and the charging of each with H_2O requires a separate and distinct operation. In another form each element is so connected with all the others that all are charged with H_2O by one and the same operation. This is accomplished by means of a superimposed vessel of sheet Cu with a removable lid to exclude dust, and divided into H_2O -tight compartments by partitions reaching only part way to the top. Each compartment holds about 260 cc. of H_2O . In the bottom of each compartment (see fig.) is a small hole, *a*, about 5 mm. in diam.; over this hole is soldered a galvanized Fe tee, *b*. In one branch of *b* is inserted by means of a stopper the glass tube *c* for a H_2O gage; into other branch of *b* is screwed an ordinary brass gas cock, *d* (male, small size). To the nozzle is attached the siphon (by means of a stopper provided with an air-vent). This consists of a glass tube, *e*, 10 cm. long and 1.8 cm. in diam. (inside). The lower end of this tube is fitted with a stopper carrying a small glass tube, *f*, about 4 mm. in inside diam., 9 cm. long and V-shaped (ground sloping on 2 sides) at upper end which extends about 5 cm. into *e*. Over the V-shaped tube, and supported by it, is a cap (glass tube), *g*, about 7 mm. inside diam. and 4.5 cm. long; it is closed at its upper end. The siphon delivers 10-15 cm. of H_2O at each overflow. The flow of H_2O , drop by drop, into the siphon is so regulated by the cock that the siphon delivers H_2O to the funnel underneath more slowly than the H_2O runs out of the funnel. Intermittent washing is thus effected. In the large filtering funnel is placed an inverted small funnel to throw the H_2O around over the edge of the filter paper.



F. W. SMITHER.

Use of the Zeiss interferometer for gases. R. LUCION. *Bull. soc. chim. belg.* 27, 343-6(1913).—The type of interferometer studied by Rayleigh and improved by Zeiss by the introduction of optical compensation was found to afford as great a degree of accuracy in the detn. of small amts. of air in industrial H as the chem. method which depends upon the weighing of the H_2O produced by combustion, and the time required for a detn. was much less than in the latter case (*i. e.*, after a calibration had once been secured for the gas in question). This interferometer consists essentially of 2 parallel, twin tubes which are illuminated through a collimator at 1 end by means of an elec. lamp; at the other extremity are a lens and a graduated head (which actuates an op-

tically compensatory plate). If the 2 tubes contain the same gas the 2 portions of the field of vision show identical interference bands; if a different gas is placed in 1 of the tubes the displacement of the interference bands in $\frac{1}{2}$ the field of vision may be nullified by means of the compensatory plate, the movement of the latter being referred to the graduated head by which it is actuated. The interferometer must, therefore, be calibrated from mixts. of known compn. Inasmuch as H_2O vapor acts as a gas it is necessary to dry both the comparison gas and the gas to be tested. Since gas pressure exerts an influence on the position of the interference bands it is necessary to connect the containing tube with the air by means of a rubber tube attached to an open capillary glass tube (to prevent appreciable diffusion); measurements are thus made at atm. pressure, the connection with the atm. being open only at the moment of reading. The method permits the detn. of only 1 variable, i. e., it is only applicable to binary mixts. The principle of chem. absorption may be applied to the detn. of CO_2 in flue gases, for instance, by filling the comparison tube with the dried flue gas, while the other tube is filled with the same gas (dried) freed from CO_2 by passage through KOH soln. In the particular detn. under consideration (the estimation of air in industrial H) the interferometer was calibrated by means of synthetic mixts. containing pure H or industrial H which had been subjected to careful chem. analysis; a variation in the air content of industrial H of 0-10.19% by vol. corresponded to a variation of 870-780 in the reading of the scale to which the motion of the compensatory plate was referred. It is possible, by means of this method, to attain such accuracy in the detn. of air in CO_2 or CH_4 that the error does not exceed $\pm 0.01-0.02\%$.

H. S. PAINE.

Notes on centrifugals. G. BARNICK. Leipzig. *Chem. App.* 2, 152-5(1915).

—General remarks with 7 cuts, one of which shows a continuous app. for drying tar to 1% H_2O ; another shows the self-discharging Weston app.

J. H. MOORE.

Monochromators. C. LEISS. Berlin-Steglitz. *Z. Instrumentenk.* 35, 55-8(1915).

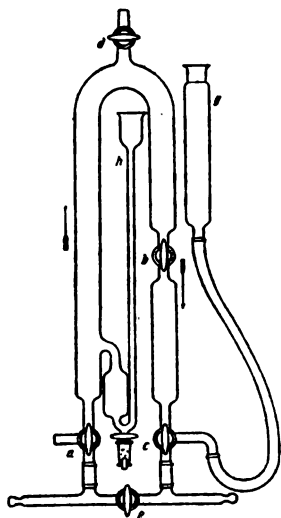
—L. described a combination of screens and prisms by means of which a pure monochromatic source may be obtained in the ultraviolet.

F. A. HARVEY.

The determination of the specific gravity of gases, and the reduction to normal conditions. M. HOFSSÄSS. *J. Gasbel.* 58, 49-51(1915);

see fig.—The app. is inserted in the gas line and washed out by closing *e*. A sample from *a* to *b* under the pressure of the main is allowed to escape through *d*, and the time it takes the manometer *h* to fall a fixed distance is noted. The lower mark on *h* is movable and is set so that with air the time is 1 min. For calibrating with air, the 3-way cocks *a*, *b*, and *c*, and the leveling bulb *g*, are so manipulated that the app. is washed out with air first. A slide rule for calcg. the results is shown, and a set of curves is given from which may be read the factor for reducing the vol. of a gas satd. with H_2O , to 0° and 760 mm.

W. L. BADGER.



A new thermoregulator. EDV. BJÖRNSSON. Lund.

Z. Instrumentenk. 35, 74-5(1915).—A spiral of thin Cu tubing, filled with toluene or pure paraffin oil and closed at both ends, is connected by a fine Cu tube to a small reservoir and to a second, fine, thin-walled Cu tube. This second tube is flattened until it is almost closed and is bent into the quarter arc of a circle. On the end of the tube

is a pointer with Pt contacts, which make contact with Pt points if the pointer moves up or down. By a valve the reservoir may be cut off from the tubing at any desired

temp., leaving a closed system full of liquid. Expansion of the enclosed liquid straightens the flattened Cu tube. The elec. contact is utilized in gas heating to actuate a magnet which draws a lever down, pinching the rubber tube of the gas burner. By means of 2 screws the motion of the lever is limited to give a max. and a min. flame. In elec. heating the contact throws in or out an auxiliary coil. Advantages are: rapidity of adjustment, 10 min. being sufficient for the fine adjustment after the rough adjustment is made; the app. is entirely free from friction or lost motion; the liquid is in a closed container, thus avoiding loss or contamination; constant temp. may be maintained with the regulator near 100° within 0.05° with elec. heating and within 0.1° with gas heating.

F. A. HARVEY.

Comparison of mercury thermometers with platinum thermometers. F. HOFFMANN AND W. MEISSNER. Reichsanstalt. *Z. Instrumentenk.* 35, 41-9(1915).—Thermometers of Jena glass 16^{III} and 59^{III} previously investigated by Weihe and Grütz-macher (*Z. Instrumentenk.* 32, 217-29(1912)) have been further studied over the range 100° to 300° by comparison with a Pt resistance thermometer. The thermometers of glass 16^{III} were of solid stem; those of glass 59^{III} were both of solid stem and milk glass scale. The potentiometer method was used with the resistance thermometer, which consisted of Pt wire, with 4 leads, wound on mica. The results are expressed in the formulas: For Jena glass 16^{III} $g_t = t(t-100)(-46.40 \times 10^{-8} + 2.8872 \times 10^{-7}t + 4.96 \times 10^{-11}t^2)$; for Jena glass 59^{III} $g_t = t(t-100)(-19.16 \times 10^{-8} + 3.0729 \times 10^{-7}t - 0.56 \times 10^{-11}t^2)$ where g_t gives the difference between the mercury and resistance thermometers. The value for 59^{III} is the mean for the 2 classes of thermometer. The different forms vary up to 0.03° from the mean.

F. A. HARVEY.

New voltage regulator. G. E. GRAU. *Elektrotechn. Z.* 36, 63-6(1915).—The construction and operation of the high speed voltage regulator of the Siemens-Schuckert Co. is described. Its applicability for power and speed regulation is discussed and a new arrangement in which the voltage relay is provided with a special reverse attachment, by means of which a premature interruption of the regulation process occurs, is described. This arrangement provides for greater speed of regulation. Cuts and diagrams are given.

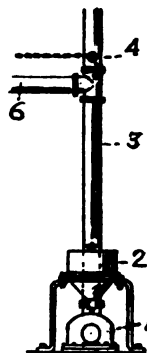
W. E. RUDER.

U. S., 1,146,020, July 13. J. F. PLACE. Apparatus for liquefying air and separating it into gaseous nitrogen and liquid oxygen. Cf. C. A. 9, 696.

U. S., 1,147,376, July 20. F. E. COOMBS. Sulfur burner. Molten S is supplied from the chamber 2 to a retort chamber beneath it which has a jet nozzle through which the S passes to the burner 1 from which the gas generated passes up 3 and through 6 to an absorption app. The burner has adjustable air inlets.

U. S., 1,147,483, July 20. T. W. CLARK. Pyrometer for immersion in molten metals, etc.

Brit., 6,793, Mar. 17, 1914. B. HOFER. App. for separating solid matter, particularly fibrous matter, from liquids, such as waste H₂O, comprizes an open vessel, with a funnel-shaped inner vessel to the center of which the liquid is supplied through a pipe, so that the solid matter accumulates with increasing d. towards the top and is finally pushed over the upper edge. This matter collects on the floor of the outer open vessel and is discharged by means of a worm. The upper edge of the inner conical vessel may be inclined towards the side where the worm is placed.



Brit., 6,855, Mar. 18, 1914. L. LINDEN. Construction of an app. for filtering, sterilizing, and aerating liquids. Cf. C. A. 9, 2279.

Brit., 7,225, Mar. 21, 1914. H. M. SUTTON, W. L. STEELE and E. G. STEELE. App. for sizing comminuted material, wherein the material is fed upon a rough surface, which moves continuously in one direction and which is inclined transversely to the direction of motion and is agitated to aid the force of gravity to overcome the resistance of the surface and to cause the particles of the material to travel contiguously over the surface in lines deviating from the line of continuous movement at angles proportionate to their relative sizes.

Brit., 7,261, Mar. 23, 1914. W. A. HARRIS. In an app. for washing coal, ores, etc., an arrangement of jugs comprises an inclined or stepped series of screens of varying width so arranged that the depth of the material under treatment diminishes towards the discharge end for the lightest product.

Brit., 7,274, Mar. 23, 1914. A. BIBOLINI. An electrostatic separator comprises a conveyer of low inductivity moving beneath a charged electrode, the face of which is inclined upwards towards both sides transversely to the direction of travel of the conveyer.

Brit., 7,391, Mar. 24, 1914. F. MANSFIELD. Impact pulverizer.

Ger., 280,037, Aug. 18, 1912. A. P. ANDERSON. Drum closure.

Ger., 281,489, Sept. 13, 1912. P. SCHMITZ. App. for producing metal and other coatings by centrifugation.

Ger., 281,642, Apr. 10, 1913. W. BUSS. Revolvable hollow body for heating air for drying, heating, and like purposes.

Ger., 281,650, Mar. 19, 1913. R. WITTE. Plant for drying ores, peat, brick, artificial stone, and the like, with the aid of the flue gases from furnaces, or of hot air.

Ger., 281,706, Mar. 7, 1914. P. SCHULTZE. App. for the rapid determination of changing temperatures of flowing gases or liquids.

Ger., 281,789, Nov. 21, 1913. P. MÜLLER. App. for removing material from drying chambers.

Ger., 281,803, Jan. 14, 1914. E. ALTENKIRCH and B. TENCKHOFF. Absorption machine with economical preheating of the rich soln. Cf. C. A. 9, 1139.

Ger., 281,813, Nov. 4, 1913. ÖSTERREICHISCHER VEREIN FÜR CHEM. UND METALLURGISCHE PRODUKTION. Vapor, gas, and liquid meter.

Ger., 281,917, Mar. 7, 1914. P. SCHULTZE. In a mercury manometer, the holder for the app. is of a refractory substance, such as porcelain.

Ger., 281,977, Sept. 13, 1913. W. GAERDE. A vacuum piston pump. Cf. C. A. 8, 1035.

Ger., 282,107, Aug. 17, 1913. W. ROHN. Mercury air pump wherein an endless spiral is used, and the mercury is freed of dissolved and entrapped gases.

Ger., 282,151, Dec. 3, 1913. E. KNELLER. Condenser plant wherein the cooling H₂O is used first for drawing air from the condenser, by means of an aspirator, and is then employed for cooling in a surface condenser.

Ger., 282,227, May 24, 1912. WÄRME-VERWERTUNGS-GES. M. B. H. Heat exchange apparatus wherein the one agent flows through one tube and the other agent flows through an annular chamber surrounding the said tube.

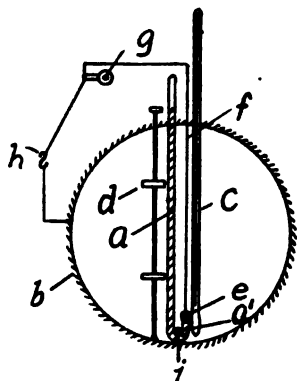
Ger., 282,238, Nov. 16, 1913. E. TIMM. Construction of a heating chamber.

Ger., 282,274, Mar. 21, 1914. O. FÖPPL. Double tube heat exchange apparatus.

Ger., 282,285, May 8, 1914. J. H. REINEKE. Device for measuring gas, vapor, and liquid.

Ger., 282,318, Apr. 21, 1914. INGERSOLL-RAND CO. Regulator for compressors.

Ger., 282,540, May 16, 1914. ATMOS G. M. B. H. Detection and estimation of mineral deposits by measuring the sp. gr. of the earth with the aid of a closed liquid manometer wherein the sealing liquid (Hg) confines within the short limb a vol. of gas under pressure. By regulation of the temp. the gas is brought to a constant vol. so that the sp. gr. can be detd. when the app. is at that specific temp. The U-shaped manometer, *a a'*, filled with Hg and closed at both ends, is mounted in a heat-insulated Cu container *b*, together with a thermometer *c* and a stirring device *d*. Above the Hg in the limb *d* is a vacuum, and the space above the Hg in the limb *a'* is a gas, as N. An insulated metallic circuit extends from the point *e* (downwardly directed and adapted to contact with the surface of Hg in the limb *a'*), out through the casing, through a telephone receiver *g*, a source of a. c. (primary and secondary coils) *h*, and to the Cu vessel *b*. The connection between the Cu vessel and the Hg in the manometer is made through a cock *i* which rests upon the bottom of the Cu vessel, and which is closed during transportation of the app. to prevent the entry of the N from the short limb into the vacuum space over the Hg in the limb *a*. By means of the telephone receiver *g* the contact between the point *e* and the Hg in limb *a'* may be detected. The Cu vessel is filled with H₂O, or other suitable liquid, the temp. of which may be read upon the thermometer. The stirrer equalizes the temp. of the liquid, as does also the good heat conducting surface of the vessel *b*. The manometer consists of a material (such as invar nickel-steel and quartz glass) whose coeff. of expansion may be neglected. The detn. of the sp. gr. of the earth is made by noting the temp. of the liquid in the container *b* at the instant when the point *e* touches the Hg surface in the limb *a'*. From these temp. readings at points with different sp. gr., considering that the temp. of the liquid corresponds to that in the manometer limb *a'*, the difference in sp. gr. may be calcd. Under suitable conditions, the sp. gr. at different points varies as the abs. temp. of the gas in the limb *a'*. The results are sufficiently accurate for practical purposes.



Ger., 282,705, July 19, 1913. H. MEYER. App. for the continuous separation of mixed liquids, *e. g.*, fat and glue liquor.

Ger., 282,733, Jan. 25, 1914. JOERNING & SAUTER. Drum pulp collector.

Ger., 282,737, July 23, 1913. Addition to 277,091. E. MÖLLER. Elec. separation of suspended matter from gases or other elec. nonconducting fluids. Cf. C. A. 9, 415, 2193.

Ger., 282,741, Sept. 13, 1913. F. UHLIG. Process and app. for separating substances according to specific gravity.

Ger., 282,944, Sept. 25, 1913. A. A. PINDSTOFTE. In an app. for saturating liquid with carbon dioxide or other gases, the gas and liquid are forced up through a closed impregnating chamber provided with perforated sepg. walls arranged over one another in intermediate chambers, and the impregnated liquid is drawn off from the top of the app.

Ger., 283,021, Oct. 28, 1913. J. KRAUS. Electrostatic separator for treating combustible or explosive substances. The electrodes or carriers for the elec. energy

serving for the production of the electrostatic field, consist of half-conductors (wood, marble, or the like), or of nonconductors (glass, parchment, or the like). The sparking is reduced to a negligible amt. or is entirely prevented. While, *e. g.*, a metal electrode of Zn with a tension of 8000–10000 can be discharged only with strong sparking, poles or electrodes of wood, marble, paper, or the like, even under tension of 12000–15000 v., do not give rise to sparks discernible in daylight. If nonconductors such as glass, parchment, or the like, be employed as electrodes or carriers, no spark is produced. Cf. *C. A.* 8, 3552; 9, 874, 1138.

Ger., 283,159, Feb. 21, 1914. Addition to 251,801 (*C. A.* 7, 391). C. BREUER. App. for maintaining a practically constant temperature in chemical boilers.

Ger., 283,451, Jan. 28, 1914. J. MARSHALL. Constructional details of a thermopile. Cf. *C. A.* 8, 275, 595.

Ger., 283,458, July 7, 1914. L. UBBELOHDE. In a process and app. for the continuous detn. of the specific gravity of gases, the gas under exam. and air are passed under the same pressure, through sep. meters and jets.

2. GENERAL AND PHYSICAL CHEMISTRY.

WILLIAM D. HARKINS.

Assistants: E. B. MILLARD and A. B. CARTER.

Karol Olszewski. H. KAMERLINGH ONNES. *Chem. Ztg.* 39, 517–9(1915).—An obituary. J. H. MOORE.

Nicholai Alexeyevich Oumov. LEO PASVOLSKY. *Science* 42, 113–5(1915).—An obituary. E. J. C.

Boyle's views on the calcining of metals. ERNST BLOCH. *Chem. Ztg.* 39, 481–2(1915).—Historical. J. H. MOORE.

Introduction to the first Guthrie lecture. G. CAREY-FOSTER. *Proc. Phys. Soc. London* 26, 183–4(1914).—Biographical sketch of life and works of Frederick Guthrie. PAUL D. FOOTE.

The structure of complex atoms and the changes of mass and weight involved in their formation. WILLIAM D. HARKINS AND ERNEST D. WILSON. *Proc. Am. Acad. Sci.* 1, 276–83(1915).—The authors calc. the change in mass which occurs when a positive and a negative electron are brought close together. The effect of the overlapping of the fields of the two electrons is expressed in terms of the "mutual electromagnetic momentum" as $G = \pm (\mu K^2 e^3 / 8c^2 r^3) - 4\pi \int_0^\infty \int_0^\infty (y^2 dy dx / \sqrt{[(x-a)^2 + y^2][(x+a)^2 + y^2]})^{3/2}$ or $G = \pm \mu K^2 e^3 / 4\pi r a^2$ and $\Delta m = e_1 e_2 / 4\pi r a c^2$ where Δm is the change of mass due to the overlapping of the electrons, or $\Delta m/m = 3R/d$ where R = radius of the electron, and d is the distance between the centers of the electrons and $\Delta m/m$ represents the fractional change of mass. Taking R as the radius of the positive electron and -0.77% as the "packing effect" (see following abstracts) the distance apart of 1 positive and 1 negative electron would be 400 times the radius of the + electron. Though this case is simpler than that for any known complex atom, since the helium nucleus or the alpha particle is assumed to contain 4(+) and 2(−) electrons, the theory accords well with the diameter of the gold nucleus as calcd. by Rutherford to be less than 6.8×10^{-12} cm. According to the theory presented the gold nucleus consists of about 197 (+) hydrogen nuclei and 118 (−) electrons which must be packed in this extremely small space.

W. D. H.

Atomic structure. I. Changes of mass and weight involved in the formation of complex atoms. W. D. HARKINS AND E. D. WILSON. *J. Am. Chem. Soc.* 37, 1367-83 (1915).—The first 27 elements do not have at. wts. which are whole numbers, but they differ from whole numbers by a constant percentage amt., namely -0.77% . This difference has been called the "packing effect," and it represents the decrease in mass, and presumably in weight also, which must take place if the other atoms are built up from H atoms. If the at. wt. of H ($O = 16$) be decreased by this "packing effect" %, it is then a whole no., and all the elements built up from H atoms as units (*i. e.*, all those whose packing effect is -0.77%) have also at. wts. which are whole numbers. Evidence is presented to show that the electrons and positive particles are packed exceedingly closely in the nucleus of a complex atom, as a result of which the electromagnetic fields overlap to a considerable extent, which would mean that the mass of the atom ought to be equal to the sum of the masses of the individual particles from which it is built. Prout's hypothesis in the original form was not valid, and is here presented in a new form, that the atoms are composed of H atom nuclei. The probability that the sum of the deviations of the at. wts. (basis of $O = 16$) from whole numbers should be as small as it actually is by accident for the first 27 elements was calcd. to be one chance in 15 million, but a change of only 0.77% from the O basis to that of H gave one chance in 10 that the at. wts. should be by accident as close to whole numbers as they are. The atomic weights of the elements are represented by the formula $W = 2(n + n') + \frac{1}{2} + \frac{1}{2} (-1)^{n-1}$ where n is equal to zero for the lighter elements.

II. Structure of complex atoms. The hydrogen-helium system. *Ibid* 1383-96.—A scheme (see below) is presented to show that the system which has been found to apply to the at. wt. and valence relations of the members of each radioactive series also holds true as well for the lighter atoms. That is, beginning with He, which has an even at. number, the addition of each mass of 4 or one He atom, adds 2 to the at. number and also increases the valence by 2. Beginning with Li, which is represented by $He + 3H$, the same rule holds for the members of the odd numbered groups. The theory is shown to be in accord with the astronomical evidence for the evolution of the elements from H and He. The He nucleus or the α particle is supposed to be made up of 4 positive H nuclei and 2 negative electrons. With the exception of Ne, Si, Mg, and Cl, the elements with at. wts. up to 59 (Co) could be represented *very exactly* as composed of H and He, and in all cases except Be, of He alone or of He and H_2 . It was concluded that isotopes do not exist for these elements, except the 4 mentioned, to any considerable extent. The 4 elements also accord with the system but less exactly. For elements above Co the tendency for the at. wts. to approximate whole numbers seems entirely to disappear, or is covered up by the appearance of some other

SYMBOLIC REPRESENTATION OF THE ATOMIC WEIGHTS ACCORDING TO THE HELIUM SYSTEM DERIVED FROM THE BEHAVIOR OF THE RADIOACTIVE ELEMENTS IN THEIR ALPHA DISINTEGRATIONS

H DETD. = 1.0078

GROUP	0	1	2	3	4	5	6	7	8
Series 2	He	Li	Be	B	C	N	O	F	
	He	He + H_2	2He + H	2He + H_2	3He	3He + H_2	4He	4He + H_2	
Calc.	4.00	7.00	9.0	11.0	12.00	14.00	16.00	19.00	
Detd.	4.00	6.94	9.1	11.0	12.00	14.01	16.00	19.00	
Series 3	Ne	Na	Mg	Al	Si	P	S	Cl	
	5He	5He + H_2	6He	6He + H_2	7He	7He + H_2	8He	8He + H_2	
Calc.	20.0	23.00	24.0	27.0	28.0	31.00	32.00	35.00	
Detd.	20.0	23.00	24.3	27.1	28.3	31.02	32.07	35.46	
Series 4	A	K	Ca	Sc	Ti	V	Cr	Mn	Fe
	10He	9He + H_2	10He	11He	12He	12He + H_2	13He	13He + H_2	14He
Calc.	40.00	39.0	40.00	44.0	48.0	51.0	52.0	55.00	56.00
Detd.	39.88	39.1	40.07	44.1	48.1	51.0	52.0	54.93	55.84
									58.97

Increment from series 2 to series 3 = 4 He.

Increment from series 3 to series 4 = 5 He. (For K and Ca = 4 He.)

Increment from series 4 to series 5 = 6 He.

new series. The elements are thus supposed to be "atomic compds." (not chem. compds.) of H and He. The fact that A has a higher at. wt. than K is shown to be due to the fact that at this point in the system there is a tendency to take on He atoms more rapidly, and this rule is followed by all of the members of series 4 of the Mendeléeff table except K and Ca. A thus contains one more He group than corresponds to the structure of the elements of series 3 and this increases its at. wt. by 4. III. Recent work on the structure of the atom. *Ibid* 1396-421.—A review. E. B. MILLARD.

Integral atomic weights. F. W. DODD. Weymouth, England. *Proc. Trans. Nova Scotian Inst. Sci.* 13, 216-27 (1912-13).—The suggestion is put forward that the accepted at. wts. are fractional parts of a series of higher or integral at. wts., which more correctly represent the properties and constitution of the ats., except in the matter of wt. There is evidence that these integral at. wts. are a real function of their respective elements. From these integral at. wts. the following may be inferred: (a) The heavier elements are built up from the lighter elements with probably H, He and possibly Li largely as constituents, these sub-atoms being conjoined in some vibratory system which renders a part of their material unnecessary to the structure of the complex atom; for if the at. multiple, or the integral at. wt. be taken as proportional to the number of ultimate sub-atoms, constituting any given atom, then the excess of these magnitudes over the accepted at. wt. may be considered proportional to the loss of material in the formation of the atom. (b) The quantity of missing material is a very simple function of the closeness of the combination, *i. e.*, of the d. of the substance. (c) The sp. heat of an element depends more upon the number of ultimate sub-atoms, in its main atom, than upon the actual wt. of the main or complex atom. (d) With a given number of sub-atoms, the m. p. is a direct function of the quantity of missing material, so that the m. p. and sp. gr. curves are similar so long as the number of sub-atoms (*i. e.*, the at. multiple) remains const. H. JERMAIN CREIGHTON.

Electrical activation of nitrogen. A. KORNIG. *Z. Elektrochem.* 21, 267-86 (1915); cf. *C. A.* 7, 3053; 8, 626, 2283, 2971.—Mol. N reacts at ordinary temps. with Li and with other elements (metals) at temps. where no dissociation into atoms could be found by gas-density methods. Either mol. N must possess a kind of residual activity (or secondary valence) which allows it to react, or there is a physically unmeasurable but chem. significant quantity of N in the dissociated state at ordinary temps. The latter was considered more probable. The reaction velocity of Li (*s. g.*) with N was detd. only by its speed of vaporization from the solid or liquid state (which governs the v. p., and is dependent upon temp.), and the "resistance at the surface" caused by a more or less adherent film of solid reaction product. When a monoatomic Li mol. strikes 3 N atoms, N_3Li will be formed; a large reaction velocity was not to be expected on account of the extremely small concn. of N atoms. A full discussion of Strutt's work (*C. A.* 9, 1561), of elec. activation by impact ionization, of N atoms as intermediate products, afterglow, etc., has been given. The N after-glow may be produced in the entire absence of O or O compds. Traces of metal vapor or dust act unfavorably on the N after-glow by forming nitrides and thus using up the active N and by a catalytic retardation of activation; traces of O oxidize the metals and destroy their retarding effects. High tension d. c. arcs can also activate N as well as condenser sparks, and N so formed reacts with C_2H_4 , C_2H_2 , C_4H_{10} , NO and metals, but not with H, CH_4 , H_2O , O_2 or O_3 . Pure O at low pressures showed a weak glow after passing through an elec. discharge, and the glowing O formed NO with N. This is the first instance of an oxidation of N at low pressures outside of the elec. discharge. At atm. pressure the reaction took place only inside the discharge area. The presence of active H outside the discharge was not established with the present app., doubtless because its "activity" disappears much more rapidly than that of N or O. E. B. M.

Numerical relationships between electronic and atomic constants. H. S. ALLEN. King's Coll. *Proc. Phys. Soc. London* 27, 425-31(1915); *Engineering* 99, 687(1915).—The quantity hc , where h is Planck's const. and c = velocity of light has the dimension of (elec. charge)². Putting $2\pi e^2/hc = \sqrt{p}$ where e = electronic charge, the charge e in c. s. u. = $9 p^{10^{-8}}$, $e/m = p^{10^{12}}$, "at. mass of electron" = $10 p$, and other derived quantities depending on e , m , and c can be expressed in terms of simple integers, powers of 10, p and π .

PAUL D. FOOTE.

Report of the committee on nomenclature and symbols. *Proc. Phys. Soc. London* 26, 381-4(1914).—Nomenclature and symbols for numerous physical quantities are recommended by a committee composed of J. J. Thomson, H. L. Callendar, A. Campbell, C. Chree, G. Carey Foster, W. Eccles, George Greenhill, A. Russel, R. J. Strutt, S. P. Thompson, and W. Watson.

PAUL D. FOOTE.

The thermochemistry of compounds of copper and aluminium. LUIGI ROLLA. Univ. Genoa. *Gazz. chim. ital.* 45, I, 192-6(1915).—In calculating the sp. heat of several compds. between metals Schimpff (*C. A.* 4, 1129) and Schübel (*C. A.* 8, 2837) showed that the deviations from the law of Neumann and Kopp can not be attributed to the heat of formation nor to the position of the compd. on the fusion curve as was shown for Cu_3Al , CuAl and CuAl_2 . However, in Lindemann's formula for the atomic frequency of an element in which this value is calcd. from the atomic frequencies of the elements the sp. volumes are used as well as the abs. m. ps. R. detd. the sp. vols. of the compds. named and finds a diminution with respect to the sp. vol. of the free elements which is large enough to affect the values for the atomic frequency and therefore also the sp. heats. In order to det. also whether there is any relation between the heat of formation and the deviations from the law of N. and K. the heats of formation of the 3 compds. were detd. This was done by detg. the heat of formation of the bromides of Al, Cu and of the 3 alloys in $\text{Br}_2\text{-KBr}$ soln. The values obtained were: CuAl 32.38, CuAl_2 23.29 and Cu_3Al -13.33 Calories, resp. The strongest exothermic compd. is formed with the least contraction. There is apparently no relation between the heat of formation of alloys and the deviation from the law of Neumann and Kopp.

E. J. WITZEMANN.

The electrical resistance of acetic acid in the solid and liquid phases. J. H. L. JOHNSTONE. Dalhousie Univ., Halifax, N. S. *Proc. Trans. Nova Scotian Inst. Sci.* 13, 191-208(1912-13).—The following satisfactory methods have been investigated and used for the measurement of high elec. resistances: (1) For the measurement of resistances between 10^4 and 10^8 ohms an alternating current "bridge" method may be employed, in which the telephone or galvanometer of the Kohlrausch app. is replaced by an electrometer and two of the resistances by capacities; (2) using a sensitive galvanometer and a d. c., resistances ranging from 10^8 to 10^{10} ohms may be conveniently measured, since here the polarization effect will be small as compared with the total resistance, because the current flowing through the cell will be minute; and, furthermore, as the applied e. m. f. is large, the "e" term will be a small fraction of the total e. m. f.; (3) for greater resistances than 10^{10} ohms an electrometer may be substituted for the galvanometer in (2). The sp. resistance of AcOH in the solid and liquid phases has been measured at temps. ranging from -80° to 47° . Sudden changes were observed at the m. and the eutectic points. The resistance in the solid phase above the eutectic point was found to vary in a peculiar manner as the temp. changed. This variation has been explained. The effect of small quantities of H_2O on the resistance of the acid has been studied, the results obtained explained, and it has been shown that the cond. of the acid above the eutectic point is due almost entirely to the presence of this H_2O . The temp. coeff. in the liquid phase has been found to be nearly const. and equal to 0.04, while in the solid phase it varies from 0.30, at -43° , to 0.25 at 70° .

H. JERMAIN CREIGHTON.

Confirmation of the law of Bunsen and Roscoe by means of the photochemical reaction of hydriodic acid. E. JIMENO GIL. *Anales soc. espan. fis. quim.* 12, 534-9 (1914).—G. studied the law of Bunsen and Roscoe according to which $i t = \text{const.}$ (i = intensity of light and t = period of illumination). An elec. arc and a Hg lamp in quartz were employed as sources of light and 3 vessels (either cylindrical in shape or with rectangular sides) containing the reacting medium were placed at distances from the source of light which bore the relation 1, $1 \times \sqrt{2}$, 2 to each other; the actual distances in 2 series of expts. were 20, 37.5, 40 cm. and 30, 42.5, 60 cm. Each of the vessels contained 40 cc. of a soln. composed of 2 g. KI, 100 cc. H_2O and 50 cc. HCl. The solns. were kept at const. temp. ($19-21^\circ$ for the entire series) in each expt. Heating of the solns. by the light was avoided by passing the rays through a H_2O filter. O was passed simultaneously and consecutively through the solns. so that the O conc. was const.; after an equal period of illumination for each of the solns. the amt. of I formed was detd. by titration with 0.02 or 0.01 N $\text{Na}_2\text{S}_2\text{O}_3$ soln., the HCl having been added to the KI soln. at the moment of placing the latter in the appropriate vessel. A similar soln. was kept in the dark for the same period of time as in the case of the 3 exptl. solns. proper and the vol. of standard $\text{Na}_2\text{S}_2\text{O}_3$ soln. required for the titration of liberated I was subtracted from the vol. of $\text{Na}_2\text{S}_2\text{O}_3$ soln. required in each case; the final values were, therefore, a measure of the catalytic action of light. For the distances 20, 37.5, 40 cm. the corresponding corrected vols. of $\text{Na}_2\text{S}_2\text{O}_3$ soln. were 2.0, 4.1, 8.0 cc., resp.; the corrected vols. of the latter soln. were 0.3, 0.58, 1.25 cc., resp., for the distances 30, 42.5, 60 cm. For the distances 20, 37.5, 40 cm. with different periods of illumination of 20, 40 and 80 min., resp., the corresponding corrected vols. of $\text{Na}_2\text{S}_2\text{O}_3$ soln. were 1.7, 1.7, 1.75 cc.; for the distances 30, 42.5, 60 cm. with varying periods of illumination of 20, 40 and 80 min., resp., the corresponding corrected vols. of $\text{Na}_2\text{S}_2\text{O}_3$ soln. were 0.95, 0.98, 1.00 cc. The law is, therefore, apparently confirmed, although slight discrepancies appear. Although the above reaction is especially influenced by blue rays of the region λ 436 the red rays also have considerable effect; the liberation of I causes a progressive increase in the intensity of the red coloration of the soln., thus producing absorption of all rays except the red and diminishing the velocity of the reaction. It is, therefore, advisable to use either dil. solns. or short periods of radiation. At the beginning of the reaction, all the light is absorbed by the HI with decompn. of a portion of the mols. and formation of I ions; the latter then absorb light in proportion to their conc. (thus retarding the reaction) and the total intensity of light absorbed is not employed in decomposing HI. In order to test the law rigorously it is necessary

to calc. the absorbed light according to the relation $L_{\text{HI}} = L \frac{K_{\text{HI}} C_{\text{HI}}}{K_{\text{I}} C_{\text{I}} + K_{\text{HI}} C_{\text{HI}}}$ where

L is the total intensity of the absorbed light, L_{HI} is the intensity of the light absorbed by HI and C_{HI} and C_{I} are the concs. of HI and I, resp. The absorption of light by the soln. employed in the present instance is small and an error in the measurement of the distance from the source of radiation is committed if this distance is not measured with reference to the mean point of absorption in the liquid. The error in measurement of distance may be greatly reduced if a distance of approx. 2 m. instead of 20 cm. is employed and a source of light of great luminosity is used; diffused light would, however, play a greater role in this case.

H. S. PAINE.

Experimental confirmation of the new theory of allotropy. Ila. A. SMITS. Amsterdam. *Z. physik. Chem.* 90, 126(1915).—Polemical. H. JERMAIN CREIGHTON.

Physico-chemical studies with cadmium. III. ERNST COHEN AND W. D. HELDERMAN. Utrecht. *Z. physik. Chem.* 89, 728-32(1915); see C. A. 9, 2019.

H. JERMAIN CREIGHTON.

Physico-chemical studies with lead. II. ERNST COHEN AND W. D. HELDER-

MAN. Utrecht. *Z. physik. Chem.* 89, 733-41(1915); see C. A. 9, 403.—Detns. have been made of the d. of Pb which has been treated in different ways. Dilatometric expts. have also been carried out.
H. JERMAIN CREIGHTON.

Physico-chemical studies with zinc. II. ERNST COHEN AND W. D. HELDERMAN. Utrecht. *Z. physik. Chem.* 89, 742-7(1915); see C. A. 8, 2515. H. J. C.

The metastability of the metals as a consequence of allotropy and its significance for chemistry, physics and technics. III. ERNST COHEN AND G. DE BRUIN. Utrecht. *Z. physik. Chem.* 89, 748-56(1915); see C. A. 9, 987. H. JERMAIN CREIGHTON.

Physico-chemical studies with antimony. ERNST COHEN AND J. C. VAN DEN BOSCH. Utrecht. *Z. physik. Chem.* 89, 757-60(1915); see C. A. 9, 1267.

H. JERMAIN CREIGHTON.

An allotropic modification of lead. HANS HELLER. Univ. Leipzig. *Z. physik. Chem.* 89, 761-2(1915).—H. has observed that Pb electrodes which are placed in a HNO_3 soln. of $\text{Pb}(\text{C}_2\text{H}_3\text{O}_5)_2$ commence to change into a gray powder-like modification at the end of 2-3 days, and that the transition is complete at the end of about three weeks.

H. JERMAIN CREIGHTON.

Determination of the size of ultramicroscopic particles suspended in a liquid by a chrono-photometric method. G. REAUME. *Bull. soc. chim.* 17, 155-63(1915).—An app. has been arranged by which 10 exposures of a plate can be made, sepd. by known intervals of time, showing the positions of colloidal particles suspended in H_2O . The principle of the method is the same as that of Henri (C. A. 2, 2328). From the formula $D^2 = (RT/N)(l/3\pi\eta r)$ the projection of the trajectory of a particle may be used to compute the radius. D is the projection on the axis of observation during the time l , η is the viscosity of the medium, N Avogadro's number, and r the radius of the spherical particle. By using condensed solar light in the ultramicroscope it was possible to extend the observations to particles $6\mu\mu$ in radius. Plates were used, since a cinematograph film does not return to its original length after development. The expts. were made with a S colloid suspended in H_2O , using time intervals of 0.75 sec., at 20° . From 2 sets of expts. the values of displacements were found to be proportional to the radii of the particles.
E. B. MILLARD.

The stability of some liquid films. P. PHILLIPS AND J. ROSE-INNES. *Proc. Phys. Soc. London* 27, 328-38(1915).—By use of elementary but rigorous math. the equilibrium form of a thin film which is a surface of revolution is calcd. The stability for certain kinds of displacement for the sphere, cylinder, and catenoid is considered. P. D. F.

The structure of the capillary layer. G. BAKKER. *Z. physik. Chem.* 90, 89-120 (1915); cf. C. A. 8, 1226; 9, 736.—The great disorder in the motion and position of the molecules makes it possible in the case of liquids, vapors and their transition layers to compensate the substance by a const. expanded agent. The potential function of the attractive forces between the elements of this agent is the function: $-fe^{r/\lambda}/r$, where λ is a very small distance and r the radius of the sphere of influence. It has been shown that λ is of the order of the mean distance between two liquid mols. If ϵ_1 , ϵ_2 , ϵ are the energy of the liquid, the vapor and the capillary layer (all per unit mass), then $[(\epsilon_1 + \epsilon_2)/2] - \epsilon = \Delta\epsilon$. If M represents the mol. wt., N Avogadro's number, and n the number of mol. layers in the capillary layer, then for those cases where the mol. wt. remains unchanged by vaporization, it is shown thermodynamically that $\Delta\epsilon/r_1 = \frac{1}{2} (\rho_1 - \rho_2)/(\rho_1 + \rho_2) - 1/\eta$ ($2\sqrt{\rho_1} + 2\sqrt{\rho_2}/(\rho_1 + \rho_2)$ $2\sqrt{N/M} [H - T \cdot (dH/d\epsilon)]/r_1$, where ρ_1 and ρ_2 represent the densities of liquid and vapor, and H and r_1 the surface tension and the internal heat of vaporization. In order to test the validity of this equation, the heat of vaporization of C_6H_6 has been calcd. at a number of different temps. At 80° , for example, $r = 40.4 \times 10^6$ ergs, a value which agrees closely with

that detd. exptly. by Brown. Similar calcns. have been made for ether. It has been shown that the number of mol. layers in the capillary layer is 3-4 at the m. p., and at a few degrees under the critical temp. is of the order of 12. Further it has been shown that the radius of the sphere of influence is equal to about 6-7 times the mean distance between the liquid mols.

H. JERMAIN CREIGHTON.

The influence of light on colloidal systems. H. STINTZING. *Kolloidchem. Beihefte* 6, 231-96(1914).—In the discussion of colloidal systems it was suggested that they be characterized according to their vol. dispersity. The various former expts. on the influence of light on colloidal systems were discussed. If a soln. of Ag resinate in benzene be exposed to partial illumination by means of a silhouet it is found that the Ag is deposited on the illuminated part. The conclusion reached is that the light causes an indirect chemical action. A thorough investigation was made, both qual. and quant., on the new phenomenon that if a colloidal system is partially exposed to light there is an increase in amount of substance in the illuminated section. This phenomenon is similar to photocrystn., photosublimation, photodromy and the increase in amt. of substance in gas systems on illuminated surfaces. Films on glass plates of moist gelatin containing water-sol. colored salts were exposed to light by covering them with a black lid in which slits had been cut; they showed after only a few min. a more intense color on the illuminated parts. This was noticed with all rays of light from ultra-red to ultra-violet. Partial heating also caused the same effect. It was found that there was a decided difference in temp. between the strips of gelatin exposed to light and the dark strips and that the illuminated strips evapd. more quickly than the dark ones. The increase in substance was due to partial evapn. and was toward the illuminated portion. A series of expts. was carried out to show this phenomenon quantitatively. The expts. (see original) were carried out so that the colloidal systems were exposed to strips of light (silhouets) in a thermostat in such a manner that the parts exposed and unexposed to light could be sepd. and analyzed quantitatively. Because of the simplicity of analysis the systems investigated were: Ag resinate in benzene; gelatin solns; ferrum dialysatum; and Ag sol (Bredig). It was found that the increase in substance in all cases was toward the illuminated parts. Qual. expts. were carried out with: gelatin solns. containing $\text{Co}(\text{NO}_3)_3$, NiSO_4 , KI, litmus, sugar and quinine sulfate; chlorophyll in water; eosin and fluorescein in alc.; picric acid and inorganic salts in glycerol; quinine sulfate in H_2SO_4 and dyestuffs in paraffin. The phenomenon of increase in substance toward the parts exposed to light was found to be typical for all colloidal systems and was not found in mol. disperse systems. The degree of increase in substance was about the same in the different colloidal systems, being about 20-30% of the total. The cause of the increase in substance was found to be due to evapn. of the solvent at the parts exposed to light, for where the possibility of evapn. was not present the phenomenon was not present.

W. F. ZIMMERLI.

The distribution law. G. v. GEORGEVICS. Prague. *Z. physik. Chem.* 90, 47-58(1915).—It is shown that abnormal distribution results may be due to other causes than association. Exam. of viscosity data shows that the chem. affinity of $\text{C}_6\text{H}_5\text{CO}_2\text{H}$ and $\text{CH}_3\text{CO}_2\text{H}$ for H_2O is great while that of HCO_2H is small. The distribution of these 3 substances between H_2O and C_6H_6 indicates association. It is shown, however, that the distribution completely corresponds to the process of sorption. Measurements have been made of the distribution of $\text{CH}_3\text{ClCO}_2\text{H}$ and $\text{CHCl}_2\text{CO}_2\text{H}$, also of pyridine, piperidine and hydrazine between H_2O and C_6H_6 (cf. *C. A.* 9, 2171). From the results of the investigation, it is concluded that characteristic α -values have the same importance for sorption as for the distribution of substances between C_6H_6 and H_2O ; and that the "distribution law" has, therefore, lost its value.

H. J. C.

An hypothesis concerning the condition of dissolved electrolytes. H. C. S.

SNETHLAGE. Univ. Groningen. *Z. physik. Chem.* **90**, 1-46(1915).—The hypothesis of Arrhenius is not applicable to solutions of electrolytes in MeOH and EtOH. There exist in these solvents two sharply separated groups of electrolytes. The first embraces the strong electrolytes such as HCl and the salts. The following properties of these solns. are proportional to the gross concn.: catalytic action, light absorption, and change of cond. by H₂O; while the law of Kohlrausch and cond. are simple functions of the concn. It is possible that the raising of the b. p. constitutes an exception. Therefore, the ratio Δ_9/Δ_∞ is of no small importance in the detn. of the typical electrolyte properties. The 2nd group, which embraces most of the organic acids and probably also bases, is differentiated from the 1st group in that such a proportionality does not exist. Solns. of electrolytes of the 2nd. group show increasing efficacy (calcd. per mol. dissolved substance) with decreasing concn. So far as cond. is concerned, this change is governed by Ostwald's dilution law, and the change of catalytic efficacy by the formula, $k_R = \{(\Delta_9/\Delta_\infty)k_A + (1-(\Delta_9/\Delta_\infty))k_N\}1/v$, where k_R is the velocity const. of the reaction, k_A the velocity attributed to unit concn. of the catalytic ion, k_N that for the undissociated mol. and v the concn. of the catalyst. These phenomena are explained by the hypothesis that the characteristic properties of these electrolytes do not proceed from the free ions, whose relative concn. changes with the concn. of electrolyte, but from a special property of the mol. of the dissolved substances which are elec. polar and thereby active, in contradistinction to the mols. of non-electrolytes. In the case of the 2nd group there exists an equil. which depends on the concn. between two kinds of mols.: active and inactive, the latter being few in number. For the cases investigated, the relative concn. of the two varieties is given approx. by the value of Δ_9/Δ_∞ . With reference to the electrolytic properties, cond., catalytic action, etc., the active mols. are practically identical with the mols. of the electrolytes of the 1st group. The dissociation const. determines the equil. between the active and inactive mols., and is highly dependent on the nature of the solvent. The change of the mol. cond. with concn. of electrolytes of the 1st group is the result of a mutual influencing of the mol. which may be either intra- or intermolecular. Correspondingly, the difference between Δ_∞ and the mol. cond. at any particular concn. is proportional to the mean sepn. of the mols. The value of Δ_∞ , which is reached when the concn. is so small that the "disturbing" influence ceases to be effective, is a measure of the elec. and the catalytic activity of the mol., and is governed by the electrochem. character of the ions. On the other hand, for electrolytes of the 2nd group the change in cond. results from the transition of inactive to active mols. In the cases investigated, the concn. of the active mols. is so small that the mutual influence is inappreciable. The value for Δ_∞ is attained when the vol. is so large that the mols. are all in the active condition. Evidence is put forward which shows that the explanation of the properties of the 1st group, on the supposition that dissociation into ions occurs, and that the degree of dissociation, independent of the concn., is 1, is incorrect. The activity of the mol. can be explained by ascribing to an electron a special position within the at., whereby the mol. has two poles. A splitting in the mol., in the sense of the dissociation hypothesis, does not occur. It is probable that the forces between these poles are closely associated with the affinity. At all events, they are a standard for the properties of the electrolyte. Solvation may also serve as measure of the elec. catalytic activity of the mol., for a larger value of Δ_∞ appears to be associated with a stronger catalytic action and a stronger solvation and vice versa. This holds probably for the active mols. of both groups. In the case of the 2nd group, the transition from inactive into active mols. appears to be a process which proceeds with participation of the solvent. This is very probable if it is assured that the resulting active mols. are solvated. In this event the reaction may be expressed: inactive mol. + solvent $\longrightarrow$ solvated active mol. It is pointed

out that, in alc. soln. for example, a K ion in KCl differs from a K ion in KNO₃. Both the investigation of catalytic phenomena and the consideration of properties in alc. soln. lead to a conception regarding the condition of the electrolyte in this solvent which differs considerably from that for aq. soln. In conclusion it is pointed out that the continuation of this problem is of great importance for the development of the theory of soln.

H. JERMAIN CREIGHTON.

Antimony pentachloride as solvent. E. MOLES. Madrid. *Z. physik. Chem.* 90, 70-88(1915).—Pure SbCl₅ melts at 3.0°. The value given in text books is false and refers to a product containing more than 5% Cl. Pure SbCl₅ is not colorless, as supposed, but lemon yellow. The cryoscopic const. $E = 18.5$. The heat of fusion of SbCl₅ is therefore 8.17 cal., $d_4^{20} = 2.3356$. The b. p. curve has been detd. between 9 and 90 mm. When dissolved in SbCl₅, Cl, Br, SnCl₄, SbCl₃, CrO₂Cl₂ and CrO₃ have a normal mol. wt.; ICl₃ and AuCl₃ are dissociated, and I, SnBr₄ and SnI₄ react with the solvent. Ebullioscopic expts. indicate that in CCl₄ and CHCl₃, at ordinary concns., SbCl₅ is normal, but in dil. solns. it is dissociated.

H. JERMAIN CREIGHTON.

The osmotic pressure of the ions and of the undissociated molecules of salts in aqueous solution. STUART J. BATES. *Proc. Nat. Acad.* 1, 363-8(1915).—A brief discussion of researches being published in detail in *J. Am. Chem. Soc.* (cf. C. A. 9, 1710).

E. J. C.

Gas solubility in aqueous solutions of glycerol and chloral hydrate. A. VON HAMMEL. Münster. *Z. physik. Chem.* 90, 121-5(1915).—The expts. of Carl Müller on the absorption of N in aq. solns. of chloral hydrate have been confirmed, and have been extended through measurements on the absorption of CO₂. It has been shown that the course of the absorption in concd. glycerol soln. differs from that given by Müller. All Müller's conclusions regarding the untenableness of the Philip-Washburn hydrate theory have been confirmed.

H. JERMAIN CREIGHTON.

Electrolytic dissociation of acetylene and its metallic derivatives. M. SKOSS-AREWSKY. *J. chim. phys.* 13, 3-17(1915).—A more detailed discussion of the expts. described in C. A. 9, 543.

E. J. C.

Solubility influences. ERIK G. THORIN. Stockholm. *Z. physik. Chem.* 89, 685-92(1915).—Solns. of different salts in H₂O and in EtOH have been used as solvents. Measurements have been made of the lowering of the solubility produced by the different salts. It has been found that the solubility lowering, which different salts exert towards nonelectrolytes, varies considerably with the nature of the salt. For example, the action of the halogen salts of Na increases with their electro-affinity. A striking difference exists between the influence of aliphatic and aromatic anions. The aliphatic anions lower the solubility in the same manner and to the same degree as inorganic anions, while aromatic anions increase the solubility or influence it but slightly. The solvent itself is found to play a specific role in the change in solubility by salts.

H. JERMAIN CREIGHTON.

The velocity of the auto-esterification of dibasic acids. ANTON KAILAN. Vienna. *Z. physik. Chem.* 89, 641-75(1915).—The elec. cond. of oxalic, malonic, succinic, tartaric, fumaric and maleic acids at different concns. at 25° has been measured in abs. amyl alc., and in amyl alc. containing small and large amounts of H₂O. The order of the strengths of these acids in amyl alc. is different than in aq. soln., maleic acid having the greatest cond. The velocity of the auto-esterification of the above mentioned acids, as well as of malic acid, has been measured in amyl alc. at 25°. It has been found that the velocity does not correspond to the square of the concn., as is the case with monobasic acids, but is approx. proportional to the concn. raised to the $3/2$ power. Approx. calcn. shows that the reaction that is influenced by H ions participates in the total

reaction to a considerable extent, but that in the case of oxalic and maleic acids does not exceed 50-70%. It has been found that the value of the "sesquimolecular" const. does not increase with increasing acid concn. as would be expected. This is explained by assuming that, in addition to the two reactions which occur in the case of auto-esterification with monobasic acids, here a 3rd reaction between an acid mol. and the alc. takes place. The one carboxyl group of a dibasic acid can consequently influence the auto-esterification of its own mol. as well as the auto-esterification of the carboxyl group of another mol. It has been found that the relative catalytic action of the undissociated acid mols. increases with increasing acid strength. This rule appears to hold for the above mentioned 3rd reaction. The retarding influence of the H_2O is usually very small, but differs from case to case. The order of the velocities of the auto-esterification of the acids investigated is not the same as in the case of esterification with alc. HCl. Evidence is put forward which indicates that steric influences play a part in indirect, as well as direct, ester formation. H. JERMAIN CREIGHTON.

Indirect ester formation in alcohol-water mixtures. ANTON KAILAN. Vienna. *Z. physik. Chem.* 89, 676-84(1915); cf. preceding abstr.—Measurements have been made of the velocity of esterification of succinic acid in alc.- H_2O mixts., which contain 12.3, 25, 50 and 75 vol. % of H_2O . In these expts. HCl has been used as a catalyst. Detns. of the cond. of HCl in the different mixts. have also been carried out. It has been found that the esterification of succinic acid, with $N/6$ HCl as catalyst, in an alc.- H_2O mixt. that contains 25 volume per cent H_2O is 100 times slower than in an alc.- C_2H_5 mixt. of the same alc. content; while with 50 volume per cent H_2O the esterification is 150 times slower than in the corresponding alc.- C_2H_5 mixt. H. J. C.

Catalysis. XXI. Reactions of both the ions and the molecules of acids, bases and salts. Reactions of sodium ethylate with methyl iodide in absolute ethyl alcohol at 25°. H. C. ROBERTSON, JR. AND S. F. ACREE. *J. Am. Chem. Soc.* 37, 1902-9(1915); cf. *C. A.* 7, 3125; 9, 544, 2018.—Using the method described in earlier papers, R. and A. have detd. the velocity of reaction at 25° between 0.5-0.025 N NaOEt and 0.5-0.125 N MeI in EtOH, also in EtOH with 1% H_2O , EtOH with 10% Et_2O , and in the presence of 0.5-1.0 equiv. NaI. In agreement with the earlier work, it is found that the reaction is not purely ionic, the "deviation" being strictly proportional to the concn. of the non-ionized NaOEt. The values K_i (0.127) and K_m (0.0596) agree well with those previously found for MeI and KOEt (0.126 and 0.0687) and for MeI and LiOEt (0.1367 and 0.03871) (according to the theory the K_i values should be identical). The addition of considerable amts. of Et_2O and NaI to some mixts. shows that the small amts. of these formed during the time periods measured in the other mixts. have no great effect on the reaction velocities. In a table in which the observed K_N values have been corrected for an assumed positive "salt catalysis" of 8% per g. mol. NaOEt K_i is raised from 0.127 to 0.136 and K_m lowered from 0.0594 to 0.05538. The harmony of the present work with that on KOEt and LiOEt shows that the "salt effect," whether large or small, is nearly the same for the 3 ethylates. **XXII. Reinterpretation of the reactions of sodium methylate and sodium ethylate with 1,2-dinitrobenzene, 1,2,4-dinitrochlorobenzene and 1,2,4-dinitrobenzene.** S. F. ACREE. *Ibid* 1909-14.—The work of Bruyn, Steger and Lulofs (*Z. physik. Chem.* 49, 329 et seq.(1904); *Rec. trav. chim.* 18, 13, 41; 20, 292) has been recalcd. on the assumption that the reactions are both ionic and mol.; the ionization of the NaOEt was obtained from A.'s own data, that of the NaOMe calcd. from Tijmstra Bz's (*Z. physik. Chem.* 49, 349(1904)). The values for K_N thus found agree closely with B., S. and L.'s observed reaction velocities. The following are the values obtained for K_i and K_m , resp.: NaOEt and o - $C_6H_4(NO_2)_2$ in EtOH at 45°, 0.229, 0.230; NaOMe and o - $C_6H_4(NO_2)_2$ in MeOH at 45°, 0.1458, 0.1278; NaOMe and 3,4-(ON_2) $_2$ C_6H_3Cl in 90.3% MeOH at 15°, 1.376, 0.759; NaOMe and 3,4-

$(\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{Cl}$ in abs. MeOH at 15° , 1.299, 0.724; NaOEt and 3,4- $(\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{Br}$ in EtOH at 15° , 2.838, 0.823; NaOEt and 3,4- $(\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{Cl}$ in EtOH at 15° , 4.473, 1.195. Since the ions and mols. of NaOEt react with the same velocity with $o\text{-C}_6\text{H}_4(\text{NO}_2)_2$, the addition of NaNO_2 and NaOAc should not affect the reaction velocity, a deduction confirmed by expt., while on the other hand, in conformity with the theory, the addition of NaI to NaOEt and 3,4- $(\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{Br}$ lowers the reaction velocity. C. A. R.

Catalytic effect of metals and metallic compounds. H. J. PRINS. Zaandam. *Chem. Weekblad* 12, 588-92(1915).—An address dealing with the "activation" theory of catalysis (cf. C. A. 8, 2695). GEORGE W. MOREY.

Speed of reduction of potassium permanganate by oxalic acid. A. BOUTARIC. *Compt. rend.* 160, 711-4(1915).—The amt. of unchanged KMnO_4 in soln. at a given time has been detd. by the intensity of a radiation of certain wave length after passing through the soln. If I_0 is the intensity transmitted when the concn. of KMnO_4 is zero, I_a that for a quantity a , the amt. of KMnO_4 changed at the end of a time t is x in the equations $I = I_0 e^{-hx}$, $I_a = I_0 e^{-ha}$, where the const. h depends on the radiation used ($\lambda 558\mu$ in these expts.) and on the thickness of the layer of soln. The velocity of the reaction was not, for the most part, proportional to the concn. of KMnO_4 ; it started at zero, increased to a max., and then decreased again. A "logarithmic law" was not followed. Details of the expts. are to be published later. E. B. M.

The specific heat and heat of fusion of ice. H. C. DICKINSON AND N. S. OSBORNE. *J. Wash. Acad.* 5, 338-46(1915); *Bur. Standards Sci. paper* 248; *Am. Soc. Refrigerating Engineers* 1, 32-61(1915).—Besides their value as natural consts., the results of this paper have a very important bearing on the molecular nature of the change of state solid-liquid. The detns. were made with the "aneroid" calorimeter (C. A. 9, 1705), which permitted detns. (1) of very high accuracy, (2) for very small temp. intervals (0.03° in one case), (3) on samples of water which were kept pure and invariable by hermetical sealing in a tin-lined case. Several writers had observed that the sp. heat of ice increased rapidly just below the m. p., and Nernst and many others had considered that it really increased in accordance with the observations. A. W. Smith (1903) found that the effect diminished as the ice became purer. He suggested that it was probably due to the slight melting caused by impurity, and would be absent in perfectly pure ice. This suggestion is strongly confirmed by the present results. Extraordinary precautions were taken in the purification of the samples, and the apparent increase in the specific heat is far less than that obtained by previous observers. Assuming that the lowering of the freezing point of the ice is proportional to the amount of dissolved impurity, D. and O. find that the apparent increase in the sp. heat, resulting from partial melting, is practically $19.75 \text{ } l/\theta^3$ where θ is temp. measured downward from zero, and l is the lowering of the m. p. owing to the impurity—that is, the temp. (below the zero for pure ice) at which the last of the sample melts. The results followed this formula within the exptl. errors. l , the final lowering, was calcd. to be about 0.001° in 3 samples, only 0.0005° in another still more carefully prepd. one, but no direct detn. of the actual difference in m. p. of the two was attempted. Cond. measurements, also, indicated less impurity than was needed to account for the variation in the sp. heat. It will, of course, always be impossible to show that there is no variation of sp. heat just before melting, because the exptl. difficulties increase indefinitely as the interval below m. p. decreases, but the results with the authors' 4th sample appear to show that the variations actually encountered in the other 3, redistilled and boiled, samples were due to impurity. Much more, therefore, do the results show that the greater variations observed by previous workers were due to impurity. All positive evidence of special variation in the specific heat near the m. p. appears, therefore, to be contradicted. It follows also that for the ice used by previous observers, and sup-

posed to be specially pure, the m. p. must have been appreciably more than 0.001° below that of pure ice—an interesting result which D. and O. do not discuss. The authors' formula for the sp. heat of ice from 0° to -40° is: $S = 0.5057 + 0.001863 \theta - 79.75 (1/\theta^2)$, where the first two terms are probably sufficient for absolutely pure ice. The latent heat (3 detns.) was found to be 79.76, with a discrepancy of about 0.002. The mean of this and a previous series of detns. by another method is 79.75.

W. P. WHITE.

The change in thermal conductivity of metals on fusion. ALFRED W. PORTER AND F. SIMMON. London. *Proc. Phys. Soc. London* 27, 307-14 (1915).—Cylinders of Hg and Na in glass tubes were heated at the top and so cooled at the bottom that half the metal was liquid and half solid, and the temp. distribution along the axis obtained by thermocouples inserted in narrow tubular depressions formed in the glass wall by locally heating and forcing in a knitting needle. The ratio of the thermal cond. for solid and liquid states, K_s/K_l , equals the ratio of the slopes of the temp. vs. distance along tube curve on each side of the m. p. $K_s/K_l = 3.91$ for Hg and 1.31 for Na.

PAUL D. FOOTE.

The thermal conductivity of mercury by the impressed velocity method. H. R. NETTLETON. Birkbeck Coll. *Proc. Phys. Soc. London* 26, 28-40 (1914). Discussion. *Ibid* 40-2.—Hg was passed through a vertical tube which was heated at the top and maintained at 0° at the bottom. The temp. distribution in the tube was obtained by a thermocouple; this data permits the detn. of the thermal cond. A mean value of 0.0201 c. g. s. units at 15.5° was obtained.

PAUL D. FOOTE.

The vacuum guard ring and its application to the determination of the thermal conductivity of mercury. H. R. NETTLETON. *Proc. Phys. Soc. London* 27, 129-48 (1915).—A vacuum cylindrical vessel containing Hg was maintained at its ends at 2 different const. temps. The vacuum chamber on the sides acts as a guard ring mitigating heat loss radially. Temp. distribution was obtained by exploration with a thermocouple and heat flow along the Hg column was measured by a spiral coil through which water flowed at a measured inlet and outlet temp. The mean value of thermal cond. of Hg was found to be 0.0196 c. g. s. units over a range 35 to 45° . From 30 to 50° it is practically const., possibly increasing slightly with increasing temp.

PAUL D. FOOTE.

Thermal and electrical conductivities of some of the rarer metals and alloys. THOMAS BARRATT. Wandsworth Tech. Inst. *Proc. Phys. Soc. London* 26, 347-70 (1914).—A new method of the "stationary temp." type was employed for detg. the thermal conds., k , from 20 to 100° , of Pt, Ir, Pt-Ir alloys, 90 Pt-10 Rh alloy, Rh, Au, constantan, W, Pd, Ta, and graphite. Elec. conds. K were also measured and values of k/KT computed where T = abs. temp. In general these values for pure metals range about 2.5×10^{-8} , though W, Rh, and Ir differ considerably from 2.5, giving about 3.9, 1.4, and 1.7, respectively. Graphite is also a very pronounced exception for its thermal cond. is very nearly that of 80 Pt-20 Ir, while its elec. cond. is 600 times less. k/KT for graphite ranges from 1110 to 770. Data on Pt-Ir alloys afford a good example of the effect of impurities on thermal and elec. properties of a metal. Grüneisen showed that the addition of a small amt. of impurity reduces the elec. cond. more than the thermal cond. Up to 90 Pt-10 Ir this property holds, but for higher amts. of Ir the thermal cond. decreases more rapidly than the elec. In general (Pt excepted) the thermal cond. decreases with increasing temp. In the temp. range employed, however, the slight observed temp. coeff. of thermal cond. might be ascribed to exptl. errors.

PAUL D. FOOTE.

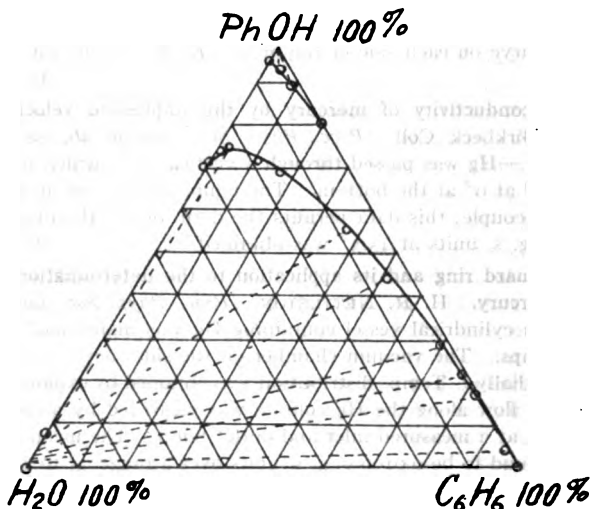
Thermal conductivity. II. Thermal conductivity of badly conducting solids. THOMAS BARRATT. *Proc. Phys. Soc. London* 27, 81-92 (1915). Discussion. *Ibid*

92-3. The above method was employed for detg. the thermal conds. from 20 to 100° of fused silica, soda glass, red fiber, fire brick, ebônite, gas carbon, mahogany, walnut, oak, lignum vitae, greenheart, Am. whitewood, and boxwood. The woods show large temp. coeffs. of thermal cond. but possibly heating at 100° alters the structure.

PAUL D. FOOTE.

Specific heat of platinum at elevated temperatures. LUIGINA FABARO. Rome. *Nuovo cimento* 9, 123-39(1915).—By a thermo-elec. method, F. confirms the fact that the sp. heat of Pt at const. vol., even for high temps., increases with the temp., contrary to the general theory according to which the sp. heat is const. at such temps. S. L.

Equilibrium in the system: water, phenol and benzene. S. HORIBA. *Mem. Coll. Sci. Kyoto* 1, 49-55(1914).—The equil. relations in this ternary system have been examd. at 25°. The phenol in the solns. was detd. by means of Br, and the C_6H_6 and



H_2O by measuring the quantities of each which were necessary for the production of permanent turbidity. The results are shown in the following table and also in the triangular graph:

MIXTS. WITH 2 LAYERS.

Upper layer.			Lower layer.		
Phenol. Per cent.	Benzene. Per cent.	Water. Per cent.	Phenol. Per cent.	Benzene. Per cent.	Water. Per cent.
0	99.95	0.05	0	0.198	99.802
4.78	94.98	0.24	1.43	0.21	98.36
17.36	81.83	0.81	2.80	0.21	96.99
21.15	77.22	1.63	3.01	0.21	96.77
28.01	69.81	2.18	3.35	0.21	96.44
44.39	50.56	5.05	4.07	0.19	95.74
55.80	36.13	8.07	4.58	0.19	95.23
74.5	3.0	22.5	5.65	0.17	94.18
70.71	0	29.29	8.195	0	91.805

Satd. solns. with phenol as solid residue were found to have the following compn.:
 (1) 81.06% PhOH, 18.94% C_6H_6 , 0% H_2O ; 89.78 PhOH, 7.92 C_6H_6 , 2.30% H_2O ; 92.31 PhOH, 4.07 C_6H_6 , 3.62% H_2O ; 95.14 PhOH, 0 C_6H_6 , 4.86% H_2O . E. J. C.

Equilibria in ternary systems. XVIII. F. A. H. SCHREINEMAKERS. *Proc. Akad. Wetenschappen* 17, 1260-74(1915).—S. derives formulas and outlines conditions of vapor-pressure and sublimation curves in certain equilibria. B. R.

Remark to Karl Czukor on a theory of dielectrics. MAX BORN. *Verh. deut. physik. Ges.* 17, 204(1915).—The theory as developed by Czukor has already been developed by BOGUSLAWSKI in *Physik. Z.* 15, 283, 569, 805(1914); cf. *C. A.* 8, 3261.

E. B. MILLARD.

The Thomson effects in tungsten, tantalum and carbon at incandescent temperatures determined by an optical pyrometer method. A. G. WORTHING. Nela Lab. *Phys. Rev.* 5, 445-51(1915).—A method is given for detg. the Thomson effect in filaments of incandescent lamps by means of a temp. survey near a cooling junction, with a Holborn Kurlbaum pyrometer. The temp. distribution depends upon whether a. c. or d. c. is used in heating and upon the direction of d. c. Factors requiring consideration are: rate of development of heat in an element of the filament, radiation intensity, distance along and radius of filament, heating capacity, resistivity, temp., rate of heat conduction, thermal cond., and several important consts., yet in spite of these many variables, surprising accuracy is obtainable. The following values of the Thomson e. m. f. coeffs., microvolts per degree, (σ), were observed: (1) temp. abs., (2) σ . W 2200, —35; 2000, —28; 1800, —21 to —16; 1600, —11; 1500, —10; Ta 2100, +24; 1900, +20; 1700, +16; C 2100, —22; 2000, —21; 1800, —19.

PAUL D. FOOTE.

High temperature investigation and a study of metallic conduction. EDWIN F. NORTHRUP. Princeton. *J. Frank. Inst.* 179, 621-62(1915).—The Drude electron theory of metallic conduction is rejected and a new theory of "electronic transfer" is developed, which agrees approx. qual. with expt. The mols. are assumed to be perfect conductors in oscillation, and attached to the surface of each mol. are a number of electrons. When there is no elec. stress each mol. is electrically neutral. Suppose an elec. stress is impressed in a given direction. This drives all the electrons to one side of the mol. to which they are attached, say, to the right side. The mol. in oscillating comes in contact with another mol. on the right and immediately gives up its electrons to the left side of the new mol. The electrons then slide about this mol. to the right side and the process is repeated with a final transfer of electrons from left to right. The theory, with reasons for the mol. and electronic movements, is developed in math. detail which does not permit abstracting.

PAUL D. FOOTE.

The theory of liquid potential differences. I. K. H. A. MELANDER. Stockholm. *Z. physik. Chem.* 90, 59-69(1915).—A mathematical paper. H. J. C.

Deposition from flames by electricity and experiments to determine the validity of Faraday's law for flame conduction. BRUNO THIEME. Berlin. *Z. physik. Chem.* 89, 693-727(1915).—Expts. carried out with C at high temps. show that the Faraday law for the electrolytic sepn. of C from flame gases is substantiated, provided at these temps. the C is monovalent.

H. JERMAIN CREIGHTON.

Electro-optics of the hydrogen molecule. A. HEYDWEILER. *Verh. deut. physik. Ges.* 16, 179-88(1915).—H. finds a good agreement between the calcd. and observed values for refraction, magnetic rotation and dispersion of light by gaseous H. This gives a satisfactory confirmation of Drude's electron theory if it is assumed that in a mol. there is a slowly vibrating valence electron and a not accurately detd. number of bound electrons vibrating more rapidly. The vibration frequency of the first may safely be taken as $\nu_1 = 3.14 \times 10^{15}$ sec.⁻¹ (accurate to within 1% or less); that of the 2nd kind of electrons differs according to the number which are assumed to be present. If the number is 3, the frequency is $\nu_2 = 11.3 \times 10^{15}$ sec.⁻¹. The accuracy of this value is less than that of the first.

E. B. MILLARD.

The emissivity of metals and oxides. III. The total emissivity of platinum and the relation between total emissivity and resistivity. PAUL D. FOOTE. *Bur. Standards, Sci. Paper No. 243*, 6 pp.(1915); see *C. A.* 9, 404. **IV. Iron oxide.** GEORGE K. BURGESS AND PAUL D. FOOTE. *Bur. Standards, Sci. Paper No. 249*, 7 pp.(1915); *J. Wash. Acad.* 5, 377-8(1915).—The total and monochromatic emissivity of the oxide surface formed upon Fe heated in air was detd. by use of radiation and optical pyrometers. For observed temps. of 600, 700, etc., to 1100°, (a) by optical pyrometer and (b) by radiation pyrometer, the following are true temps.: (a) 600, 700, 801, 902, 1004, 1106, and (b) 630, 735, 835, 940, 1040, 1145. A large temp. drop exists through the oxide layer; this appears to be of approx. the same order of magnitude for different sized samples from iron tubes to 100 lb. rails, and increases rapidly with temp., rising from 10° at 600° to about 100° at outside temp. of 1100°. Thus, to obtain the temp. of the Fe under the oxide the pyrometer reading must be corrected for lack of blackness of the oxide and for temp. gradient throughout the oxide. PAUL D. FOOTE.

Influence of structure-action, especially the Thomson constructive force, on the electron emission of metals. W. SCHOTTKY. *Physik. Z.* 15, 872-8(1914); cf. *C. A.* 8, 2842, 3147, 3746. E. B. MILLARD.

Pure electron discharge. S. G. BROWN. *Electrician* 75, 323(1915).—Polemical against Irving Langmuir (cf. *C. A.* 9, 2036). Priority is discussed. S. E.

Hall and Corbino effects. E. P. ADAMS. *Proc. Am. Phil. Soc.* 53, 47-51(1915); cf. *Phil. Mag.* 27, 244(1914); *C. A.* 9, 1576.—The Corbino effect has to do with the production of a secondary circular current in a metallic disk when a primary radial current is sent through it, and the disk is placed in a magnetic field perpendicular to its plane. (Cf. *Physik. Z.* 12, 561, 842(1911).) Some calcns. have been made to show that this effect and the Hall effect are essentially the same, and that any explanation of one effect will explain the other. The Corbino effect is easier to measure, since it is not necessary to use very thin films and there are no free transverse boundaries. E. B. M.

Ozonization of liquid oxygen by radiation. E. WARBURG. *Verh. deut. physik. Ges.* 17, 194-7(1915).—Liquid O or liquid air was employed in place of the gases at high pressures in the usual ozone app. It showed the same absorption as that ascribed to compressed O by Liveing and Dewar (*Proc. Roy. Soc. London* 46, 222(1890)). Since liquid O obeys Trouton's rule, it is not much polymerized, and the increased absorption must be due to mol. collisions. The Zn arc spectrum passed through the empty quartz app. from λ 203 to 332 μ to a considerable extent, but was completely absorbed up to 256 μ by liquid air and up to 261 μ by liquid O. O₂ was shown to be present in the gas rising from the tube contg. the liquid air or O. Its presence in the liquid was also shown by the disappearance of the line groups 0.277 to 0.280 μ from the transmitted spectrum shortly after the radiations fell upon the liquid, and later the spectrum to 0.29 μ was either weakened or totally absorbed. E. B. MILLARD.

The spectra of some metallic compounds. G. TAMMANN. *Göttingen. Z. anorg. allgem. Chem.* 92, 76-80(1915).—A comparison of the arc spectra of some metallic compds. with those of their components, in order to obtain evidence as to the constitution of the compds. The spectra of Cu₃Sb and Zn₃Cu₂ were the sum of the spectra of their components. The spectra obtained with a Mg alloy containing 30% Sb, with Bi₂Mg₃, and with Mg₂Sn were characterized by the reversal of the Mg line 285.2, but otherwise were identical with the spectra of the components, though a few lines may have been missing. GEORGE W. MOREY.

The ultraviolet absorption of several mono derivatives of benzene. CHRISTINE STRASSER. *Z. wiss. Phot.* 14, 282-311(1915).—The ultraviolet absorption spectra of the following substances were measured from λ 2900 to 2300, and a theoretical dis-

cussion of the results is given: C_6H_5F , C_6H_5CHO , C_6H_5CN , $C_6H_5CH_2OH$, $C_6H_5CH_2OC_2H_5$ and C_6H_5COOH . C_6H_5F and C_6H_5CN especially have a multitude of fine absorption lines. The absorption lines of all the compds. are correlated in series: a grouping of pairs in which the distance between adjacent pairs is called the long difference and between two lines of the same pair the short difference. In the following table showing the relation between chem. constitution and spectra the 1st row gives the material, 2nd row long differences and 3rd row short differences, expressed in frequencies:

F.	Cl.	CH ₃ .	Br.	COOH.	NH ₂ .	OCH ₃ .	COH.	CN.	CH ₂ OH.
97.0	96.5	96.3	95.8	95.7	95.4	95.3	95.3	94.0	94.0
5.0	3.3	3.1	2.8	?	15.7	19.8	15.3	23.6	?
CH ₃ OC ₂ H ₅ .	OH.	C ₆ H ₅ .							
94.0	94.0	92.2							
?	15.2	..							

PAUL D. FOOTR.

Use of a rotating sector in photographic photometry. A. E. WEBER. *Ann. Physik* 45, 801-38(1914).—Expts. have been made on 6 kinds of plates, each suited to some particular purpose. The source of light was photographed for a given length of time. Then a group of lines was photographed on the same plate, using a light source of the same wave length and of const. intensity, for another length of time. In the first exposure a sector opening of 360° was used, and in the succeeding ones the sector opening was made smaller and smaller. After development, the amount of blackening from the source under investigation was compared with that from the group of lines in an illumination of known intensity for a known time, and the unknown intensity detd. by interpolation. The detns. could also be made with a rotating sector having 2 openings, the ratio of light to pause then bearing a definite relation to the angle of opening. For $\lambda = 434.8 \mu\mu$, the values detd. were independent of the speed of rotation of the sector, between 120 and 1890 r. p. m., and of the time of exposure, if it was between 15 and 300 sec. Since the intensity was also independent of the type of plate used, the method was suited to ultraviolet photometry. The method was not suited to expts. with weak light sources, since then long periods of exposure were required. Expts. were made with $\lambda\lambda$ 334.2, 248.2, 434.8, 546, 577.9 and $650 \mu\mu$. The errors were generally within $\pm 4\%$, part of which was due to variations in the plates, and most of the remainder to errors in the blackening comparisons.

E. B. MILLARD.

Photometry of different colored light sources. M. PIRANI. *Z. Beleuchtungs-w.* 1915, 87; *Elektrotechn. Z.* 36, 202-6(1915); cf. *C. A.* 9, 2031.—The comparison of colored sources with a white light is made by placing a color filter before the white light.

W. E. RUDER.

Experiments on condensation nuclei produced in gases by ultraviolet light. MAUD SALT MARSH. Bedford Coll. *Proc. Phys. Soc. London* 27, 357-69(1915). Discussion. 369-70.—From exptl. investigation with gases and vapors in a Wilson expansion app. the following conclusions were drawn: Nuclei produced in air by ultraviolet light which has traversed a few cm. of air are not affected by an elec. field of 50 volts per cm. The nuclei are equally effective in producing condensation of water, toluene and turpentine vapors, and they are formed even by light which has traversed 50 cm. air. Alc. vapor condenses without expansion on much smaller nuclei than water. No nuclei were formed by light in absence of O or CO₂. There was no trace of H₂O₂ in the clouds on nuclei. O containing ozone also contains nuclei for condensation having similar properties to those formed by ultraviolet light. The nuclei can be destroyed by heating. It seems probable that the nuclei formed by ultraviolet light do not cause condensation by virtue of any particular chem. compound but that they are particles large enough to act like dust particles as centers round which condensation can begin. P. D. F.

Vapor pressures of ethane and ethylene at temperatures below their normal boiling points. G. A. BURRELL AND I. W. ROBERTSON. *J. Am. Chem. Soc.* 37, 1893-902(1915).—The satd. vapor pressure of C_2H_6 has been found to range from 760 mm. at -89.3° to 1 mm. at -159.8° ; that of C_2H_4 from 760 mm. at -103.9° to 4 mm. at -159.9° . The app. used is described in detail. C. A. ROUITLER.

Atomic weight of columbium (SMITH) 6.

3. RADIOACTIVITY.

WILLIAM H. ROSS.

X-Rays. III. W. P. DAVEY. *Gen. Elec. Rev.* 18, 625(1915).—A review.

C. G. F.

Radiations from exploding atoms. E. RUTHERFORD. *Engineering* 99, 657-9 (1915).—A semi-popular lecture on radioactivity. E. B. MILLARD.

The spectrum of homogeneous secondary X-rays. M. GLAGOLEV. *Compt. rend.* 160, 709-10(1915).—In making a study of the reflection of secondary X-rays, the primary rays emitted by the Pt anticathode of a large Röntgen tube were allowed to fall on a Cu plate placed before the window of a Pb chamber. In the chamber behind the window was mounted a crystal of NaCl and a photographic plate suitably orientated. After an exposure of 12 hrs. there was obtained on the photographic plate in the region of incidence of the rays reflected by the crystal at different angles, a line clearly defined and a second line less distinct. No trace of a continuous spectrum was visible. It was concluded that in the spectrum of the secondary rays emitted by Cu the line spectrum is much more pronounced than the continuous spectrum, and that the secondary rays undergo reflection from a crystal surface only at certain well-defined angles. The wave lengths of the rays reflected from Cu were detd. accurately to within 6%. Within these limits the wave lengths obtained are identical with those given by Moseley for the α and β lines of Cu. W. H. ROSS.

The spectra of homogeneous secondary X-rays. M. DE BROGLIE. *Compt. rend.* 160, 798(1915); cf. *C. A.* 8, 2649, 3150, 3394.—A claim for priority as regards a recent paper on the same subject by Glagolev (preceding abstr.). W. H. ROSS.

Radium emanation in petroleum from Nisiyama oil field in the province of Etigo. KYÔROKU FUJI. *Proc. Tôkyô Math.-Physic. Soc.* [2] 8, 13-4(1915).—A detn. of the Ra Em in the petroleum from 2 wells in the Nisiyama oil field gave the values of 166 and 114×10^{-12} curie per l. W. H. ROSS.

Radioactivity of mineral springs in Miyagi Prefecture. D. ISITANI. *Proc. Tôkyô Math.-Physic. Soc.* [2] 8, 15-35(1915).—I. made measurements of the Ra Em in the waters from 57 springs occurring in 28 different spas. The results obtained varied from 0 to $4,200 \times 10^{-12}$ curie per l. W. H. ROSS.

Atomic structure (HARKINS) 2.

4. ELECTROCHEMISTRY.

COLIN G. FINK.

Preparation, properties and composition of silundum. S. A. TUCKER AND A. LOWY. Col. Univ. *J. Ind. Eng. Chem.* 7, 565-71(1915).—Two varieties of silundum are formed, a slate-green, which has the formula Si_4C_4O and a gray, corresponding to the formula SiC . The temp. of formation lies above 1300° , the first variety (slate-green)

being formed up to about 1800° while above this point SiC is formed. Continued heating above 2200° results in the decompn. of silundum with the formation of graphite. The extent of penetration of silundum in the charge depends upon the duration of heating, the process being more complete when the object is embedded in the charge. Silundum is a good conductor of electricity with a negative temp. coeff. for its resistance, possesses a hardness of about 9 (Mohr scale), a sp. gr. of 2.9-3, is not attacked by H, O or N (even at 1100°) or acids. It is attacked by some fused salts such as Na_2CO_3 , NaOH, KOH. T. and L. have developed a new method for detg. C in such materials based on combustion (in electric furnace) in presence of PbO in a current of O. The method is accurate to 0.3% of theoretical.

ISADOR MILLER.

Preparation of aluminium from Russian minerals. N. PUSHIN, É. DISHLER AND M. MAKSIMENKO. *J. Russ. Phys. Chem. Soc.* 46, 1347-65 (1914).—Since no Al has so far been manufactured in Russia, the authors worked out a method for obtaining it from Russian minerals. The method is as follows: Russian soimonite (63% Al_2O_3) is converted into Na aluminate by calcination with Na_2CO_3 , the product is dissolved in H_2O , the soln. filtered, and the hot filtrate satd. with CO_2 which ppts. Al_2O_3 in cryst. form. By carefully treating part of the Al_2O_3 thus obtained with a definite amt. of HF it is converted into basic Al_2OF_6 , and the latter, when mixed with NaF, gives artificial cryolite. To this is added the other part of the Al_2O_3 , and the mixt. electrolyzed. With a proper adjustment of c. d. and keeping the conc. of Al_2O_3 at about 40 mol. % by adding from time to time either Al_2O_3 or Al_2OF_6 , the yield of Al is as satisfactory as in the large factories.

H. M. GORDIN.

Electrolytic copper refining. FRANZ ALTNER. *Metall u. Erz* 3, 173-8 (1915).—A process is described applicable to either Pb or Cu refining. The series process is used and in general the operations are similar to those of the Hayden process, but in this case one side of the electrode is coated with vaseline or paraffin, which makes it possible to strip off the deposited material whenever it has attained the desired thickness. It is not necessary to roll the electrodes as in the Hayden process. C. R. H.

Anodic solution of lead. N. M. BELL. *Trans. Faraday Soc.* May 11, 1915 (12 pp.) (*advance proof*).—By electrolyzing $\text{Pb}(\text{OAc})_2$, NaOAc, KH tartrate, H_2SiF_6 , KBr and $\text{Na}_2\text{S}_2\text{O}_8$ with a Pb anode and using several c. ds., it was found that the anode lost more Pb than it should from Faraday's law for divalent ions. In the case of 4 of the solns., $\text{Pb}(\text{OAc})_2$, $\text{KHC}_4\text{H}_4\text{O}_6$, H_2SiF_6 and KBr, it was shown from a blank treated in the same way as the anode but not electrolyzed, that the extra loss was due to chem. soln. and mechanical detachment in cleaning. In the cases of NaOAc and $\text{Na}_2\text{S}_2\text{O}_8$, (particularly the latter), such an explanation would not seem readily applicable, and the loss was taken as evidence of the formation of monovalent Pb ions. If such were the case, these ions were 2.8% of all those formed in the NaOAc and 5.6% of those in the $\text{Na}_2\text{S}_2\text{O}_8$ soln. A black deposit on the anode in the latter soln. may have been a mono-Pb compd., or PbS, or finely divided Pb due to breaking up of a mono-compd. with the formation of Pb or due to the Pb dissolving anodically in only one direction. Further work is to be done.

E. B. MILLARD.

Artificial light sources in photography. H. LUX. *Elektrotechn. Z.* 36, 203 (1915).—Describes a number of elec. units.

C. G. F.

Vaporization of carbon and the production of solar temperatures. O. LUMMER. *Electrician* 75, 517 (1915); see C. A. 9, 562.

C. G. F.

Toxic symptoms among workers in calcium cyanamide factories. F. KOEHLER. *Münch. Med. Wochschr.* 1914, 1869.—Workers in electrochem. industries, who inhale dust containing Ca cyanamide, suffer peculiar transitory attacks of congestion of the upper parts of the body immediately after taking even very small amts. of alcoholic beverages.

H. G. WELLS.

Electric steel direct from ore fines. A. C. DALTON. *Chem. Eng.* 22, 32-4(1915); see *C. A.* 9, 176. E. J. C.

"Fibrox." E. WEINTRAUB. *Chem. Eng.* 22, 7-10(1915); see *C. A.* 9, 1276. E. J. C.

The Thomson effects in tungsten, tantalum and carbon at incandescent temperatures (WORTHING) 2. Fixation of atmospheric nitrogen (PRINSEN-GEERLIGS) 18. New voltage regulator (GRAU) 1.

U. S., 1,145,593, July 6. W. M. JEWELL. **Method of circulating electrolytes in electrolytic cells, e. g., in electrolysis of NaCl soln. in cells with graphite anodes.** Deterioration of the anodes is minimized by circulating the liquor through the lower portions of the anode and cathode chambers, then out of the cell and back to the anode chamber after adding fresh NaCl.

U. S., 1,145,747, July 6. P. BUNET. **Aluminium nitride** is made by heating a mixt. of Al_2O_3 and C in an atm. of N while passing through an inclined rotary tubular elec. furnace with electrodes set in the wall of the furnace. The charge is mixed with sufficient excess of C or other elec. conductive material to insure the passage of the current at all times and the excess of C in the charge is sufficient to burn out O from air which is introduced at the delivery end of the furnace so that the residual atmospheric N is available in the reaction.

U. S., 1,145,748, July 6. P. BUNET. **Inclined rotary electric furnace for use in making AlN by the process of the preceding pat.**

U. S., 1,145,950, July 13. S. M. WARD, JR. **Galvanic battery (structural features).**

U. S., 1,147,150, July 20. F. I. DUPONT. **Obtaining oxides of nitrogen from the air.** The air is compressed in cylinders, subjected to an elec. arc and allowed to expand while drawing out the arc and the expansion of the gases in the cylinders is utilized to drive the pistons of an engine operating somewhat like a multi-cylinder 4-cycle gasoline engine. Cf. *C. A.* 9, 1156.

U. S., 1,147,165, July 20. W. H. HAMPTON. **Electric furnace for roasting ores, or drying or calcining various solid materials.**

U. S., 1,147,261, July 20. C. S. PALMER. **Regenerating lead sulfated storage batteries.** The battery is charged and discharged with an electrolyte of concd. $NaHSO_4$ soln. containing a small amt. of H_2SO_4 , using low current density and increasing density, in the latter part of the treatment to secure uniformity of action on the negative and positive plates.

U. S., 1,147,265, July 20. J. R. QUAIN. **Apparatus for producing ozone electrically.** Cf. *C. A.* 8, 1064.

U. S., 1,147,422, July 20. W. R. MOTT. **Arc lamp electrodes** are made of C 60, ZnO 5, CaF_2 26, KCl 4 and rare earth oxides 5%. The ZnO reduces slag formation on the electrode tips and prevents liberation of free HF. Cf. *C. A.* 8, 1278.

Brit., 6,731, Mar. 17, 1914. F. KRUPP AKT.-GES. **Construction of an electric furnace provided with cooling means.** Cf. *C. A.* 9, 1721.

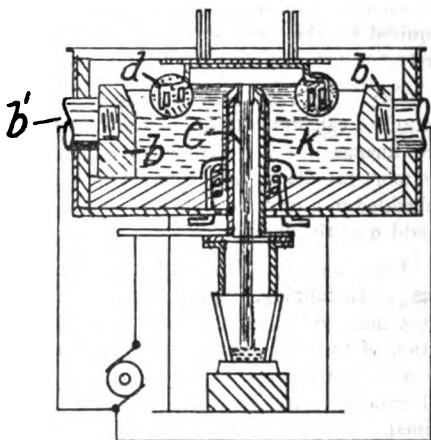
Brit., 6,865, Mar. 18, 1914. F. W. HIGHFIELD. **Molten zinc** is obtained from oxide or blue powder by feeding the material directly on a bed of C heated elec. to about 1050° in an atm. of pure CO, air being excluded; the molten metal percolates through the C and collects and passes into a cooling-chamber containing a neutral or reducing atm., such as N or the residue from the air present at starting.

Brit., 6,866, Mar. 18, 1914. F. W. HIGHFIELD. In the reduction of complex sulfide ores, the ore is first roasted and thereafter a reducing-atm. is formed in the furnace, and the charge is heated elec. to obtain metal and mat. The Pb is run off and cupelled, preferably in an elec. heated hearth, and the residual mat is further heated by means of a direct current. Cf. C. A. 9, 2220.

Brit., 6,993, Mar. 19, 1914. ELEKTRO-OSMOSE AKT.-GES. Peat or other organic or inorganic material is subdivided as finely as possible, in a ball mill, *e. g.*, to facilitate subsequent removal of H_2O or juice by elec. endosmose. An electrolyte such as NaOH soln. may be added in amt. proportional to the fineness obtained. This addition is preferably made before comminution, which is assisted thereby.

Brit., 6,995, Mar. 19, 1914. ELEKTRO-OSMOSE AKT.-GES. In electric endosmose, a colloid is added with or before an electrolyte to a mass being ground in accordance with the process described in 6,993, 1914 (*supra*). The beneficial effect of the electrolyte during subsequent extn. of H_2O by elec. endosmose is thus enhanced. Suitable colloids are silicic acid and humic substances such as Cassel brown. In the treatment of steatite, Na_2SiO_3 may be added, to furnish (by dissociation) both the electrolyte and the colloid.

Brit., 29,418, Dec. 20, 1913. SODIUM PROCESS CO. In an electrolytic furnace a cathode, applicable to the production of light metals such as Na from salts such as chlorides, comprizes an inner part and a surrounding sleeve connected to it at 1 end only. Current flows in opposite directions in the inner and outer parts of the cathode, so as to lessen electrodynamic effects on the electrolyte. In the furnace shown, the cathode *c* is hollow and enters from below, and the metal sleeve *k* is insulated from it, except at the top, by asbestos. A pool of Na or other metal, confined by a salt-encrusted cooling-coil *d*, floats in contact with the cathode, and the excess of metal escapes through the cathode, into which a short tube projects for this purpose. C anodes *b* supplied with current by C rods *b'* wholly or partly surround the cathode and cooling-coil.



Ger., 282,057, Aug. 28, 1912. Addition to 177,667, SIEMENS-SCHUCKERT-WERKE G. M. B. H. Preps. of acetylcelluloses are employed as dielectrics for elec. condensers or for app. with condensing action.

Ger., 282,497, Apr. 2, 1914. E. ACHENBACH. A container for galvanic elements with alkaline electrolyte is made of thickly tinned metal sheet, or the cell is first made up, and then tinned, inside and outside. If a Zn electrode be placed in such a container and soldered to the tinned vessel, the Zn is not consumed nor is H_2 formed.

Ger., 282,710, June 20, 1913. G. BRÜSTLEIN. Mfg. lining for electric induction furnaces.

Ger., 282,749, Nov. 26, 1912. E. A. ALLEN and H. I. ALLEN. Constructional details of an electrolytic decomposition cell, wherein only the anode is immersed in the liquid; the cathode lies on the diaphragm.

Ger., 283,042, Mar. 11, 1914. Addition to 279,043 (C. A. 9, 1172). F. A. HERRMANN. Electroplating wires, bands, and the like.

Ger., 283,068, Dec. 4, 1913. CHEM. FABRIK VON HEYDEN AKT.-GHS. A depolarizer for galvanic elements with NH_4Cl in the electrolyte consists of manganomanganites or other manganites whose liberated bases do not decompose NH_4Cl . The depolarizing masses used heretofore for galvanic elements, wherein artificial instead of natural MnO_2 has been used, occasion loss of NH_4Cl , inasmuch as during the action of the element the liberated Mn base reacts with the NH_4Cl of the electrolyte with the evolution of NH_3 . This objection is met in the selection of manganites, whose base consists wholly or in part of MnO or of an oxide approaching it, instead of the heretofore used alkali- or Ca-manganites. These manganomanganites are prepared from the com. alkali- or Ca-manganites, which are treated with sol. manganous salts.

Ger., 283,110, Mar. 20, 1912. SPEZIALFABRIK FÜR ALUMINIUM-SPULEN UND LEITUNGEN, G. M. B. H. In the electrolytic insulation of aluminium wire, and the like, whereby the wire is constituted as the anode in a bath of alkali silicates, and subjected to high tension electrolysis, substances (as NaCl) are added to the electrolytic bath which are adapted to reducing the max. polarization tension of the Al or the like. Furthermore, substances giving off O (such as H_2O_2) are added to the bath, in order to harden the insulating layer by increasing the O content. Consequently, the tension required in the process is lessened, and there is no danger that the wire may melt.

Ger., 283,276, May 25, 1913. BOSNISCHE ELEKTRIZITÄTS-AKT.-GHS. In the manuf. of calcium carbide, in continuous process, by the fusion of lime and coal in the elec. furnace, the C electrodes take part in the reduction of the CaO and are consumed, the more rapidly as they come in contact with CaO . To avoid this, the electrodes are imbedded in a mixt. of CaO and coal which is poor in CaO , and then a lime-rich mixt. is added as the charge.

Ger., 283,285, Sept. 20, 1913. ELEKTRO-OSMOSE AKT.-GHS. (GRAF SCHWERIN GHS.). In tanning, impregnating and like processes, the liquid containing the active substances and in which the material under treatment is immersed, is subjected to the action of the elec. current between diaphragms, maintaining circulation of the liquid by means of stirrers, or the like. The charge at the diaphragms is detd. so that the substances subject to electroösmose pass through, while the active substances are retained.

Ger., 283,390, June 16, 1912. QUARZLAMPEN-GHS. M. B. H. Process and app. for lighting mercury vapor apparatus.

Ger., 283,484, May 20, 1913. ALLGEMEINE ELEKTRIZITÄTS-GHS. In a high pressure mercury vapor lamp, the entire space in which the condensation of Hg may occur, is filled with substances which do not affect the action of the lamp, in order to increase the pressure and, therefore, the candle power. Quartz pearls are specified. Cf. C. A. 8, 3273.

Swed., 36,626, Jan. 16, 1913. K. U. O. LÖBECK. In the manuf. of a mass composed of the higher O-compds. of Ni, for use as positive electrodes of alkaline accumulators, the higher oxides of Ni are reduced to a lower state of oxidation with a reducing liquid or a gas, and mixed with solid pulverulent substances which in contact with a liquid yield a reducing liquid or a reducing gas. Such compds. are, *e. g.*, sugar or a metal, such as Zn or Al, which dissolves in alkali with the evolution of H_2 . This latter effects the desired reduction.

5. PHOTOGRAPHY.

LOUIS DERR.

Thioindoxyl development and its bearing on the theory of the latent image. R. E. CROWTHER. *Phot. J.* 55, 186-99(1915).—Image-reversal in collodion films being thus far unrecorded, and having been definitely established as impossible in a film of pure Ag halide, it appears possible that reversal is at least in part a function of development rather than of exposure. It is conjectured that the action of light is to split the AgBr into Ag and Br progressively, the Ag acting as a nucleus about which development may proceed; or, under suitable conditions, the Ag may be rehalogenized; or, with long exposures, it may become a component of a printed-out image. The Br combines with the gelatin, and the gelatin-Br complex is attacked by the developer while the main development proceeds, the reaction products effecting the reversal. In normal exposures, a certain amt. of the developer is oxidized by the gelatin-Br complex; the oxidation products diffuse into the bath and cease to act, while, with a relatively high conc. of unaltered AgBr, the main development goes on. With exposures giving reversal, there is usually a visible image, rich in Ag and poor in the developable compd. Hence there is little development of the image; and the action of the developer on the gelatin complex forms products similar to those of the normal development of the Ag halide; these cause the observed disappearance of the visible image. With very long exposures, the amount of Br which the gelatin can absorb is exceeded, the excess escaping; hence the entire quantity of Ag in the printed-out image cannot be rehalogenized. This is the second negative stage, in which the deposit is more like a brown stain, quite unlike the normal image. Indoxyl and thioindoxyl as developers yield composite images of Ag and blue indigo or red thioindigo, respectively, and C. shows by their aid that the second negative is residual Ag not rehalogenized by the oxidation products of the developer. From this it follows that a second positive stage of reversal is theoretically unattainable, and, in fact, none such has been observed. L. DERR.

A method of automatic exposure and development. W. GAMBLE. *Phot. J.* 55, 234-41(1915).—A description of the procedure of C. Gravier. An invariable exposure of 0.025 second is adopted for instantaneous work, as for motion pictures. The stop is varied according to the light. The actinometer is a strip of rapid bromide paper impregnated with 5% KNO_3 ; the paper darkens to a limiting heliotrope tint. Development is done with changing-bag and light-proof tray, with adurol or hydroquinone, for a fixed time. Omission of fixing is suggested, if need be, or the developing tray may be used for fixing. In discussion, the necessity of temp. control was emphasized, and a wider range of exposure thought necessary. L. DERR.

U. S., 1,143,991, June 22. A. L. ORMAY. Photographic process of preparing etched metallic printing plates.

U. S., 1,145,143, July 6. F. E. IVES. Multi-color photographs are made by superposing mono-chrome positives in different colors and having a transparent celluloid base, and cementing them together with amyl acetate collodion. Cf. C. A. 8, 416.

U. S., 1,145,968, July 13. P. D. BREWSTER. Photographic film for producing pictures in natural colors is formed with an emulsion on one side sensitive chiefly to green, blue, indigo and violet light and an emulsion on the other side sensitive to red, orange and yellow light. The body of the film is formed of celluloid or other transparent material and the first-mentioned emulsion is combined with yellow stain which serves as a filter to restrict passage of bluish light through the film. Cf. C. A. 9, 2039.

Ger., 278,779, Nov. 19, 1913. *Fr.*, 467,085, Jan. 7, 1914. **CHEM. FABRIK VORM. SANDOZ.** Mfg. pure salts of *p*-dimethylaminophenol and *p*-hydroxyphenyltrimethylammonium salts. The ready solubility and ease of oxidation of the products of methylation of aminophenol find exception in the ferrocyanides which are pptd. from acid soln., while ferricyanides exert first an oxidizing action. After satn. with alkali, the extrn. of the dimethyl product is effected by means of benzene. The product is used as a developer in photography.

Ger., 280,586, Apr. 19, 1912. **A. MOLLING & Co.** Photomechanical production of polychrome stone printing surfaces.

Ger., 280,622, Feb. 20, 1914. **ZENTRALE FÜR WISSENSCHAFTLICHE UND SCHUL-KINEMATOGRAFIE, G. M. B. H.** Rendering the so-called rain streaks on films invisible by spraying the film while being drawn out, with CCl_4 or other readily volatile combustible liquid whose refractive equiv. approximates that of the body of the film.

Ger., 280,679, Oct. 4, 1912. **CHEM. FABRIK AUF AKTIEN (VORM. E. SCHERING).** Selenium toning bath. See *Brit.*, 4,513, 1913 (*C. A.* 8, 2658).

Ger., 280,856, Aug. 28, 1912. **THEODOR DITTMANN.** Process of producing printing forms for positive and negative printing, by duplex photographic copying.

Ger., 281,362, Apr. 5, 1913. **L. CAESAR VAN RIPER.** In mfg. colored cinematographic pictures, the color values for colors of shorter period of sensitiveness are greater than for color of longer period of sensitiveness.

Ger., 281,395, Dec. 2, 1913. Addition to 279,931 (*C. A.* 9, 1283). **E. FRIEDMANN and B. REIFFENSTEIN.** Production of pictures with stereoscopic effect, of the parallax-stereogram type.

Ger., 282,246, Nov. 2, 1913. **A. BETTMANN.** App. for developing, washing, and drying prints (blue prints and the like).

Ger., 282,299, Oct. 5, 1912. **MILLERGRAPH Co.** Photographic reproduction of drawings produced by surface abrasion of a special transparent paper which is stamped superficially with conical elevations and depressions, of minute size, and covered with a non-actinic transparent or translucent coating. The depth, or breadth, of the abrasions det. the depth of tone in the copy.

Ger., 282,327, Dec. 19, 1913. **HOH & HAHNE, FABRIK PHOTOGRAPHISCHER APPARATE.** Etching apparatus for printing plates.

Ger., 282,363, Jan. 30, 1914. **E. EBERHARD.** Mfg. autotype screen pictures.

Ger., 283,085, Feb. 26, 1914. **FARBW. v. M. L. & B.** Producing photographic pictures in sepia- and red-tones by developing latent pictures by means of hydroxyisocarbostryl and treating the resulting pictures with fixing baths, alone or with fixing and Ag solvents. If, *e. g.*, the picture developed in this manner be fixed with $\text{Na}_2\text{S}_2\text{O}_3$ soln., a beautiful sepia shows up; if, during or after fixing, the picture is treated with a Ag solvent, a red tone is obtained. In general, the so-called "reducers" are used as Ag solvents, such, *e. g.*, as Farmer's reducer, a soln. of $\text{Na}_2\text{S}_2\text{O}_3$ with K_3FeCN_6 added. The hydroxyisocarbostryl developer can be prepared by dissolving hydroxyisocarbostryl in H_2O by means of alkali in the presence of neutral alkali sulfite, if necessary with the addition of KBr . *E. g.*, crystallized Na_2SO_3 10 g., 5 g. anhydrous soda, and 0.5–1 g. KBr are dissolved together in about 100 cc. H_2O . To this is added 1 g. hydroxyisocarbostryl and the soln. is heated to 50° until the latter is dissolved, when it is cooled and filtered. Instead of soda, 2 cc. acetone can be used. The picture appears very quickly in this developer, and is finished after about 3 min.

6. INORGANIC CHEMISTRY.

H. I. SCHLESINGER.

Notes on sodium columbates. II. Atomic weight of columbium. EDGAR F. SMITH AND W. K. VAN HAAGEN. *J. Am. Chem. Soc.* 37, 1783-97(1915); cf. C. A. 3, 520.—A quantity of K oxyfluocolumbate, dissolved in hot H_2O , was treated with 3 times its wt. of NaOH and the washed ppt. crystd. from boiling H_2O . The crystals were $7Na_2O \cdot 0.6Cb_2O_5 \cdot 31H_2O$ (called "7:6 salt"). This large excess of alkali was necessary to obtain the 7:6 salt, and the yield was conditioned by the amount of alkali used. By spontaneous evapn. of the mother liquor from this process, the salt $Na_2O \cdot Cb_2O_5 \cdot 7H_2O$ was obtained in short, stout triclinic crystals, sometimes 6-7 mm. in length. The 1:1 salt was difficult to recrystallize. The 7:6 salt crystd. in slender needles or prisms, often microscopic in size. It is difficultly sol. in hot H_2O ; becomes lemon-yellow on ignition and white again on cooling. The ignited mass was insol. in H_2O , but part of its alkali splits off, leaving the 1:1 salt, $7Na_2O \cdot 0.6Cb_2O_5 \rightleftharpoons 12NaCbO_3 + Na_2O$. The salts are, then, mutually convertible. The ratio $NaCbO_3:NaCl$ was used for the at. wt. S_2Cl_2 was passed over $NaCbO_3$ until all Cb was expelled, which was accomplished after repeated treatments, alternated with treatments with H_2O . As a mean of 7 detns. of this ratio in a special app. constructed wholly of glass, the at. wt. of Cb was 93.13, if Na = 23.00 and Cl = 35.46. The usual precautions were rigidly observed.

E. B. MILLARD.

Sulfites, thiosulfates, and polythionates. II. A. SANDER. Tech. Hoch., Karlsruhe. *Z. angew. Chem.* 28, I, 273-7; cf. C. A. 9, 2042.—For the prep. of c. p. tetrathionate, 26 g. of I_2 are dissolved in EtOH, cooled, and a satd. soln. of 50 g. $Na_2S_2O_4$ or 39.5 g. $K_2S_2O_4$ run in from a dropping funnel. The tetrathionate formed, being insol. in EtOH, seps. out in small crystals. These are drained and washed with EtOH till free from I_2 and iodides. The crystals are dissolved in the smallest possible quantity of H_2O at room temp. and the crystals again pptd. with EtOH, sucked dry, pressed between filter paper and dried over H_2SO_4 . A number of analyses showed that the tetrathionate thus prepared is very pure. The solid alkali tetrathionates are stable at ordinary temps. The soln. of the pure alkali tetrathionates may be boiled without decomp., but the presence of other salts as impurity at once causes decomp. $Na_2S_2O_4$ with tetrathionates acts to a slight extent only at room temp. At 100° the tetrathionate is rapidly decomposed in the presence of $Na_2S_2O_4$. In this case there is no reaction between the thiosulfate and tetrathionate, the former merely acting as a catalytic agent. L. T. F.

A new tin-sulfur compound, Sn_3S ? G. EPPRECHT. *Chem. Ztg.* 39, 341-2(1915).—During the repair of a furnace used for Sn recovery, the presence of well-formed gray crystals was observed. They are stable in air and appear to be a new compd. The density of the crystals is 5.77. They are not affected by cold dil. acids nor when heated with NaOH soln. The crystals are somewhat impure. The analytical results after correction for impurities indicate a compound of the formula Sn_3S . E. assumes that under the conditions in the furnace the Sn would be in the tetravalent form and suggests that the compound is *distanmic sulfide* of the structural formula $Sn \equiv Sn$.


 W. H. S.

Action of stannous chloride on sulfuric and sulfurous acids. R. G. DURRANT. *J. Chem. Soc.* 107, 622-38(1915).—The action of concd. H_2SO_4 in excess on hydrated $SnCl_2$ results in hydration followed by liberation of HCl between 20 and 90° , and the liberation of SO_2 between 130 and 200° with the formation of $Sn(SO_4)_2$. When heated alone, $SnSO_4$ liberates SO_2 between 360° and a dull red heat, forming SnO_2 . When H_2SO_4 acts on $SnCl_2$ in the presence of water, various reactions caused by dissolved

SO_2 and HCl take place. The H_2S produced is shown to depend upon dissolved SO_2 . The action of H_2SO_3 on solns. of SnCl_2 occurs at room temp. and varies according to the proportions of SnCl_2 , SO_2 , HCl , and H_2O present. The result is a partial or complete oxidation of SnCl_2 . It is slow and incomplete without an excess of HCl . It is evident that 5 reactions are involved. The reaction is bimol., provided that HCl is present in excess. Aside from complete oxidation resulting in the formation of H_2S , the interaction of H_2S and H_2SO_3 occurs to the greatest extent. The interaction of H_2S and SnCl_2 occurs only at high concn. of HCl . SnCl_2 and H_2S react in the earlier stages; SnS appears only when H_2SO_3 is present in slight amt., but it is evident that a colloidal form is produced. The action of SnCl_4 upon H_2SO_3 occurs least of all. To attain complete oxidation the mol. ratios $\text{SnCl}_2:\text{H}_2\text{SO}_3:\text{HCl}$ must be in the proportion 3:1.55:6. Higher proportions of H_2SO_3 and particularly of HCl accelerate the oxidation. W. H. S.

Cuprous carbonate. P. CARLES. *Bull. soc. chim.* 17, 163-4(1915).—During the prepn. of ammoniacal solns. of CuO by the combined action of air and NH_3 upon Cu it was observed that the solvent action gradually became sluggish. The cause was traced to CO_2 , an insol. carbonate slowly forming scales which could be shaken off by boiling water. The outer surface of the scales was blue, the interior a malachite green, and the layer in contact with the metal yellow. In time the blue surface gradually changes to green, and then all becomes reddish yellow. The product when powdered is stable and dissolves in acids with effervescence. With HCl a colorless soln. results; this gives an abundant white ppt. when diluted with water. W. H. S.

"Boric acid water-glass." W. ACKERMANN. *Chem. Ztg.* 39, 225(1915).—A. discusses a fluid compound containing approximately 3 or 4 B_2O_3 to 1 Na_2O prepd. by warming gently a mixt. of borax and boric acid (3:1). The compd. is to be considered analogous to ordinary water-glass; hence it possibly is a colloidal soln. of H_2BO_3 in borax. The fluid compd. is fairly stable though less so than ordinary water-glass, for it tends to solidify and crystallize on standing, especially if shaken. It finds technical application as a flux in soldering, to take the place of borax, over which several important advantages are claimed. Finally it is pointed out that "water-glasses" are met with among the alkali compounds of silicic, phosphoric and boric acids, and that these are more or less closely allied to one another. T. R. BRIGGS.

The action of ammonium salts on mercuric iodide. I. ICILIO GUARESCHI. Univ. Turin. *Atti accad. sci. Torino* 50, 231-6(1915).—In the course of his expts. on metallic bromides G. made some observations with HgI_2 which are reported here. If a mixt. of HgI_2 with a little NH_4Br is heated in a long narrow hard glass tube, violet I vapors are formed. The aq. ext. of the cold mass gives an intense blue coloration with starch soln. The reaction which is shown by as little HgI_2 as 0.0001 g. is due to the formation and subsequent decompn. of NH_4I . The same reaction takes place when the NH_4Br and HgI_2 are heated in aq. soln. This reaction as a qual. test for I is much better than concd. H_2SO_4 . NH_4I heated by itself decomp. thus: $2\text{NH}_4\text{I} \longrightarrow 2\text{NH}_3 + \text{I}_2 + \text{H}_2$ so that the reactions must be $\text{HgI}_2 + 2\text{NH}_4\text{Br} \longrightarrow \text{HgBr}_2 + 2\text{NH}_4\text{I}$ and $2\text{NH}_4\text{I} \longrightarrow 2\text{NH}_3 + \text{I}_2 + \text{H}_2$. The presence of HgCl_2 , HgBr_2 , or PbBr_2 hinders the reaction. The presence of KBr is without effect. Both $(\text{NH}_4)_2\text{SO}_4$ and NH_4NO_3 heated with HgI_2 evolve I vapors but reabsorb them on cooling so that the starch test fails. $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ gives the free I but is not a convenient reagent. Heated with NH_4Cl , HgI_2 gives almost no I. Hg_2I_2 heated with NH_4Br gives no I. The reactions taking place are expressed thus: $\text{HgI}_2 + 2\text{NH}_4\text{Br} \longrightarrow \text{HgBr}_2 + \text{Hg} + 2\text{NH}_4\text{I}$ and $2\text{NH}_4\text{I} \longrightarrow 2\text{NH}_3 + \text{H}_2 + \text{I}_2$ and $\text{Hg} + \text{I}_2 \longrightarrow \text{HgI}_2$. The presence of Hg_2I_2 or Hg_3Br_2 prevents the reaction with HgI_2 . Hg_2I_2 boiled in H_2O with NH_4I gives Hg . The same is true for $\text{Hg}_2\text{I}_2 + \text{NH}_4\text{Br}$. HgI_2 is readily sol. in cold NH_4Br soln. and if the residue

on evapn. is heated I is evolved. This reaction permits of the sepn. and identification of HgI_2 when mixed with large amts. of other insol. red compds.; thus HgS (cinnabar) containing 0.1% of the iodide gives a positive result. This result is not obtained if the mixt. is heated with the NH_4Br soln. since in this case $(\text{NH}_4)_2\text{S}$, S, etc., are formed. No other easy way of finding HgI_2 in HgS is known. HgI_2 dissolves in NH_4Br soln. with a marked diminution in the temp. of the soln. When a mixt. of a little HgI_2 is heated slowly with much MnO_2 , I vapors are evolved at first but later the HgI_2 sublimes. When heated rapidly almost no I is liberated. The addition of NH_4Br to the mixt. causes a marked evolution of I. When $\text{HgI}_2 + \text{Sb}_2\text{S}_3$ are heated with NH_4Br , NH_3 is evolved in large amts., a sublimate is formed, but no I is evolved. When this mixt. is treated with aq. NH_4Br and the dried cryst. residue from the soln. heated, faintly violet vapors form, but no test for I was obtained with starch; the presence of I was shown by the addition of Cl water. II. *Ibid* 354-60.—In continuing his earlier expts., G. heated all metallic iodides, even those like AgI , which withstand high temps. without decomp., in a long, narrow hard glass tube with NH_4Br and found that all yield free I. In most cases the NH_4Br may be replaced with NH_4Cl . In this way many iodides and iodo compounds that would require long processes by any other method may be recognized quickly. In this way as little as 0.0001 KI may be detected even when mixed with a large proportion of a chloride or bromide of an alkali or alkali earth metal. It therefore constitutes a delicate test for I as an impurity in these salts. The double iodides $\text{HgI}_2 \cdot 2\text{KI}$, $\text{HgI}_2 \cdot \text{CdI}_2$ and $\text{ZnI}_2 \cdot \text{KI}$ give I more easily when heated with NH_4Br than when heated without NH_4Br . TlI gives I when heated alone but less easily than when mixed with NH_4Br . AgCl containing AgI treated with an aldehyde and K_2CO_3 gives metallic Ag which dissolved in HNO_3 leaves unchanged AgI (Vanino and Hanser). AgI heated with NH_4Br gives I at once. It likewise gives I with NH_4Br when heated with anything less than a large excess of AgBr . AgCl effectively prevents the detection of I in AgI on heating with NH_4Br , but the following test gives good results, even when only traces of I are present. The mixt. of $\text{AgI} + \text{AgCl}$ is agitated with about 10 times its wt. of NH_4Br in 20 times its wt. of H_2O , the soln. decanted and the liquid tested for I with Cl water and starch or Cl water and CHCl_3 . The double iodide $\text{HgI}_2 \cdot 2\text{AgI}$ readily gives the reaction with NH_4Br . The same result is obtained in the presence of AgBr , or PbBr_2 , but not when AgCl is present. With PbI_2 the reaction is not prevented by the addition of AgI , HgI_2 , PbCl_2 or PbBr_2 . When a mixt. of $\text{HgBr} + \text{NH}_4\text{Br}$ is heated, it fuses, boils and gives a red-brown sublimate and free NH_3 , but not Br. The sublimate is sol. in hot abs. EtOH from which it seps. as a red powder. This reaction is to be studied further.

E. J. WITZEMANN.

The critical temperature at which hydrochloric acid is formed in the evaporation of magnesium chloride solutions. H. HOF. Wansleben. *Chem. Ztg.* 39, 470(1915).—H. finds that HCl first appears at about 157° when pure MgCl solns. are evapd. under conditions which prevent superheating any part of the soln.

J. H. MOORE.

Molybdenum semipentoxide and its salts. F. MAWROW AND M. NIKOLOW. *Sophia. Z. anorg. allgem. Chem.* 92, 135-44(1915).—When the violet compd. $\text{Mo}_2\text{O}_5 \cdot 7\text{H}_2\text{NO}_3 \cdot 3\text{H}_2\text{O}$ is triturated with NH_4OH soln., the product filtered and washed with dil. NH_4OH and then with EtOH , a yellow substance slightly sol. in H_2O , sol. in acids, is obtained; analysis showed this to be ammonium molybdenum semipentoxide trihydrate, $\text{NH}_4\text{Mo}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$. When this compd. is heated in a stream of CO_2 the product is Mo_2O_5 , violet-black powder. Sodium molybdenum semipentoxide trihydrate, $\text{NaMo}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$, was obtained by triturating with NaOH , and on heating in CO_2 it yielded sodium molybdenum semipentoxide, NaMo_2O_5 . Barium molybdenum semipentoxide trihydrate, $\text{BaMo}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$, and barium molybdenum semipentoxide, BaMo_2O_5 , were obtained in a similar manner.

GEORGE W. MORRIS.

Ferric salts of uni- and polyvalent non-substituted organic acids. R. F. WEINLAND AND FR. PASCHEN. Tübingen. *Z. anorg. allgem. Chem.* 92, 81-118(1915).—Previous work has shown that ferric compds. or organic acids contain the Fe either as a complex cation, generally composed of 3 Fe and 6 (or less) acid residues, or as a complex anion. The rule has been that monocarboxylic acids always form the 1st type of compds. while dicarboxylic acids form also the 2nd type; in the present paper derivs. of a number of organic acids are studied to see if the above rule is adhered to. The *mononaphthoate* of a *hexanaphthoato-triferric base*, $[\text{Fe}_3(\text{C}_{10}\text{H}_7\text{CO}_2)_6(\text{OH})_2](\text{C}_{10}\text{H}_7\text{CO}_2)$, from $\text{C}_{10}\text{H}_7\text{CO}_2\text{Na}$ and FeCl_3 , forms orange-yellow powder, sol. in organic solvents; the *nitrate*, from the above compd. and HNO_3 in EtOH soln., forms glittering dark red rhombic plates; the *perchlorate-naphthoate*, $[\text{Fe}_3(\text{C}_{10}\text{H}_7\text{CO}_2)_6(\text{OH})_2]\text{ClO}_4 + [\text{Fe}_3(\text{C}_{10}\text{H}_7\text{CO}_2)_6(\text{OH})](\text{C}_{10}\text{H}_7\text{CO}_2)(\text{ClO}_4)$, from the 1st compd. and HClO_4 , forms dark red glittering crystals; the *compound* $[\text{Fe}(\text{C}_{10}\text{H}_7\text{CO}_2)_2(\text{OH})_2]\text{C}_{10}\text{H}_7\text{CO}_2 + [\text{Fe}_3(\text{C}_{10}\text{H}_7\text{CO}_2)_6(\text{OH})_2]\text{C}_{10}\text{H}_7\text{CO}_2$ by slowly evap. an Me_3CO soln. of the 1st compd., forms brownish red octahedra. On addition of FeCl_3 to a soln. of Na cinnamate a *compound* containing 6 Fe to 13 cinnamic acid residues is obtained; light yellow powder, sol. in organic solvents. On dissolving this compd. in EtOH and adding H_2PtCl_6 soln., reddish brown 4-sided columns of the *chloroplatinate* of the *hexacinnamylato-triferric base*, $[\text{Fe}_3\text{C}_6(\text{OH})_2]\text{O} \cdot 5\text{PtCl}_4 \cdot \text{H}_2\text{O}$ (Ci representing the cinnamyl radical) separate; the *nitrate*, obtained in a similar manner, $[\text{Fe}_3\text{C}_6(\text{OH})](\text{NO}_3)\text{Ci} \cdot 4\text{H}_2\text{O}$, forms brownish red 4-sided tablets; the *perchlorate-cinnamylate*, $3[\text{Fe}_3\text{C}_6(\text{OH})_2]\text{ClO}_4 + [\text{Fe}_3\text{C}_6(\text{OH})_2]\text{Ci} + 15\text{H}_2\text{O}$, long brownish red 4-sided columns. When the above 6:13 compd. is extracted with Me_3CO , indefinite mixts. richer in Fe result. When FeCl_3 is added to a H_2O soln. of Na pyromucate, *ferric pyromucate*, $[\text{Fe}_3\text{Pm}_6(\text{OH})_2]\text{Pm} + [\text{Fe}_3\text{Pm}_6(\text{OH})_2]\text{Pm} + x\text{H}_2\text{O}$ (Pm representing the $\text{C}_4\text{H}_5\text{OCO}_2$ radical), yellowish red ppt., sol. in EtOH, Me_3CO , CHCl_3 , slightly in H_2O , is obtained, which on recrystn. from EtOH yields the *monopyromucate* of the *hexapyromucato-triferric base*, $[\text{FePm}_6(\text{OH})_2]\text{Pm} + \text{H}_2\text{O}$, long yellowish red tablets the *perchlorate*, $[\text{Fe}_3(\text{Pm}_6\text{OH})_2]\text{ClO}_4 + [\text{FePm}_6(\text{OH})]\text{ClO}_4\text{Pm} + 5\text{H}_2\text{O}$, fine yellow needles, is obtained similarly, with addition of HClO_4 ; the *chloride*, $[\text{FePm}_6(\text{OH})_2]\text{Cl}$, yellow needles, is prepd. similarly. *Ferric 2-phenylquinoline-4-carboxylate*, $[\text{Fe}_3\text{Q}_2(\text{OH})_2]\text{Q} + \text{H}_2\text{O}$, is obtained as a white ppt. on addition of FeCl_3 to NaQ ; the *chloride* of the *hexa base* was obtained by recrystn. from EtOH on addition of HCl . Addition of FeCl_3 soln. to Na laurate gives a flesh-colored ppt., whose compn. is probably similar to that of the above compds. When a Na *o*-phthalate soln. was pptd. with FeCl_3 , the reddish brown ppt. obtained contained Fe:Phth (Phth representing $\text{C}_6\text{H}_4(\text{CO}_2)_2$) in the ratio 3:3.12; when this ppt. was boiled with EtOH and phthalic acid under a reflux condenser, the *mono-o-phthalate* of a *diphthalato-triferric base*, $[\text{Fe}_3\text{Phth}_2(\text{OH})_2]\text{Phth} + 3\text{H}_2\text{O}$, yellow powder, was obtained. When the heating under a reflux was carried out in the presence of HNO_3 , the *nitrate-phthalate* of a *triphtalato-triferric base*, $[\text{Fe}_3\text{Phth}_2(\text{OH})_2]\text{Phth}(\text{NO}_3)_2 + 8\text{H}_2\text{O}$, orange-yellow powder, was obtained, while heating with HClO_4 gave the *perchlorate-phthalate*, $[\text{Fe}_3\text{Phth}_2(\text{OH})_2]\text{Phth}(\text{ClO}_4)_2 + 18\text{H}_2\text{O}$. The *isophthalate* of a *tri-isophthalato-triferric base*, $[\text{Fe}_3\text{Phth}_3(\text{OH})]\text{Phth} + x\text{H}_2\text{O}$, was obtained from Na isophthalate and FeCl_3 , insol. in EtOH or other organic solvents. FeCl_3 and Na terephthalate yielded a dark brown ppt., which could not be freed from the admixed acid. Addition of FeCl_3 to Na camphorate soln. gave the *monocamphorate* of a *tricamphorato-triferric base*, brownish red powder, decompd. by heating with EtOH and organic acid. An *acid camphorate-perchlorate* of the above base, yellowish red powder, was obtained by adding H_2O to a soln. of camphoric acid and $\text{Fe}(\text{ClO}_4)_3$ in 50% EtOH; the *acid camphorate-nitrate*, yellowish red powder, was obtained in a similar manner. Na succinate and FeCl_3 gave a gelatinous ppt.; the *nitrate-succinate* of a *trisuccinato-triferric base*, $[\text{Fe}_3\text{C}_4\text{H}_4(\text{CO}_2)_2(\text{OH})_2](\text{C}_2\text{H}_4\text{CO}_2)\text{NO}_3 + 10\text{H}_2\text{O}$, brown

powder was obtained from succinic acid and $\text{Fe}(\text{NO}_3)_3$ in EtOH soln. The fumarate of a difumarato-trisferric base, $[\text{Fe}_3\text{Fu}_2(\text{OH})_3]\text{Fu} + x\text{H}_2\text{O}$, flesh-colored powder, was obtained from FeCl_3 and Na fumarate. A chloride-fumarate of a trifumarato-trisferric base was obtained by heating a H_2O soln. of FeCl_3 and fumaric acid, and extracting the excess acid from the filtered ppt. with EtOH; a perchlorate-fumarate and a nitrate-fumarate were obtained in a similar manner. Expts. were also made with maleic acid and with oxalic acid in an attempt to obtain ferric derivs., but without success. An Fe salt of hemimellitic acid, $[\text{Fe}_3(\text{C}_6\text{H}_2)(\text{CO}_2)_3(\text{OH})_3](\text{C}_6\text{H}_2)(\text{CO}_2)_3 + x\text{H}_2\text{O}$, was obtained as a chocolate brown powder by dissolving hemimellitic acid in NaOH soln. and adding FeCl_3 ; the Fe salt of aconitic acid was obtained in a similar manner. G. W. M.

Approximate determination of the boiling points of the alkali halides. L. H. BORGSTROM. Helsingfors. *Med. Finska Kemistsamfundet* 24, 2 pp.(1915) (Swedish).—The salts were heated in Pt crucibles by a blast lamp or elec. furnace, and the temps. observed with a Pt-Rh thermoelement. As a mean of several detns., varying $10-20^\circ$, the following values were obtained: LiCl 1360° , NaCl 1490° , NaBr 1455° , NaI 1350° , KCl 1500° , KBr 1435° and KI 1420° . E. T. WHERRY.

7. ANALYTICAL CHEMISTRY.

E. G. R. ARDAGH.

Application of petrographic methods to analytical chemistry. W. H. FRY. Washington. *Science* 42, 89-90(1915).—Attention is called to the great value of petrographic microscopic methods in analytical chemistry, and it is urged that the methods be more generally used by chemists. GEORGE W. MORREY.

Specifications for sampling liquids. Report of sub-committee of American Society for Testing Materials. *Drugs, Oils and Paints* 31, 47(1915).—*Liquids contained in containers capable of agitation.* With barrels, after agitation, a tube is to be inserted so as to be filled completely. *Samples from tank cars.* No recommendations at present in view of the difficulty in obtaining a representative sample. Three methods are outlined, e. g., the thief method, sampling from a pipe line and sampling at point of efflux by taking samples at regular intervals or by diversion of a portion of the stream.

E. W. BOUGHTON.

Methods of determination and separation of iron, aluminium, chromium, zinc and manganese. G. VAN PELT. *Bull. soc. chim. belg.* 28, 101-27, 138-43(1914).—V. P. discusses the theory of the hydrolysis of salts in aq. soln. and the method of sepn. of Fe, Al, Cr, Zn and Mn which depends on the different degrees of hydrolysis of salts of bivalent and trivalent elements and the change in equil. due to fixation of HCl by BaCO_3 , KI and KIO_3 and the action of Na succinate or AcONa and AcOH . The general subject of sepn. and detn. of Al, Fe, Cr, Mn and Zn is then treated under the following heads: (1) hydrolysis of aq. solns. of salts of Al, Fe, Cr, Zn and Mn; (2) exptl. verification of the methods based on the hydrolysis of aq. solns.; (3) exptl. verification of the methods based on the oxidation of certain of these elements. The degree of hydrolysis of aq. solns. of AlCl_3 , FeCl_3 , CrCl_3 , MnCl_2 and ZnCl_2 was measured by means of the catalytic action (due to H^+) of these solns. on the velocity of sapon. of diazoacetic ester, the rate of evolution of N being taken as an index of this velocity and the general procedure being according to the method described by Fraenkel. The influence of Cl^- was eliminated by using only the data obtained at the beginning of the reaction. These measurements showed that the salts of Fe and Al are hydrolyzed in the proportion of approx. 80%, while those of Cr and Mn are hydrolyzed in the proportions of approx. 40 and 10%, resp.; the salts of Zn are not hydrolyzed. The principle of the hydrolysis method is, therefore, inexact, inasmuch as the salts of Mn are distinctly

hydrolyzed and the moderate degree of hydrolysis of Cr salts causes the pptn. of Cr to be much slower than that of Fe and Al. The Jannasch method for the sepn. of Cr and Mn does not give satisfactory results, while the method of Dittrich and Hassel is not reliable in the case of chlorides. V. P. proposed the following procedure: add 2 g. crystd. $(\text{NH}_4)_2\text{S}_2\text{O}_8$ and several drops conc. HNO_3 to the soln. of CrCl_3 and MnCl_2 in 300-400 cc. and heat on H_2O bath until a yellow coloration appears. Add the cooled soln. to 75 cc. NH_4OH and 75 cc. H_2O_2 with stirring, warm for $\frac{1}{2}$ hr., decant, wash with H_2O containing NH_4OH and filter; acidify the wash H_2O (which contains Cr as the chromate) with HCl , conc. to 1 cc. and add H_2O_2 . Then ppt. the CrCl_3 with NH_4OH after heating. For the sepn. of Zn and Mn pour the soln. of Mn and Zn salts (in 50 cc. vol.) with shaking into a mixt. of 50 cc. NH_4OH , 25 cc. of a 10% NH_4Cl soln. and 100 cc. H_2O_2 ; add gradually 50 cc. conc. H_2O_2 to this mixt. and warm for approx. $\frac{1}{2}$ hr. on the H_2O bath. After standing 1 hr. wash the Mn ppt. with warm H_2O containing NH_4OH , decant and filter; ppt. Zn from the filtrate with Na_2CO_3 . For the sepn. of Mn, Cr and Zn add 1 cc. conc. HNO_3 to the soln. of the salts (in 200-300 cc. vol.), then add 2 g. $(\text{NH}_4)_2\text{S}_2\text{O}_8$, heat until yellow coloration ensues and allow to cool; pour the soln. into a mixt. of 50 cc. 10% NH_4Cl soln., 75 cc. NH_4OH and 75 cc. H_2O_2 and warm on H_2O bath until Mn is completely pptd. Decant and filter as above, add several drops H_2O_2 to the filtrate, evap. to dryness, redissolve in H_2O , add 20 cc. NH_4Cl soln., ppt. Cr with NH_4OH at b. temp. and ppt. Zn in the hot filtrate with Na_2CO_3 . For the sepn. of Fe and Cr (the Jannasch method is not reliable) acidify with HNO_3 (as in sepn. of Cr and Mn), add $(\text{NH}_4)_2\text{S}_2\text{O}_8$ (to transform Cr to the chromate form) and ppt. Fe with NH_4OH ; the sepn. of Cr and Al may be effected in the same manner. For the sepn. of Fe, Al, Cr, Mn and Zn acidify the soln. of the salts (in 200-300 cc. vol.) with HNO_3 , add 2 g. crystd. $(\text{NH}_4)_2\text{S}_2\text{O}_8$ and warm until Cr is completely oxidized; pour the cold soln. into a mixt. of 25 cc. 10% NH_4Cl soln., 75 cc. conc. H_2O_2 and an excess of NH_4OH , warm until $\text{Fe}(\text{OH})_3$, $\text{Al}(\text{OH})_3$ and $\text{Mn}(\text{OH})_2$ are completely pptd., wash the ppt. with dil. NH_4OH , decant and filter. Heat the hydroxides in a Pt crucible with 3 g. Na_2CO_3 and 3 g. KNO_3 until quiet fusion is effected, repeat the operation with 2 g. each of Na_2CO_3 and KNO_3 , dissolve the melt in H_2O and filter the aluminate and manganate from the insol. Fe oxide; dissolve the traces of the latter attached to the Pt with HCl and ppt. with NH_4OH . Transform the manganate into the manganous salt by acidification and addition of a small amt. of H_2O_2 , render the soln. strongly alk. with NaOH , ppt. Mn with H_2O_2 and ppt. Al with NH_4OH in the acidified filtrate. The filtrate from the 1st pptn. contains Cr and Zn; evap. the acid soln., add H_2O_2 and dissolve in H_2O with addition of NH_4Cl . Ppt. Cr with NH_4OH and then ppt. Zn in the filtrate with Na_2CO_3 .

H. S. PAINE.

Analysis of ferro-chrome. H. SCHILLING. Baildonhütte. *Chem. Ztg.* 39, 466 (1915).—An improvement of Knorre's method. To 0.5 g. ferro-chrome in a small covered beaker add 10 cc. H_2SO_4 (1.84), then cold, distd. H_2O , drop by drop, till the max. reaction occurs (about 10 cc. H_2O is required). When the violent reaction is over add 2 drops HF and warm gently till soln. is complete; then follow Knorre's method. If a detn. of Si is desired, evap. the H_2SO_4 soln., without adding HF , till SO_3 just begins to come off, cool, dil. with H_2O , filter and weigh the SiO_2 (which contains some Cr), treat with HF and weigh again. All other constituents are detd. in the usual way, after oxidation.

J. H. MOORE.

Determination of ferrous iron in silicates by titration with dichromate. O. I. BARNBEY. *J. Am. Chem. Soc.* 37, 1829-35 (1915).—Fe cannot be titrated with $\text{K}_2\text{Cr}_2\text{O}_7$ in the presence of HF ; the addition of H_3BO_3 removes HF by forming HBF_4 . The indicator color appears slowly in the presence of fluorides, and the slowness increases with increasing quantities of $\text{K}_2\text{Cr}_2\text{O}_7$. Expts. showed that the sensitiveness of the ferri-

cyanide test decreases with increasing concn. of acid, whether HCl or HF, but that HF is much worse than HCl in concealing Fe. The sensitiveness of the test is reduced from 1 in a million in the absence of HF to 1 in 14000 in the presence of 2.5 N HF. Small amts. of Fe can be titrated accurately in the presence of even 2.5 N HF if H_3BO_3 be added. Addition of $FeCl_3$ to the $K_3Fe(CN)_6$ on the spot plate increases the sensitiveness of the test in the presence of large amts. of HCl. (In an added note B. suggests the use of acetone as a drying agent in glassware, in place of alc. and Et_2O , since the acetone is easily removed by a current of air.)

E. B. MILLARD.

The separation of potassium and sodium by the use of aniline perchlorate, and the subsequent estimation of the sodium. D. U. HILL. Yale. *Am. J. Sci.* 40, 75-7 (1915).—Pptn. of NaCl from EtOH soln. by HCl, after removal of K as $KClO_4$, gives results about 1% low. Substitution of aniline perchlorate for $HClO_4$ as a pptnt. of K was also tried but results were low. Prepn. of aniline perchlorate by evapn. of NH_4ClO_4 with aniline was not satisfactory, the decompn. being slow and the product dark colored. The best method of prepn. is to prepare $HClO_4$ by Willard's method, add aniline in slight excess to a H_2O soln. of the acid, then boil until the excess aniline is removed.

GEORGE W. MOREY.

New method for the iodometric estimation of thiocyanic acid and of hydrogen sulfide. F. P. TREADWELL AND C. MAYR. Zürich. *Z. anorg. allgem. Chem.* 92, 127-34 (1915).—The method is based on the use of Br, liberated by the action of acid on $KBrO_3$ and HBr, as an oxidizing agent, and the titration of the excess Br in the usual manner. For the detn. of HCNS, either alone or in the presence of HCl or HBr, but with HI absent, place 5 or 10 cc. of a 0.2 N soln. in a stoppered 1 l. flask, add 50 cc. 0.2 N $KBrO_3$ soln. and 10-15 cc. 10% KBr soln., evacuate the flask under a water pump, and add concd. HCl through a dropping funnel until the vol. of liquid is increased one-third. Then let the flask stand 10-15 min., add concd. KI soln. through the dropping funnel, and titrate the soln. with $Na_2S_2O_3$, using starch. In case both HCNS and HCl (or HBr) are to be detd., det. the HCNS as above, and $HCNS + HCl$ (or HBr) by the Volhard method; then the latter can be calcd. In the titration of H_2S by the above method the S is completely oxidized to H_2SO_4 , instead of to S as is the case when titrating with I, making the former method 4 times as sensitive as the latter; the actual operation is carried out as described above. When both HCNS and H_2S are to be detd., det. the total S in one portion by the $KBrO_3$ -KBr method, the H_2S by titration with I in the usual manner; then the HCNS can be calc. Results given are good.

GEORGE W. MOREY.

An improved method for the detection of cobalt by means of α -nitroso- β -naphthol. F. W. ATTACK. *J. Soc. Chem. Ind.* 34, 641-3 (1915).—The test for Co by means of α -nitroso- β -naphthol is greatly increased in delicacy by the use of the Na salt, instead of the oxime in EtOH soln. The reagent is prepd. by boiling 0.1 g. α -nitroso- β -naphthol with 20 cc. H_2O to which has been added 1 cc. dil. NaOH, filtering, and diluting to 200 cc.; the soln. so prepd. is stable over a year. To test for Co add 1 cc. NH_4Cl [strength not given.—ABSTR.] and then 1 cc. of the reagent to the soln. to be tested; an orange to red coloration or a red ppt., unaffected by the addition of dil. H_2SO_4 , indicates Co. 0.001 mg. Co in 1 cc. soln. can be detected by this reagent. The coloration due to Ni, Fe^{+++} , etc., is destroyed by the H_2SO_4 , and Mn, Zn, tartaric acid or citric acids do not interfere. Large amts. of Ni must be removed.

GEORGE W. MOREY.

Determination of chlorine in vegetable matter. D. J. DE JONG. Gröningen. *Chem. Weekblad* 12, 592-4 (1915).—Wet the sample (10-15 g.) with 10 cc. of 10% Na_2CO_3 soln., then ignite, and det. the Cl in the melt.

GEORGE W. MOREY.

Brit., 6,767, Mar. 17, 1914. SIEMENS & HALSKE AKT.-GES. Addition to 28,943, 1912 (C. A. 8, 1890). **Gas analysis.** In the process of the principal patent, the relative proportions of gases present in a gaseous mixt. of known constituents are detd. by a comparison in a single instrument of the pressure differences produced by centrifugal blowers, etc., working under the same conditions in the gaseous mixt. and in the standard gas. In the present modification, the pressure difference produced in the standard gas is automatically maintained at a constant value independent of changes of temp. and pressure, the proportion of gases in the gas mixt. being still shown by the reading of a single instrument.

8. MINERALOGICAL AND GEOLOGICAL CHEMISTRY.

EDGAR T. WHERRY.

The melting and boiling points of metalloid-sulfide, selenide, and telluride minerals. L. H. BORGSTRÖM. Helsingfors. *Öfvers. Finska Vetensk. Soc. Förh. (A)* 57, No. 24, 13 pp. (1914-5).—The usual methods of detg. mineral m. ps. have certain disadvantages, and to overcome these B. has introduced a procedure corresponding to that used in organic chem., namely, the placing of a minute amt. of the mineral in a capillary tube and heating in a liquid the temp. of which can be observed. The liquids used for this purpose were, for temps. of 220–450°, 55 pts. $\text{NaNO}_3 + 45 \text{ KNO}_3$; 380–650°, 3 $\text{KCl} + 1 \text{ LiCl}$; 630–850°, 7 $\text{Na}_2\text{SO}_4 + 3 \text{ NaCl}$; and above 810°, pure NaCl . The temps. were measured with a Pt-PtRh thermoelement, which, it was found, could be safely introduced into the bath without any protecting casing, thereby increasing the accuracy of the method. By watching the samples closely as the heat increases, the m. p. can in most cases be readily detd. Since the amt. of air in the capillary is very small, even easily oxidizable minerals can be thus examd. The behavior of the 7 minerals studied is described in detail, and the most satisfactory values for the m. ps. given as: realgar 310, orpiment 320, kermesite 517, stibnite 546, tetradymite 600, guanajuatite 690, and bismuthinite 718°; the b. ps. for the first 3 as 589, 690 and 990°, respectively. The limits of accuracy of these detns. would appear to be about $\pm 5^\circ$. The occurrence of these minerals is then discussed, and by tabulating their m. ps. and modes of occurrence it is shown that in a general way those with the lowest m. ps. form under conditions of low temp. and pressure, near the surface of the earth, while the higher the m. p. becomes the more the mineral is found in deep-seated rocks.

E. T. W.

Study of the relations existing between the chemical, optical and other physical properties of the members of the garnet group. W. E. FORD. New Haven. *Am. J. Sci.* 40, 33-49 (1915).—From the literature selected analyses of 23 garnet minerals, in which the n and in most cases the sp. gr. had been observed, were tabulated. Mol. ratios were obtained from each analysis; the discrepancies between these numbers and theory were averaged and from these new values the analyses were recalcd. and reduced to a 100% summation. From these modified analyses the % of the mols. corresponding to the different garnets were derived. In addition all the available garnet analyses were collected and, after the elimination of those of unusual comp., about 200 were studied with reference to their content of the 5 common members of the group (pyrope, grossularite, spessartite, almandite, and andradite). It was found that about 15% contained 4 or more isomorphous mols.; the remaining 85% contained 2, or more frequently 3, which made up more than 95% of the total comp. This study showed that in any given series formed by the mixt. of 3 garnet mols., 2 predominate, the third mol. being present in very subordinate amts. Analyses of 64 garnets were studied to learn the relations between comp. and sp. gr. using the following sp. gr. values for the component mols.: pyrope 3.51, grossularite 3.53, andradite 3.75, spessartite 4.18,

almandite 4.25. The results of this study are shown by 9 figures of equilateral triangle plotting. It appears to be established that the n and the sp. gr. of any garnet depend in a direct and simple way upon its chem. comp. "Having given these physical constants, and knowing from qual. tests the predominant mols. present, it should be possible in the majority of cases to predict within reasonable limits the comp. of the mineral." The relationships between sp. gr., n and mol. wt. seem fairly constant until the andradite mol. becomes prominent; this causes a distinct break in the continuity of these relations. It is noted that andradite has the highest mol. wt. of all the garnets. While the relationship between sp. gr. and index of refraction (n) is often a reasonably definite one, there are apparent exceptions which at present do not admit of explanation. L. W. R.

Remarkable contact-metamorphic phenomena of the granite of Madagascar (imerinite). A. LACROIX. *Compt. rend.* 160, 724-9(1915).—The observations refer to a locality east of the middle of the island, in the province of Imerina. The ribbon-like limestone, resembling marble, instead of including diopside, tremolite or actinolite (which are common in that region) as the principal metamorphic mineral, contains an abundance of a new type of amphibole, which L. names *imerinite*, and which has the comp.: SiO_2 53.73, TiO_2 0.41, Al_2O_3 2.72, Fe_2O_3 4.72, FeO 4.70, MgO 20.60, CaO 2.73, Na_2O 7.42, K_2O 1.82, H_2O 0.85, F 0.92, sum 100.62%. While its chem. comp. allies it to the richterites and glaucophanes, in its optical characters it resembles the rhodusites, being distinguished from the latter chemically by its low sesquioxide content. *Imerinite* forms clear, dark blue crystals 2 cm. in length, or fibrous lavender-blue masses; it constitutes the local amphibolites, including always a little calcite. On the borders of the limestone the imerinite is associated with fine lamellas of microcline, albite, quartz grains and with amphibolic needles throughout the mass. There is also present monazite, which would not be expected under these conditions, accompanied by celestite. Analysis of the monazite (by Pisani) gave: P_2O_5 30.18, ThO_2 1.05, Ce_2O_3 39.51, $(\text{LaDi})_2\text{O}_3$ 27.80, Fe_2O_3 0.92, CaO 0.46, loss on ignition 0.47, total 100.39%; sp. gr. = 5.25. This monazite is unusual in the low Th content. The metamorphism at contact with granite is discussed at length, mainly from a petrographic point of view. L. W. RIGGS.

Identity of calciocancrinite and meionite. L. H. BORGSTRÖM. Helsingfors. *Öfvers. Finska Vetensk. Soc. Förh.* (A) 57, No. 6, 3 pp.(1914-5).—The mineral discovered by Lemberg in 1876 and named calciocancrinite (Kalkcancrinitt) has been regarded as "a combination of anorthite with CaCO_3 " and as a typical member of the cancrinite group. Recent studies by B. (C. A. 9, 189) having shown that meionite is also a combination of anorthite and CaCO_3 , the nature of Lemberg's material has been reconsidered. The 2 are found to agree closely in properties and comp., analyses of both conforming essentially to the same formula, $\text{CaCO}_3 \cdot \text{CaAl}_2\text{Si}_2\text{O}_8$; they are, therefore, evidently identical.

E. T. W.

Two minerals from Baveno containing rare earths: weibyeite and bazzite. E. E. ARTINI. *Atti accad. Lincei* 24, I, 313-9(1915).—A. has identified weibyeite, a Ce carbonate, by its cryst. form, in the granite of Baveno. In addition a very rare, hitherto unknown, mineral was obtained from the same source. This mineral appears as very small blue hexagonal prisms, which are uniaxial with strong double refraction. The main ns . were detd. in a mixt. of monobromonaphthaline and vaseline; for the Na line, the internal nucleus had $\epsilon = 1.608$, $\omega = 1.626$, the external zone $\epsilon = 1.602$, $\omega = 1.623$. The mineral is strongly pleochroic; intense sky blue to pale green. It is unattacked by acids (except HF). Fused with Na_2CO_3 and taken up with HCl the main constituent was found to be SiO_2 ; NH_4OH ppts. $\text{Fe}(\text{OH})_3$ and a white ppt. of the hydroxides of the rare earths, which because of the small amt. available was examd. microchemically. With oxalic acid, crystals identified as Sc oxalate were obtained. The mineral is,

therefore, a Sc silicate, containing some other rare earths, possibly Ce, some Fe and a little Na. The mineral is called *bazzite*, after its discoverer. E. J. WITZEMANN.

Cataclase in meteoric iron. S. MEUNIER. *Compt. rend.* 160, 736-9(1915).

L. W. RIGGS.

The composition and structure of the Indarch, Russia, meteoric stone. GEORGE P. MERRILL. U. S. Nat. Mus. *Proc. U. S. Nat. Mus.* 49, 109-12(1915).—This stone, unusual in containing oldhamite and a CO₂-bearing mineral, perhaps breunnerite, has the total comp.: SiO₂ 35.699, Al₂O₃ 1.969, FeO 25.790, MnO 0.130, NiO 0.549, CoO 0.049, CaO 1.160, MgO 16.920, CO₂ 0.271, P₂O₅ 0.520, H₂O 2.799, Fe 10.400, Ni 0.949, Co 0.020, P 0.092, Mn 0.119, C 0.310, S 5.100, less O = S 2.540, sum 100.306. No Ba, Sr, or Zr could be detected; the sp. gr. = 3.42 and the mineral comp., detd. by combining results of microscopic exam. and the analysis is: enstatite 74.42, metal 11.50, troilite 13.296, oldhamite 0.596, graphite 0.310, sum 100.122%. Attention is called to the occurrence of oldhamite in stones of a wide range of comp. (cf. C. A. 9, 2208).

E. T. W.

The spark spectrum of N'Kandhla meteorite and of other meteoric irons. JOSEPH LUNT. *S. African J. Sci.* 11, 243-52(1915).—A spectrographic exam. supplementing the chem. exam. by Stanley (*Rept. S. African Assoc. Adv. Sci.* 10, 105; also C. A. 7, 2534) is described.

J. H. BOWER.

The formation and distribution of bog iron-ore deposits. C. L. DAKE. Rolla, Mo. *Bull. Am. Inst. Mining Eng.* 1915, 1429-36; cf. C. A. 9, 13.—These ores originate from natural ferrous salts or ferric salts reduced by organic matter, which are dissolved and carried to bogs where they ppt., either by oxidation, by loss of CO₂, or by bacterial action. They consist essentially of limonite with subordinate amts. of carbonate, are usually high in P and preserve abundant fossil plant fragments. They are widely distributed but occur chiefly in the colder temperate regions within the glaciated area, probably because there the swamps are more numerous and are of small size and so allow greater conc. of "chalybeate" waters. Furthermore, glacial soils contain much available Fe.

H. L. OLIN.

Additional data on origin of lateritic iron ores of eastern Cuba. C. K. LERTH AND W. J. MEAD. *Bull. Am. Inst. Mining Eng.* 1915, 1377-80; cf. C. A. 5, 1891.—Results of analyses of 29 samples grading from the unaltered serpentine rock to the lateritic ores above are given. Starting with the bed rock, MgO and SiO₂ are lost rapidly; Al₂O₃, Fe and Cr increase in % with the loss of SiO₂ and MgO. Fe reaches const. max. % at the same depth that SiO₂ reaches its min. %. The marked loss of Ni and Co during the formation of the ore suggests the possibility of secondary downward conc. of these metals.

H. L. OLIN.

The Mayari iron-ore deposits, Cuba. JAMES F. KEMP. *Bull. Am. Inst. Mining Eng.* 1915, 1461-2; cf. C. A. 9, 903.—In this postscript K. corrects his previous statement that the ores contain no fossils, having found on closer exam. a small foraminifer (*Orbitoides*) probably an Oligocene form.

H. L. OLIN.

Origin of thick gypsum and salt deposits. E. B. BRANSON. *Bull. Geol. Soc. Am.* 26, 231-42(1915).—The theory proposed is a modification of the "bar" theory, consisting in supplying the basins with highly conc. waters instead of normal sea water. In the drying up of a large interior sea the waters might come to lie in separate basins if the bottom were uneven. Assuming that isolated basins were formed, separated by low barriers, and that the main streams emptied into the marginal basins, the inflow might be sufficient to cause these basins to overflow and supply the inner basins, that had no direct stream connection, with highly charged waters as fast as their own waters evaporated. With the high conc., life would have ceased to exist in the supplying basins

before gypsum deposited and no fossils would be present. The filling up of the outer basins with sediments would cause more water to flow over to the inner basins, and this fresher water might entirely stop the gypsum deposition by causing the inner basins to overflow, and would also prevent any salt from being deposited. W. F. HUNT.

Oil, gas, and water content of Dakota sand in Canada and United States. L. G. HUNTLEY. *Bull. Am. Inst. Mining Eng.* 1915, 1333-53.—H. discusses the age and nature of deposition of Dakota sand, its lithologic character, the extent of its outcrop in Canada, the tar sands and production of oil (including analysis), the presence of gas, salt water and fresh water, the structure, pressures and geological history. The following summary is given: (1) In general, on account of the very uniform character and thickness of the Dakota sand over wide areas, it is not believed to be a prospect horizon of the first class for the development of oil production except in certain limited districts. (2) In Canada it is believed that the most favorable areas for the development of oil production in this sand will be found in the region where it begins to play out and become discontinuous and lenticular in its nature. This is the case in the oil pools of Wyoming producing from it and points to certain parts of Montana as worthy of prospecting. (3) While not a prospect of the first order, the testing of the Battle River anticline for oil in the Dakota is distinctly worth while. This anticline is for the foregoing reasons, more favorable for gas in this sand; and oil should be looked for, if at all, in the more laterally restricted sands occurring in the Benton or Niobrara, or higher. (4) The chances for the development of oil production in the formations lying below the Dakota in western Canada are not of the first class from the com. standpoint. (5) Where structural and other conditions are favorable for the conc. of oil, the relatively lenticular sand bodies above the Dakota, particularly the Benton and Niobrara, are more promising for the development of production than is the Dakota sand itself (except in the regions noted). J. H. BOWER.

The possible occurrence of oil and gas fields in Washington. CHARLES E. WEAVER. *Bull. Am. Inst. Mining Eng.* 1915, 1419-21.—From the geological conditions known to exist in the Cascade Mts. and in eastern Wash. the chances for the occurrences of petroleum are unfavorable. The Eocene formations in the Puget Sound Basin were laid down under conditions which would not allow the accumulation of organic matter, while the overlying Miocene strata, which were involved in a great anticlinal fold, have been so eroded that any oil deposits that may have existed must have been destroyed. The Jurassic of the western side of the Olympic peninsula presents possibilities. H. L. OLIN.

Obsidian from Hrafninnuhryggur, Iceland; its lithophysae and surface markings. FRED. E. WRIGHT. *Bull. Geol. Soc. Am.* 26, 255-86(1915).—The obsidian varies from a dense black glass to a rock approaching pumice. The glass has $n =$ about 1.500 and $d = 2.387$. It contains numerous minute crystallites of a colorless prismatic mineral. The analysis corresponds to that of a normal rhyolitic obsidian and includes 0.27% H_2O , 0.13% Cl, and 0.07% SO_3 . The release of these volatile components in the magma was largely responsible for the formation of the lithophysae, while the character of the physico-chem. system thus produced caused the simultaneous formation of crystals of fayalite and tridymite at relatively low temps. Hot circulating solns. acting on the more porous and exposed portions of the obsidian have produced some alunite, hyalite, and etched surfaces which resemble moldavitic markings. W. F. HUNT.

A new gypsum-bearing deposit in Senigallia. C. AGOSTINELLI. *Univ. Pavia. Rass. min.* 42, 101-3(1915).—On the extreme western declivity of Monte d'Oro is found a blue-grayish marl in regular strata 10-40 cm. thick, and further up an extremely friable, clayey-sandy, yellowish material in barely perceptible and almost horizontal strata. The blue marl is quite compact, mixed here and there with very fine, sky-blue

clay, occasional particles of quartz sand and very numerous crystals of gypsum, together with a few nodules of S. Comp. of the blue marl: H_2O 22.25, CO_2 1.22, SiO_2 1.61, SO_2 42.54, free S 0.11, Fe_2O_3 0.81, Al_2O_3 0.22, CaO 30.81, MgO 0.48%; of the yellowish marl: H_2O 7.30, CO_2 11.14, SiO_2 37.44, SO_2 1.34, P_2O_5 0.87, Fe_2O_3 20.92, Al_2O_3 0.98, CaO 9.32, MgO 3.14, free S 0.06, K_2O 4.38, Na_2O 3.14%. C. A. ROULLIER.

Report on some carbonic acid tests on the weathering of marbles and limestones. GEORGE P. MERRILL. U. S. Nat. Mus. *Proc. U. S. Nat. Mus.* 49, 347-9(1915).—Cubes of various samples about an inch in diam. were rubbed smooth with emery flour, weighed, and suspended in H_2O through which a slow current of CO_2 passed. After 3 months they were weighed and examd. for changes. The smallest amt. lost was 0.0009%, by marble from Cockeysville, Md.; the largest 0.050%, by oolitic limestone from Salem, Indiana. From a practical point of view, however, the amount of material lost is not as important as the manner in which loss occurs. In some stones the whole surface is dissolved uniformly; others become roughened, granules being loosened; in others, small interstitial crystals dissolve out, leaving the larger grains in relief; while in oolitic rocks the oolites are eaten out, although their shape may be retained by insol. impurities. Tables of the results with 19 different rocks are given. E. T. W.

Clay and shale deposits of Quebec (KEELE) 19.

9. METALLURGY AND METALLOGRAPHY.

WILLIAM BRADY, WILLIAM T. HALL.

Progress in metallurgy. JAMES DOUGLAS. *Bull. Am. Inst. Mining Eng.* 1915, 763-6.—A brief address. E. J. C.

The consulting metallurgist and metallurgical investigations. W. B. BLYTH. *Proc. Australasian Inst. Mining Eng.* 16, 403-38(1914).—B. discusses the difficulty of making correct comparison between the results obtained from the exam. of small parcels of Au ore and the results expected from the continuous working of large plants on the same ore. A description of the many varying factors which influence treatment in Au metallurgy in western Australia is given, including hardness of ores, roasting, amalgamation, leaching, slime settlement and vacuum filter capacity. Charts and curves are given. WEBBERT.

Precipitating action of carbon in cyanide solutions. O. C. RALSTON. *Mining Sci. Press* 111, 77-8(1915).—Discussion of article by W. R. Feldtmann (cf. C. A. 9, 1891). R. explains certain facts already known about charcoal, which in conjunction with colloid-chem. principles further support Feldtmann's work in explaining the pptn. of Au on charcoal. L. A. TOUZALIN.

Metallurgy (of vanadium) at the Primos Chemical Co.'s plant. ANON. *Mining Eng. World* 43, 105-6(1915).—A description of the practice at Vanadium, Colo. The ore, a soln. of roscoelite in sandstone, contains 1 to 3% of V. A charge of 1500 lbs. of ore, 90 lbs. of NaCl and 30 lbs. of FeS, ground to pass a 30-mesh screen, is roasted in a McDougal and a Wedge roaster, both fired by oil. The ore from these roasters is cooled and discharged into a launder containing a weak soln. of Na_2VO_4 , and is then carried to the leaching vats. These vats are of steel with a flat bottom and have a canvas or cacao matting filter. There are 5 vats, each 100 tons capacity; they are filled in 18-22 hrs. and the usual practice is to have one filling, one empty in reserve, one being discharged, and 2 leaching. The strong soln. containing 6 to 12 g. of V per l. draining off from the tank being filled, passes to a sump tank, from which it is pumped into steel storage tanks for cooling and further treatment. The weak soln. from the 2 tanks being leached passes to another sump tank. Both of these sump tanks overflow when nearly

full into a third sump; the soln. in the latter is pumped into the launder carrying the ore from the conveyor to the leaching vats. This soln. is kept weak by adding H_2O when necessary and varies from 1.5 to 4 g. per l. By keeping this soln. at about 4 g. under normal conditions the strong soln. delivered to the storage tanks will average 7 to 8 g. This is best strength for pptg. the V. The vats are leached with hot H_2O from the roasters at the rate of 3.5 ft. per hr. About 36 hrs. are required to leach a vat and when the soln. draining from a vat shows less than 0.1 g. of V per l. the vat is discharged. The 5 mill storage tanks are filled in rotation: one filling, 3 cooling, and one being transferred. Cooling renders pptn. of V more complete and is effected by an air jet extending down into the tank at the center and discharging at the bottom. Av. capacity of tanks = 60 tons. The cool soln. is transferred to 3 pptn. tanks (50 tons capacity each) in rotation: one filling, one in process of pptn., and one discharging. The soln. is agitated by air to prevent the ppt. from settling. Pptn. is effected with $FeSO_4$, theory requiring 2 lbs. of $FeSO_4$ to ppt. 1 lb. of V; in practice 2.5-2.7 lbs. of $FeSO_4$ are required. The soln. is agitated with air and the $FeSO_4$ soln. pumped in at the center of the steel tanks with cone-shaped bottoms. The $FeSO_4$ soln. is made up of 2.5-4 tons of H_2O to 1 ton of $FeSO_4$, and 50 lbs. of soda added. After adding the calcd. amt. of $FeSO_4$, the ppt. is agitated for 1 hr. and then a sample drawn, filtered and filtrate acidified with H_2SO_4 and tested with $K_4Fe(CN)_6$. The Fe should be present in decided excess, as 4 to 6 hrs. (with agitation) are necessary to complete the pptn., with a minimum ppt. of Ca. 0.15-0.2 g. V remain unptd. The mixt. is drawn off by gravity to 2 sets of monteius each of 14 tons capacity; air is passed in at 30-40 lbs. pressure and the soln. forced through 2 Kelley presses. It requires 1-1.5 hrs. for a cake 0.5-0.75 in. to form on the filter leaves. This is washed 30 min. with H_2O and then discharged into a hopper. The cake is a slimy, black mud, and is carried out of the hopper by a screw conveyor to a Ruggles-Coles drier fired by oil. The discharge from the drier is granular and brown in color and is shipped to the refinery.

F. W. SMITHER.

Flotation at Inspiration Mine, Arizona. ANON. *Mining Sci. Press* 111, 7-10 (1915).—A description of the equipment and methods of flotation exptd. with and used in actual practice at the above mine. A flow sheet is appended. L. A. TOUZALIN.

Arizona Copper Co.'s Dorr thickener. DAVID COLE. *Eng. Mining J.* 100, 132-4 (1915).—An illustrated description of the largest Dorr thickener ever constructed. It is 130 ft. in diam. and is used with entire success to recover water from the tailings of the concg. mill.

E. J. C.

Recovery of mercury from amalgamation tailing, Buffalo Mines, Cobalt. E. B. THORNHILL. *Bull. Am. Inst. Mining Eng.* 1915, 1653-7; *Mining Sci. Press* 111, 211-2 (1915); see C. A. 9, 1740.

E. J. C.

Some properties of thallium-lead alloys. LUIGI ROLLA. Univ. Genoa. *Gazz. chim. ital.* 45, I, 185-91 (1915).—Rurnakow (*Z. anorg. Chem.* 52, 430; 64, 149; 83, 200; 88, 109) showed that in some cases a max. p. on the fusion diagram of a binary system does not correspond to a particular point on the curve of physical properties. Thus in the system Pb-Tl thermal analysis and the micrographic method have shown the presence of an α phase (up to 6.5% Pb) that has the cryst. form of Tl and a β -phase (24.7-100% Pb) that crystallizes in octahedra of the regular system. This branch of the thermal curve rises quickly to the max. which does not represent a simple stoichiometric ratio of Pb and Tl. This abnormal behavior has caused R. to study the physical properties of this alloy and especially the β -phase. In its thermoelec. properties the β -phase is abnormal. It is formed from the components without any change in vol. It is exothermic which argues for the possibility of the formation of true chem. compds. in nonstoichiometric proportions. That is, such a compd. would have

continually varying properties like a soln. R. points out the importance of the definition in these cases and suggests the extension of the ideas of Tammann (*C. A.* 8, 2091).

E. J. WITZEMANN.

Sound steel ingots. ROBERT A. HADFIELD AND GEORGE K. BURGESS. *Engineering* 99, 538-43(1915); see *C. A.* 9, 778, 1168. W. T. HALL.

Sound steel for rails and structural purposes. ROBERT A. HADFIELD. *J. Frank. Inst.* 99, 663-80(1915); see *C. A.* 9, 778, 1168. W. T. HALL.

Heat treatment of low-carbon steel. JOHN LUND. Ordnance Dept. U. S. Army. *Am. Machinist* 42, 505-6(1915).—To show how the microscope enables one to tell very closely what the heat treatment of a steel has been, photomicrographs of a steel containing 0.39% C, 0.28% Si, 0.05% S, 0.04% P and 0.83% Mn are shown both before and after various heat treatments. W. T. HALL.

The change in the elasticity of a mild steel wire with current and external heating. H. L. DODGE. *Phys. Rev.* 5, 373-84(1915).—The wire studied contained 0.06 Si, 0.06 S, 0.11 P, 0.74 Mn, 0.16 C and 98.88% Fe. At first the specimen showed very erratic changes in elasticity on being heated but by continual heating and stretching it was brought to a steady elastic state in which Young's modulus becomes a function of the temp. This was secured first for a temp. range of 20-300° and later up to 475°. Continued heating and stretching gradually increased the modulus but, except for this small and gradual increase, the modulus of the wire was independent of its history, the thermal route by which the temp. was reached having no effect. Heating by an elec. current had no effect other than that of changing the temp. The Young's modulus $\times 10^{-1}$ dynes per sq. cm. was 19.3 at 20° and decreased quite steadily until it reached the value 18.0 at 300°. At 475° the value had decreased to 13.8. W. T. H.

Shell manufacture in a general engineering plant. ANON. *Engineering* 99, 685-6(1915).—The shells are received at the plant in the form of rough forgings. The operations of milling and boring, the heat treatment, the final assembly and the method of testing are described. W. T. H.

The detection of burning in steel. J. E. STEAD. *Engineering* 99, 714-5(1915).—A paper read before the Iron and Steel Inst. The burning of steel, or heating to a temp. such that the steel cannot be rolled or forged without breaking, is coincident with incipient fusion. The part of the metal which melts first is that part which solidified last and is usually rich in P. It is sometimes hard to tell whether the steel is burnt or is merely red-short. It was formerly thought that O from the air caused the trouble but this is not true; the oxide found between the crystals after the metal has broken up is caused by the rush of air which enters the open fissures. Burnt steel can readily be detected when the metal has cooled down for the phosphorized portions are located either in globules or as an envelope around the crystals. If burnt steel is allowed to cool thoroughly and is then reheated to the proper temp., the metal becomes suitable for use. To det. whether a sample is burnt or merely red-short, it is necessary to select a portion of the metal which is free from cracks and etch a polished section with the CuCl_2 soln. to be described in the following abstract. If the metal is free from globular specks, rich in P, the metal is red-short; otherwise it is burnt. W. T. H.

Iron, carbon and phosphorus. J. L. STEAD. *Engineering* 99, 569-72, 611-3, 637-41(1915); illus.—A paper read before the Iron and Steel Inst. It contains a review of all the recent work on the subject and a bibliography of 58 articles together with a statement of exptl. evidence which helps to explain the behavior of P in Fe alloys. A new etching agent is described; it is composed of 10 g. CuCl_2 , 40 g. MgCl_2 , 20 cc. HCl and alc. to make one liter. A thin layer of this liquid is poured upon the polished specimen and allowed to remain there about 1 min. It is not permissible to immerse

the specimen in the etching liquid. The liquid is shaken off the metal and the process is repeated as many times as seems necessary. The surface of the metal is then washed with a little hot water and with CH_3OH which is shaken off and the remainder allowed to evaporate. Cu is deposited first on the portion of the metal containing the least P; the reaction is so sensitive that differences of less than 0.01% can be detected and all irregularities in the distribution of P in wrought Fe or steel can be detected. This behavior, however, is not peculiar to P alone, as it will be shown by any other metal or nonmetal of eutectiferous nature which tends to form conjugate solutions that separate into parts containing different amounts of the element. The reagent is extremely valuable for detecting local differences in the chemical composition of a material. When a large mass of an alloy containing Fe, C and P solidifies, Fe-C separates and, if given opportunity, decomposes somewhat into Fe and graphite before the Fe-C-P eutectic solidifies. This causes considerable internal pressure which tends to squeeze out the still molten Fe-C-P eutectic. In this way is explained the formation of blast furnace *bears* in which the greater part of the P has been eliminated and the residual P is present as uniformly diffused solid solution. The ghost lines so often found in ship and boiler plate have been reproduced synthetically from soft Fe and powdered Fe-C-P eutectic. These ghost lines are evidently composed of material which is richer in P than the surrounding portions. Such parts are the last to carburize on reheating and the first to give up C on cooling. When a C-steel casting contains parts that are richer in P than other parts and the steel is reheated to refine it, the parts richer in P will usually tend to form small crystals and the lower the P content the larger will be the crystals. This is because the primary crystallites, during their development in the more phosphorized steel, are purer than the remaining liquid which precedes them in the mold. The liquid, as these crystallites form, becomes more concentrated and its freezing point is lowered and admits the growth of more new crystallites beyond the impure liquid and these also eventually become surrounded by liquid of lower freezing point than that of the primary crystallites beyond them. This process is repeated again and again until finally the whole mass is solid. When the P content is low, the primary crystallites continue to grow unchecked for a longer distance and larger crystals result. As a general rule, the distribution of P in wrought Fe and in steel is likely to be far from uniform.

W. T. HALL.

The action of dilute solutions of acids, alkalies and salts upon certain metals. A. J. HALE AND H. S. FOSTER. *J. Soc. Chem. Ind.* 34, 464(1915).—Cleaned and polished pieces of metal 1 sq. dm. in size were immersed for 7 days in 0.5 l. of solution renewed every day, for 28 days in 1 l. not renewed, and for 4 hrs. in 0.2 N acid and the loss in weight determined. The metals studied were commercial Zn, cast Fe, wrought Fe, Al, Pb, Cu, Sn, and Ni; the solvents tested were dilute solutions of HNO_3 , HCl , H_2SO_4 , MgCl_2 , NaOH , CaCl_2 , NaCl , NH_4OH and Na_2CO_3 .

W. T. H.

The preparation of metal specimens for metallographic tests. ANON. *Metal. Chem. Eng.* 13, 400-1(1915).—A description of the Wysor combined grinding and polishing machine which can be obtained from Eimer and Amend.

W. T. H.

German silver. R. A. WOOD. *Metal Ind.* 13, 229-32, 322-3(1915).—A general description of the melting, casting and rolling of this alloy. In England it is now called nickel silver.

W. T. H.

Test pieces for tensile tests. HUGO FRIEDMANN. *Metal Ind.* 13, 247(1915).—An illustrated description of the best shape of flat bars for this test, together with reasons for the same.

W. T. H.

Government bronze specifications. ANON. *Metal Ind.* 13, 273(1915).—Standard specifications for Cu 88, Sn 10 and Zn 2, adopted by the Am. Soc. for Testing Materials, June, 1915.

W. T. H.

Heat treatment of copper and brass. CARLE R. HAYWARD. *Metal Ind.* 13, 275-7(1915); illus.—A general descriptive article. W. T. H.

Fatigue of copper alloys. ERNST JONSON. *Metal Ind.* 13, 283-4(1915).—A report of some expts. instigated by the failure of some material used in the Catskill water supply of New York. The results thus far obtained indicate that prolonged excessive stress does not injure metal when it is protected from corrosion while under stress. Corrosion does not generally injure the metal when unaccompanied by excessive stress. Corrosion accompanied by prolonged stress less than 20,000 lb. per sq. in. does not generally injure the metal. Corrosion by ammonia accompanied by a prolonged stress of 20,000 lb. per sq. in. or more causes cracking similar to season cracking. These results apply to Mn-bronze, Muntz metal and gun metal. No Cu alloy has yet been found to which they do not apply. The ammonia test is used as an accelerated corrosion test. Since all Cu alloys in practical use are exposed to various corrosive agents, cracks are likely to develop whenever such alloys are permanently stressed over 20,000 lb. per sq. in. This stress should be regarded as the practical ultimate strength of Cu alloys in general. Cu alloys should not be used in cases where the stress is indeterminate. They should not be used for important bolts when there is the least occasion for drawing them up very tight. W. T. H.

Are the deformation lines in manganese steel twins or slip bands? H. M. HOWE AND A. G. LEVY. *Bull. Am. Inst. Mining Eng.* 1915, 1467-8.—In a former paper (*C. A.* 9, 1165) it was argued that these deformation lines were slip bands; it is now suggested that the appearance of the polished specimens may be due to a combination of slip bands and twins of 2 orders of magnitude. In the former paper, a reason for the commercial value of Mn-steel was sought in the ease with which it "amorphizes." This is shown by expts. with Brinell hardness; if the load is applied all at once, in the usual way, and the values thus found are compared with those obtained by applying the load gradually, there is nearly 20% increase in the latter case. With American ingot iron, representing nearly pure ferrite, an increase of 37% was obtained but with an eutectoid steel, representing nearly pure pearlite, no such increase was noticed. E. E. BUGBEE.

The superficial deformation of steel quenched from temperatures that are not very high. B. BOGIRCH. *Compt. rend.* 160, 768-71(1915).—The phenomenon in question was first noticed by Zschokke in 1910. The steel used in these new expts. contained 0.11% C, 0.035% Si, 0.014% P and 0.22% Mn. Similar results can probably be obtained with any soft steel. The specimens used were $4 \times 4 \times 1$ cm. in size with a perfectly flat, polished surface. They were heated in a metallic bath for 1.5 hr., the temp. being kept constant during the last 30 min. After the heating, the specimen was at once plunged in water at the lab. temp. in such a way that the surface was wet last. Before the initial polishing of the specimen, it was annealed at 750-800° for 15 min. and cooled slowly. When the sample has been heated to between 225 and 350°, quenching produces a peculiar appearance to the polished surface. Ridges start from the sides of the specimen and tend to unite at a central point which does not, as a rule, coincide with the geometric center. Quenching from a temp. of 215-220° causes the first appearance of such deformation. When quenched from a slightly higher temp., the ridges are transformed into larger bands which are unequally inclined toward the surface of the specimen. At 250-260° secondary centers appear and the bands begin to disappear; at about 300° a confused mass of elevations appears. Above 300° the contour of these elevations begins to disappear and at 350-360° the disappearance is complete. The phenomenon depends upon a number of other factors beside the original temp. If the temp. of the quenching bath is raised, the range of temps. which causes such deformation diminishes; no deformation is obtained by quenching in boiling

water. At each temp. of quenching a special type of deformation corresponds if the above conditions are followed; but, by varying the duration of the heating, any desired type of deformation can be obtained. When once quenched, the metal loses the property of being deformed in this way and it is necessary to anneal before trying another expt. As the size of the surface of the specimen diminishes, the thickness being kept the same, the temp. interval in which the deformation can be caused diminishes and when the surface is only 1 cm. square, the tendency disappears entirely. W. T. H.

Change in density of mild steel strained by compression beyond the yield-point. F. C. LEA AND W. N. THOMAS. *Engineering* 100, 1-3(1915).—Specimens 1.25 in. long and 0.75 in. in diameter were turned from mild steel rolled bars and loaded axially in a 100-ton Riehle testing machine. Before applying any load, the d. of the metal was detd. carefully. The results of a series of expts. show that when steel is stressed below the yield-point the d. increases; when stressed to just a little beyond the yield point the d. is the same as at the start and when stressed far beyond the yield point, the d. becomes less than its original value. If the over-strained sample is allowed to rest, the tendency is to revert back to the original d. As explanation, it is suggested that overstrain probably produces an amorphous form of the material which is less dense than the crystalline form; this amorphous form tends to resume the crystalline form and thus to become more dense in the case of overstrained material. The return to normal d. in the case of overstrained materials can be hastened by heating in boiling water. W. T. H.

The corrosion of iron in aqueous solutions of inorganic salts. J. N. FRIEND AND PETER C. BARNETT. *Chem. Trade J.* 56, 435-6(1915).—Expts. were performed with solns. of $Al_2(SO_4)_3$, $(NH_4)_2SO_4$, $BaCl_2$, $FeSO_4$, $MgCl_2$, $MgSO_4$, $MnSO_4$, KCl , KNO_3 , K_2SO_4 , $NaCl$, $NaNO_3$ and Na_2SO_4 . As a general rule, the corrosive power of the concd. solns. was found to be less than that of pure water. As the temp. rises, the rate of corrosion increases rapidly but, with the exception of $(NH_4)_2SO_4$ solns., the corrosive power does not increase as rapidly as does that of pure H_2O . Probably for every concn. there is some temp. (which in some cases is below 0°) at which the corrosive power of the soln. is equal to that of pure H_2O . Below this temp. the soln. will have greater corrosive power than that of H_2O and above it less. The more dil. the soln. the higher the temp. at which the corrosive power is equal to that of water, and for this reason very small amts. of impurity may cause increased corrosion of boilers. W. T. HALL.

The removal of rust by means of chemical reagents. J. NEWTON FRIEND AND C. W. MARSHALL. *Chem. Trade J.* 56, 436(1915).—It has been claimed that dil. solns. of Na citrate will loosen rust without dissolving any Fe. Expts. with 1, 2, 5, 10 and 20% solns. show that such solns. are not suitable media for the quant. removal of rust. They are also very slow in their action. Solns. of H_3BO_3 of 0.5, 1.0, 1.5, 2.0 and 3.5% were found to clean Fe, the 3.5% soln. (which is satd.) acting the most rapidly. When the rust is once removed the Fe dissolves very slowly in such soln. but the loss is greater than when the rust is removed mechanically. No other reagent was found as useful as the boric acid. W. T. HALL.

The relative corrodibilities of gray cast iron and steel. J. N. FRIEND AND G. W. MARSHALL. *Gas World* 62, 579(1915); cf. *C. A.* 9, 1893.—A mild open-hearth steel analyzing: C 0.21, Si 0.013, Mn 0.49, S 0.026, P 0.053%, and a gray cast Fe analyzing: graphite C 2.75, combined C 0.61, Si 1.72, Mn 0.75, S 0.085, P 1.06%, were used in the test. Tap H_2O and 3% NaCl soln. were used and alternate wet and dry tests, alternate wet and dry and hot and cold tests, alternate hot and cold tests and acid tests were made. *Conclusions:* (1) In the alternate wet and dry tests, whether carried out at room temp. or alternately heated and cooled, the

cast Fe usually had the decided advantage. (2) Complete immersion of the metals in H_2O does not give quite the same results as the alternate wet and dry tests; there is little difference between the Fe and the steel, but if any advantage it appears to lean towards the steel. (3) The cast Fe appears to have a slight advantage over the steel in salt H_2O . (4) In acid solns. the cast Fe was very badly attacked, the steel proving in comparison highly resistant. The variation of the results with time and conc. of acid (H_2SO_4 0.05, 0.5, 5, 10, and 20%) is noteworthy, constituting a remarkable testimony, not merely to the uselessness, but to the actually misleading nature of acid acceleration tests, when used as a rapid means of detg. the general corrodibility of Fe and steel. It is pointed out that no simple answer can be given as to whether cast Fe or steel is the more corrodible unless full details are given as to the nature of the corroding media. The results indicate that the relative corrodibilities of cast Fe and steel bear much the same relation to one another at the present time as in earlier years, despite the alteration in methods of manufacture. F. W. SMITHER.

Freezing point diagram of silver-arsenic alloys. W. HEIKE AND A. LEROUX. Freiberg. *Z. anorg. allgem. Chem.* 92, 119-26(1915).—The components were sealed up in porcelain or "siloxide" flasks; in the bottom of each was a reëntrant tube in which was placed a thermoelement. With mixts. rich in As the flasks were placed inside of porcelain tubes filled with sand and closed at the top. Arsenic melts at 814.5° ; the addition of Ag lowers the m. p. to the eutectic at 540° and 25.1 at. % As; no mixed crystals are formed in this region. On addition of As to Ag, and α -mixed cryst. is the primary solid phase until a temp. of 595° is reached, at which temp. a β -mixed cryst. becomes the primary phase. The satd. α -mixed cryst. contains 6.9 at. % As at 595° , the β -cryst. 10.5 at. %; the latter breaks up into α -cryst. and As at 374° . A marked tendency toward undercooling was noticed. GEORGE W. MOREY.

Hardness test on rough cast metals. A. PORTEVIN. *Rev. métal.* 12, 95-100(1915); cf. *C. A.* 9, 1596.—The Brinell hardness test when applied to certain rough cast metals and alloys gives extremely irregular imprints. P. has applied this test to single grains in certain metals and alloys and also to grains that are similarly oriented. By prolonging the time of cooling sufficiently, large enough crystals can be formed for this purpose. In all cases the polished surface of the metal was etched with $FeCl_3$ or $(NH_4)_2S_2O_8$, so that the change in the surface could be easily observed. The errors in measurement of imprints made by a steel sphere of 10 mm. diam. under a pressure of 500 kg. upon single crystals in the following cases were: (1) Cu containing 0.5% V 0.34 mm.; (2) Cu containing 0.75% Al 0.32 mm. and 0.08 mm.; (3) Cu-Al alloy (2.16% Al) 1.01 mm. error where the mean diam. was 3.45 mm. or 29%; (4) Cu-Sn alloy (16% Sn) with pressure of 250 kg. 0.11 mm.; (5) Sb with pressure of 250 kg., *oval* impressions were obtained. Measurements upon crystals similarly oriented using a steel sphere of 10 mm. diam. under a pressure of 500 kg. gave the following results: (1) brass (Cu 70, Zn 30%) mean error of 0.30 mm.; (2) brass (Cu 57, Zn 33%) 0.10 mm.; (3) Zn, pressure 1000 kg., the imprints obtained had an *oval* form, the minimum diam. being in the direction of the longer crystal axis. L. T. FAIRHALL.

Hardening of small steel pieces. ANON. *Elektrochem. Z.* 22, 66(1915).—An app. for quenching steel parts of different kinds is described. For small pieces of complicated design having thin parts, a water bath covered with oil is recommended. This prevents the thin parts from cooling too rapidly and so causing the pieces to crack.

W. E. RUDER.

Persistent fragility in steel. A. PORTEVIN AND V. BERNARD. *Rev. métal.* 12, I, 155-60(1915).—A piece of steel that had been broken in use showed signs of persistent fragility, i. e., heat treatment failed to increase its resistance to shock, indicating that fragility in the metal was due to something other than simple granulation. Careful

metallographic exam. clearly showed that the fragility was due to a network of very small holes or gaps. This network enclosed large ferrite crystals, constituting an enclosure in which cohesion was very feeble and accounted for the fact that heat treatment failed to obviate fragility in the metal.

L. T. FAIRHALL.

Cast irons containing phosphorus. F. CARNEVALI. *Turin. Rass. min.* 39, 21-4(1913).—Castings made of the gray cast iron containing P which is commonly used for such purposes are much harder and more brittle when they are reheated at 1000° than those reheated at 800°. Bars 40 mm. in diameter were cast in molds of perfectly dry earth and after they were completely cold, 1 group was analyzed and tested directly while 2 other groups were first heated 3 hrs. in a Heraeus furnace at 800 and 1000°, resp. (the temp. being slowly and uniformly raised during the course of about 1 hr.) and then slowly cooled (about 1.5 hrs. from 1000 to 500°). The following are the results obtained for the 3 groups, resp.: Total C, 2.94, 2.94, 2.93; graphite C, 2.52, 2.81, 2.54; Si, 2.58, 2.57, 2.58; Mn, 0.85, 0.85, 0.85; P, 1.35, 1.33, 1.34; S, 0.09, 0.09, 0.08%. Brittleness test on a Charpy test bar: angle of rebound, 80, 79, 80°; fracturing work, 1.75, 2.73, 1.75 kg. Brinnell hardness, 1000 kg., 10 mm. balls: 189, 144, 178. Microscopical exam. confirms the results of chem. analyses; the bars reheated at 1000° differ markedly in structure from those heated at 800° and resemble more those which have not been reheated at all; they show numerous pearlite islands occurring only at the periphery of the light masses containing P, while in the bars reheated at 800° the islands of Fe₃P are scattered in a mass consisting of ferrite with numerous laminas of graphite but only a few small pearlite islands.

CHAS. A. ROUILLER.

Die casting of white alloys. J. C. WORK. *School of Mines Quart.* 36, 48-50 (1914).—Casting small parts of automobile engines that can be fitted together without machining can only be effected by applying pressure at the time of casting, but without pressure, accuracy to within 0.002 in. has been attained. The precise compn. of the white metal alloy is not of such importance as the vendors of secret formulas pretend. The die must be of the best grade of gray cast Fe. The temp. of the mold, and that of the metal at the time of pouring are the important points, and require experience. Spray plugs for carburettors made in this manner developed, when used with gasoline, a white deposit, apparently ZnO, which in a short time clogged the orifice. So far as expts. went, the workers were unable to make alloy containing enough Al to prevent this defect.

E. WALLER.

Electric welding. GORDON FOX. *Elec. Rev. West. Elec.* 67, 117(1915).—A detailed description of modern methods and appliances.

C. G. F.

U. S., 1,145,046, July 6. J. WEATHERBY. *Ore-concentrator*. Cf. C. A. 9, 439.

U. S., 1,145,307, July 6. J. F. GROSS. *Aluminium-solder composed of Sn 80, Pb 16, Al 8, Zn 16 and P 8 parts.*

U. S., 1,145,329, July 6. I. R. MARGETTS and E. R. PEMBROKE. *Furnace for roasting ores.*

U. S., 1,145,506, July 6. A. F. PASQUIER. *Dephosphorizing pig iron in a basic or neutral converter by blasting just short of decarburizing with air carrying a finely divided mixt. of Fe ore and CaO or CaCO₃ and removing the P-bearing slag at intervals during the operation.*

U. S., 1,145,579, July 6. J. B. GARNER. *Removing sulfur dioxide from gases, such as smelter gases by passing the gases through charcoal which has been heated sufficiently to remove from it all substances which would tend to decompose the SO₂ and cause*

deposition of free S, and subsequently heating the charcoal to 180° to expel the SO_2 which has been taken up.

U. S., 1,145,685, July 6. E. A. JOHANSSON. Condenser for vapors of zinc and lead.

U. S., 1,145,954, July 13. J. F. WILLIAMS. Obtaining precious metals from ores by treating the ore with a soln. formed from KBr 1, H_2SO_4 12 and H_2O 216 parts.

U. S., 1,146,071, July 13. A. F. HOFFMAN. Pickling iron and steel in dil. H_2SO_4 and regenerating the pickling liquor. The latter is aerated at ordinary temp. after sepn. from the articles pickled, then heated sufficiently to cause pptn. of ferric compds. and the ppt. is sepd. and heated to drive off the H_2SO_4 which it contains. H_2SO_4 is added to the liquor sepd. from the ppt. to prepare it for further use in pickling.

U. S., 1,146,075, July 13. W. MCA. JOHNSON. Ores of lead and zinc containing sulfur are smelted in a blast furnace and the Zn-bearing slag produced, which is low in S, is introduced, while molten, into an elec. furnace and heated with molten Fe to reduce the Zn. The Zn vapors are led off and condensed and other values such as Au or Ag settle out in the furnace, after which the ferruginous slag is reduced and the Fe further used to reduce Zn and Pb sulfides.

U. S., 1,146,097, July 13. P. PLANTINGA. Smelting furnace and connections for regulating the supply of air and gas and their mixing within the combustion chamber of the furnace.

U. S., 1,146,185, July 13. W. A. McADAMS. An alloy for making cast water faucets, etc., is formed of Al 82, Ag 1, Cu 12 and Cd 5 parts. The alloy is very resistant to corrosion from contact with different kinds of water and will carry H_2O under high pressure without "sweating."

U. S., 1,146,211, July 13. F. O. STROMBORG. Ore-concentrator.

U. S., 1,146,256, July 13. W. E. HOLDERMAN. Apparatus for filtering ore slimes, etc.

U. S., 1,146,373, July 13. C. S. VADNER. Extracting iron, copper and other metals from ores. The ore is treated with sulfurous gases, e. g., smelter fumes, and with a soln. of NaCl to leach out the metals; then the SO_2 is removed from the soln. by heat, steam or air, the soln. is partially neutralized with CaCO_3 , treated with air partially to ppt. the Fe as Fe_2O_3 , further neutralized and treated with air to complete the pptn.

U. S., 1,146,455, July 13. W. SCHUMACHER. Briquets of ore or coal are made with a binder of wood tar 5% and $\text{Ca}(\text{OH})_2$ 1% of the total wt. of material.

U. S., 1,146,626, July 13. W. V. JEAN. Furnace for smelting iron from black sands.

U. S., 1,146,783, July 20. F. E. CARMAN. Cyaniding tank for treating ores.

U. S., 1,146,988-9, July 20. M. ARENDT. Method of welding and coating metals by the electric arc.

U. S., 1,147,314, July 20. L. C. DIBERT. Rotary amalgamator and concentrator for treating ore pulp, beach sands, etc.

U. S., 1,147,356, July 20. C. ALLEN. Settling tank and classifier for ore slimes.

U. S., 1,147,398, July 20. R. H. HENEMIER. Alloy for making valves for pneumatic tires, etc., formed of Al 75-85, Ni 5-15, and Cu 7-10%. The alloy readily gives dense castings which are resistant to oil, H_2O and constituents of vulcanized rubber.

U. S., 1,147,466, July 20. G. D. VANARSDALE. Precipitating copper from solu-

tions of copper sulfate, etc., by the addition of SO_2 while adding lime during the pptn. to neutralize any excess of H_2SO_4 which is formed.

U. S., 1,147,633, July 20. A. R. LIVINGSTON. Flotation process for separating minerals (mechanical features).

Aust., 7535, Sept. 6, 1913. H. FLEISSNER. Utilizing slimes by adding small amts. of bases to the H_2O , thereby causing a flocculent ppt. of SiO_2 present as colloidal silica.

Brit., 6,349, Mar. 12, 1914. H. KOPPERS. A muffle furnace for production of zinc is divided up into a number of sections, each having its own reversible regenerator system. Cf. C. A. 9, 1028.

Brit., 7,113, Mar. 20, 1914. W. TROELLER. Recovering volatile metals, such as Zn, Sb, Bi, and Sn, from ores and slags, etc., by passing a current of reducing-gas through a molten mass of the material. The non-volatile metals such as Fe, which may also be present in the material, are maintained in their lowest state of oxidation during the process.

Ger., 281,208, Feb. 14, 1914. STAHLWERK THYSEN, AKT.-GES. Heating rotary furnaces for metallurgical purposes, with preheating of the air or of the gas, or of both.

Ger., 281,981, Nov. 12, 1913. Addition to 278,900 (C. A. 9, 1172). F. REICHARDT. Mfg. molded metal articles by forcing the molten metal from the melting crucible into the mold which communicates therewith.

Ger., 281,982, Dec. 30, 1913. Addition to 250,914. F. SCHRUFF. Removing piping in cast iron or steel blocks. Cf. C. A. 9, 1895.

Ger., 282,321, May 10, 1912. F. DE BUIGNÉ. Refractory tap tube for molten metal of high m. p. which is discharged from the container under gas pressure. The tube is encased to as limited an extent as possible in order that expansion and contraction are possible with changes of temp.

Ger., 282,495, May 24, 1913. M. J. LACKNER. Method of cooling furnace heads of Siemens-Martin furnaces.

Ger., 282,574, Mar. 13, 1913. EISENWERK JAGSTFELD, G. M. B. H. Process and furnace for recovering iron from friable ores, and obtaining carbon monoxide from low-grade fuel by sep. reduction and melting processes. The friable ores are reduced, in a rotary tube furnace, with prevention of sintering, by means of CO , to obtain sponge Fe. The reduced ore is transferred to a lower vertical furnace where it is melted with the aid of low-grade fuel burning in a shallow layer and producing CO , which is carried up into the rotary furnace to reduce the ores.

Ger., 282,575, Mar. 4, 1913. SIEMENS & HALSKE, AKT.-GES. Mfg. an iron and steel alloy containing tantalum by adding a Ni-Ta alloy to the Fe or steel. An alloy of Ta 10, Ni 10, and Fe or steel 80 is exceptionally tough, elastic, and hard, and suitable for the manuf. of implements and tools. The Ta oxidizes less readily when it is added to the Fe in alloy with Ni than when it is added alone to the Fe or steel. Furthermore, the amt. to be added is more accurately detd.

Ger., 282,666, Mar. 20, 1914. DEUTSCHE MASCHINENFABRIK, AKT.-GES. Double charging bell for blast furnaces.

Ger., 282,795, Feb. 6, 1914. Addition to 254,029 (C. A. 7, 1142). H. SPECKETER. Production of zinc and like metals. According to the principal patent, the old furnace charge is removed after partial removal of Zn, and a fresh charge is introduced. In this process the charge is subjected to the reduction process only until a certain portion (65-70% Zn) has been driven out, when the furnace is emptied and the hot

residue is charged into a smaller furnace, which is almost entirely filled, and smelted until all the Zn is removed. Or the partially smelted residues from a number of furnaces are united and charged into a furnace of the same size for further treatment. *E. g.*, 2-3 charges from which up to 70% Zn has been removed are used to make up a single charge. In operating elec. furnaces by this process, expenditure of current is reduced.

Ger., 282,811, Feb. 10, 1914. G. FREIMUTH and MASCHINEN UND WERKZEUG-FABRIK VOGEL & SCHEMMANN. Dressing very fine ore slimes.

Ger., 282,821, May 2, 1914. WITKOWITZER BERGRAU- UND EISENHÜTTEN-GEWERSCHAFT. Portable device for handling iron blooms.

Ger., 282,854, Mar. 27, 1914. RÖCHLINGSCHER EISEN- UND STAHLWERKE, G. M. B. H. Construction of an earthenware air heater for blast furnace and other metallurgical purposes.

Ger., 282,894, Oct. 18, 1913. GEHR. SEYBOTH, CHEM. FABRIK. Filtering metals in a molten state through materials of varying permeability. In order to free metals from the oxides formed in fusing them, loose or formed materials, of varying coarseness, some of which are unchanged in the heat and some of which are decomposed thereby, are placed at the bottom of the fusion vessel. The metals are thereby deoxidized and thoroughly filtered. Of especial porosity are those additions which lose, in the heat, a portion of their constituents by volatilization or combination with the metals. These are employed in combination with other materials, such as limestone, magnesite, dolomite, alkali carbonates, quartz, sand, rock crystals, feldspar, and the like. The lowest layer consists preferably of finely ground clay or feldspar, the middle layer of coarsely ground magnesite or feldspar with limestone and coal, the upper layer of coarse sifted sand. At a high temp. the magnesite becomes porous by loss of CO_2 , and the liquid metal flowing through the coarse sand flows through the MgO filter, and finally through the clay or feldspar filter; by employing feldspar with limestone and coal in the middle layer, the limestone, by loss of CO_2 and the feldspar by the action of the Ca(OH)_2 , formed, become porous, with sepn. of the corresponding alkali compds, which with coal form the corresponding alkali metals and CO_2 , whereby the O dissolved in the metals are reduced.

Ger., 282,899, Dec. 20, 1910. E. FRITSCH. Coating with aluminium, with the aid of a mechanical mixt. of Al powder and a welding powder (Zn), combined by means of a binder to a mass which may be spread upon the surface to be coated. The coated articles are then subjected to a temp. corresponding to the m. p. of the welding constituent.

Norw., 24,635, July 5, 1911. AKTIEBOLAGET "ELEKTROMETALL." In a process of reducing ores, a catalyzer especially prepared for the purpose is added to the charge, and consists of metallic Fe or Fe oxide of lower degree of oxidation than that of the ore under treatment. The catalyzer effects the sepn. in the furnace of the solid C in the gases containing CO_2 .

10. ORGANIC CHEMISTRY.

C. A. ROUILLER.

Cymarin, the active principle of *Apocynum cannabinum*. A. WINDAUS AND L. HERMANS. Univ. Innsbruck. *Ber.* 48, 979-90(1915).—The cymarin (a), prepd. by Bayer & Co. (*C. A.* 7, 1587), seps. from aq. MeOH in prisms, foams $130-8^\circ$ (depending on the rate of heating), exceedingly bitter, seps. from acetone in prisms, sinters 120° , foams a few degrees higher (the foaming is due to loss of solvent of crystn.), $[\alpha]_D^{20} 23.5^\circ$

in CHCl_3 , gives the Lieberman cholesterol test with $\text{H}_2\text{SO}_4\text{-Ac}_2\text{O}$, couples with PhN_2Cl and NaOH with formation of a deep violet soln. changing to brick-red on acidification with AcOH , indifferent towards FeCl_3 , faintly reduces $\text{NH}_3\text{-AgNO}_3$, gives the Legal test with $\text{Na}_2\text{Fe}(\text{NO})(\text{CN})_6$ and the Keller-Kiliani digitoxin test with AcOH and H_2SO_4 containing Fe . Titration with hot alkali indicates an equiv. wt. of 581; the air-dried product crystd. from MeOH contains 10.7% MeO , 0.5 of which is present as MeOH of crystn. These data and elementary analyses agree with the formulas $\text{C}_{31}\text{H}_{48}\text{O}_{10}\cdot 0.25\text{-H}_2\text{O}$ or $\text{C}_{30}\text{H}_{46}\text{O}_{10}$; preference is given to the 1st. On drying *in vacuo* at 95° , it loses 5.7% in wt. and its comp. then corresponds to $\text{C}_{30}\text{H}_{44}\text{O}_9$. The product from aq. acetone contains 5.2% MeO and corresponds to $\text{C}_{30}\text{H}_{46}\text{O}_{10}\cdot 0.5\text{H}_2\text{O}$; on drying *in vacuo* it loses 6.45% in wt. and then has the comp. $\text{C}_{30}\text{H}_{44}\text{O}_9$. Const. titration values are obtained only when 0.1 g. of the air-dried product from MeOH in 10 cc. alc. is boiled 45 min. with 10 cc. of 0.1 N NaOH ; on short boiling less alkali is neutralized while long boiling and the use of a large excess of NaOH produces deep-seated decompn. and neutralization of more alkali. Although (a) is a glucoside, when boiled with acids the sugar is quickly transformed into an insol. tar and escapes detection, but if hydrolyzed with cold HCl (a) gives a "genin" and a sugar. The *cymarigenin* (b), $\text{C}_{22}\text{H}_{30}\text{O}_5\cdot \text{H}_2\text{O}$, contains no MeO , behaves towards alkalies like a lactone, is identical with Moore's apocynamarin, $\text{C}_{22}\text{H}_{30}\text{O}_5\cdot 2\text{H}_2\text{O}$ (C. A. 3, 2962); of its 5 O atoms, besides the 2 in the lactone ring, a 3rd is present as HO and at least 1 of the other 2 is in a $\text{C}:\text{O}$ group. It is insol. in soda and cold KOH , but warm 0.1 N alkali converts it into the salt of a HO acid which easily loses H_2O ; the resulting lactone, however, is not identical but isomeric with (b); probably the HO originally combined with the sugar has now taken part in the lactone formation. (b), obtained in 2 g. yield from 3 g. (a) in 12 cc. alc., 12 cc. H_2O and 6 cc. concd. HCl allowed to stand 5-6 hrs. in the cold, dild. with 3 vols. H_2O and freed from alc. *in vacuo* over H_2SO_4 , seps. from 5 parts MeOH or 10 parts H_2O in pearly rhombic tables, m. about 171° (foaming), depending on the rate of heating, very bitter, gives the Liebermann cholesterol reaction, faintly reduces $\text{NH}_3\text{-AgNO}_3$, gives dyes with diazonium salts, does not react with FeCl_3 , is pharmacologically active, $[\alpha]_D^{20}$ 44.0° in MeOH , gives with BzCl in $\text{C}_6\text{H}_5\text{N}$ a *benzoate*, $\text{C}_{30}\text{H}_{40}\text{O}_7\cdot 0.5\text{H}_2\text{O}$, thin, pearly leaflets from 10 parts MeOH and 3 parts H_2O , m. 230° . *Anhydrocymarigenin*, $\text{C}_{22}\text{H}_{28}\text{O}_4$, from (b) in CHCl_3 treated several hrs. with dry HCl , m. 246° (decompn.). *Isocymarigenin*, (c), $\text{C}_{22}\text{H}_{30}\text{O}_5\cdot 1.5\text{H}_2\text{O}$, from 1 g. (b) in a little MeOH boiled 1 hr. with 50 cc. of 0.1 N alkali, treated with excess of HCl and concd. *in vacuo*, pearly leaflets from dil. AcOH , m. 239° , behaves towards soda and KOH like (b), no longer gives the cholesterol test typically; both it and (b) with hot concd. alkalies give yellow amorphous products and react (as does also (a)) with ketone reagents but the products are difficult to cryst. The filtrate from (b) in the hydrolysis of (a), when extd. 5 times with CHCl_3 , freed of HCl with Ag_2CO_3 , concd. *in vacuo*, repeatedly extd. with boiling Et_2O , the ext. pptd. with petr. ether, the ppt. treated with H_2O , filtered, evapd. and the treatment with Et_2O and petr. ether repeated, yielded the sugar, *cymarose* (d), in fine prisms, m. 88° , needles from acetone, reduces hot Fehling soln., decomps. when evapd. with acids, turning green, then brown, forms no osazone, is oxidized to AcOH , gives the same color reactions as digitoxose (Kiliani, C. A. 8, 2449). Its comp. is $\text{C}_7\text{H}_{14}\text{O}_4$; it contains 1 MeO and is probably digitoxose Me ether. *Cymarinic acid*, $\text{C}_{30}\text{H}_{50}\text{O}_{12}$, from 2 g. (a) heated 45 min. with 50 cc. of 0.1 N KOH over a free flame, cooled, neutralized with 50 cc. of 0.1 N HCl , satd. with NaCl , shaken with 100 cc. CHCl_3 , and the ppt. filtered after 24 hrs., prisms from acetone- H_2O or AcOEt -petr. ether, m. 168° , sol. in cold soda, does not reduce Fehling soln., physiologically inactive, contains 1 MeO , loses 2 H_2O *in vacuo* over H_2SO_4 and 0.5 H_2O more *in vacuo* at 110° , can easily be titrated in alc., gives the Keller-Kiliani digitoxose reaction and the other color reactions of (a), shows no tendency to form a lactone; with acids it forms (c) and (d).

C. A. R.

Relation of cymarín with other cardiac poisons of the vegetable kingdom. A. WINDAUS AND L. HERMANS. Univ. Innsbruck. *Ber.* 48, 991-4(1915); cf. preceding abstr.—A new study of strophanthidin, the hydrolysis product of strophanthin Kombé, has shown that it is identical with cymarigenin, in spite of the apparent differences in the properties of the former, as described by Feist (*Ber.* 33, 2069(1900); cf. also Heffter and Sachs, *C. A.* 6, 1812; Brauns and Closson, *C. A.* 9, 507). They show the same m. p. and behavior towards solvents and reagents, give the same titration values, yield the same benzoate, give with KMnO_4 the same acid (F.'s strophanthic acid), which, however, W. and H. believe to have the comp. $\text{C}_{22}\text{H}_{30}\text{O}_8$; with CH_3N_2 in acetone it gives a *dimethyl ester*, $\text{C}_{24}\text{H}_{34}\text{O}_8$, needles from aq. MeOH, m. 214° . The strophanthin and cymarín differ, therefore, only in that one is a compd. of strophanthobiose Me ether and the other of digitoxose Me ether. Comparison of cymarín with the cardiac poisons of *Digitalis purpurea* and *Antiaris toxicaria* also shows close relationships; digitoxose, thus far identified with certainty only in digitoxin and the components of Kraft's "gitalin," occurs as the Me ether in cymarín, and the hydrolysis products of antiarin and digitoxin are HO lactones like cymarigenin and of very similar comp.; apparently they all contain a very similar C skeleton which is only loaded down to varying degrees with O in the individual compds. There are also certain similarities between cymarigenin and an animal cardiac poison, bufotalin (Wieland and Weil, *C. A.* 8, 347), which is also a HO lactone and gives the cholesterol test. CHAS. A. ROULLER.

Catalytic actions of colloidal metals of the platinum group. XIII. Hydrogenation of ethylene with colloidal platinum. C. PAAL AND ANTON SCHWARZ. Univ. Erlangen. *Ber.* 48, 994-1001(1915); cf. *C. A.* 3, 2455.—The following expts. were carried out with equal vols. of C_2H_4 and H_2 at room temp. under atm. pressure, with colloidal Pt, protected with Na protalbinat, as catalyst. Whereas it was previously found that with 0.05 g. Pd 25 cc. C_2H_4 are quant. reduced in a gas burette in 70 min., with 0.047 and 0.0915 g. Pt in 10 cc. H_2O 160 and 88 min., resp., are required. In expts. in a shaking app., it was found that shaking increases the velocity of reduction and that with fresh colloidal Pt the reduction is also much faster than with Pt preps. which have already been used. The more concd. the colloidal Pt soln. the more rapid is the reduction with equal amts. of Pt, but the velocities are not directly proportional to the concn., increasing much more slowly than the concn. Similarly, with decreasing amts. of Pt the velocity of reduction decreases much more slowly than the amt. of Pt in solns. of the same concn. In other words, within certain limits both the quantity and the concn. of the catalyzer have but a slight influence on the course of the reduction. Pd is somewhat more effective than an equiatomic amt. of Pt. CHAS. A. ROULLER.

Nitration of halogenacylated anilines. EMIL VOTOCEK AND JAN BURDA. Prag. *Ber.* 48, 1002-8(1915).—Nitration of acylated anilines in which the acyl group is derived from strong acids gave only *o*- and *p*-, never *m*-compds., and since PhNH_2 in excess of concd. H_2SO_4 (i. e., present as $\text{PhNH}_2\text{SO}_3\text{H}$) gives much *m*- $\text{H}_2\text{NC}_6\text{H}_4\text{NO}_2$, the chief factor in detg. whether the NO_2 group will enter the *o*- and *p*- or the *m*-position is probably whether the N of the amine is tri- or pentavalent. Thus, $\text{PhNHCOCH}_2\text{Cl}$, m. 135° , best prepd. from ClCH_2COCl and 2 mols. PhNH_2 in C_6H_6 , when introduced into 3 parts of 94% HNO_3 at 7° soon deposits a mixt. of NO_2 compds. which are completely pptd. with ice after a few min. and are sepd. by crystn. from PhMe into the less sol. *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{NHCOCH}_2\text{Cl}$, m. $185-5.5^\circ$ (Deutsch, *C. A.* 2, 1151, gives 151°), sol. in alc. KOH with yellow color, and the more sol. *o*-nitrochloroacetylaniline, m. $90-3^\circ$, sol. in alc. KOH with red color. Similarly, PhNHCOCHCl_2 , m. $118-21^\circ$, at -2° gave *p*-nitrodichloroacetylaniline, m. $128-30^\circ$, and the *o*-nitro compound, light yellow, m. $78-80^\circ$, sol. in alc. KOH with orange-red color. From PhNHCOCCl_3 , m. $95-7^\circ$, were obtained *p*-nitrotrichloroacetylaniline, m. $146-7^\circ$, sol. in alc. KOH with

yellow color, and the *o*-nitro compound, yellow, m. $70-2^{\circ}$, sol. in alc. KOH with orange-red color. The same results were obtained when the acylanilines were nitrated in cold concd. H_2SO_4 .

CHAS. A. ROUILLER.

Strychnos alkaloids. XXIII. Oxalic acid and an amino acid, $\text{C}_{17}\text{H}_{18}\text{O}_4\text{N}_2$, as cleavage products of strychninolonic acid a. HERMANN LEUCHS AND GEORG SCHWAEBEL. Univ. Berlin. *Ber.* 48, 1009-15 (1915); cf. *C. A.* 8, 2718.—Just as the acid $\text{C}_{22}\text{H}_{34}\text{O}_{10}\text{N}_2$ obtained by oxidation of acetylbrucinolone a yields on cleavage $(\text{CO}_2\text{H})_2$, AcOH and an NH_2 acid (*C. A.* 8, 1427), so 3 g. of the salt $\text{C}_{21}\text{H}_{18}\text{O}_8\text{N}_2\text{Ba} \cdot 2\text{H}_2\text{O}$ (a) obtained in the oxidation of acetylstrychninolone a, when heated 45 min. on the H_2O bath with 30 cc. HBr (d. 1.47), treated with 10 cc. of *N* H_2SO_4 dild. with H_2O , filtered from the BaSO_4 , evapd. to a thick syrup *in vacuo* at a low temp., covered with 50 cc. Et_2O and extd. on the following day twice with the same amt. of Et_2O , gave 0.5 g. $(\text{CO}_2\text{H})_2$. The portion insol. in Et_2O when treated in 15 cc. cold MeOH with 2.5 cc. HBr (d. 1.47) gave 2.35 g., not of the expected NH_2 acid, but of its *methyl ester dihydrobromide* (b), $\text{C}_{17}\text{H}_{18}\text{O}_4\text{N}_2 \cdot 2\text{HBr}$, 3-cornered or trapeze-shaped leaflets with 5-9% H_2O from a mixt. of 30 vols. MeOH and 4 vols. HBr, sinters around 225° and gradually decomp. at higher temps., tastes strongly acid and bitter; on recrystn. from H_2O , MeOH or, best, 150 vols. abs. alc. it loses 1 HBr and seps. as the *monohydrobromide*, rectangular, faintly greenish prisms, m. $258-60^{\circ}$ on slow, 278° on rapid heating, seps. from H_2O in 6-sided elongated tablets. From 1 g. of the above HBr salts in 10 cc. of 25% aq. NH_3 there is obtained in a short time 0.3 g. of the *amide*, $\text{C}_{17}\text{H}_{19}\text{O}_4\text{N}_3$, flat 6-sided prisms with 1 H_2O from 300 parts H_2O , m. about 280° (decompn.), forms a neutral aq. soln., dissolves in alkalis only on long standing, easily in dil. mineral acids, with difficulty in AcOH; NH_3 repts. it. From 0.17 g. in 6 cc. of 3 *N* HNO_3 is obtained 0.16 g. of the *nitrate*, $\text{C}_{17}\text{H}_{19}\text{O}_4\text{N}_3 \cdot \text{HNO}_3$, pointed octahedrons, hydrolyzed by H_2O . From 1 g. (b) in 10 cc. of H_2O at 20° treated with 50 cc. of cold satd. $\text{Ba}(\text{OH})_2$ is obtained 0.3 g. of a *barium salt*, $(\text{C}_{17}\text{H}_{17}\text{O}_4\text{N}_2)_2\text{Ba} \cdot 4\text{H}_2\text{O}$, sepg. from 200 cc. H_2O and 50 cc. alc. in needles, sol. in H_2O with neutral reaction. From 3 g. (a) treated as above with HCl instead of HBr are obtained $(\text{CO}_2\text{H})_2$ and 1.2 g. of the *amino acid hydrochloride*, $\text{C}_{17}\text{H}_{18}\text{O}_4\text{N}_2 \cdot \text{HCl}$, massive 6-sided short columns from 20 cc. MeOH or faintly greenish rectangular tables from H_2O , loses 0.66% in wt. at 100° and 12 mm. over P_2O_5 , decomp. about 278° , easily sol. in dil. HCl, gives no ppt. with NH_3 or $\text{Ba}(\text{OH})_2$ but yields (b) with HBr in MeOH; with PhNCO and dil. alkali is formed a *ureido acid* pptd. by acids in amorphous form easily sol. in soda. *Sulfate*, $\text{C}_{17}\text{H}_{18}\text{O}_4\text{N}_2 \cdot \text{H}_2\text{SO}_4$, in 1.5 g. yield from 3 g. (a) treated as above with HBr, then with 7 cc. of 5 *N* H_2SO_4 concd. *in vacuo*, freed from $(\text{CO}_2\text{H})_2$ and crystd. from alc. and then from 15 cc. of 2.5 *N* H_2SO_4 + 45 cc. alc., 4- or 6-sided leaflets with 1 H_2O , gradually decomp. on heating, easily sol. in H_2O but soon goes over into less sol. needles still containing H_2SO_4 , gives no ppt. with NH_3 , forms (b) with HBr in MeOH.

CHAS. A. ROUILLER.

Spiranes. VI. α -Halogenation of optically active ketones. HERMANN LEUCHS. Univ. Berlin. *Ber.* 48, 1015-20 (1915); cf. *C. A.* 7, 3330; 9, 82.—*dl*- β -Chloro- β -(benzyl-*o*-carboxy)- α -hydrindone, (a), obtained in 1.95 g. yield from 2 g. of the unsubstituted $\text{C}_{17}\text{H}_{14}\text{O}_3$ (b) added to 40 cc. CHCl_3 containing somewhat more than the calcd. amt. of Cl (0.52 g.), evapd. *in vacuo* and crystd. from C_6H_6 , long rectangular prisms, m. $146-7^{\circ}$, losing HCl and passing over into the lactone, sol. in 100 parts cold C_6H_6 , gives AgCl quite rapidly with AgNO_3 on boiling alc., sol. in aq. soda and NH_3 but at once seps. as the lactone. Approx. 2% solns. of the *d*-form of (b) in CHCl_3 were prepd. from the brucine salt as previously described (*C. A.* 7, 3331), the operation requiring 0.5-1.0 hr.; after clarification with Na_2SO_4 they showed an av. $[\alpha]_D^{20}$ of 69° , the highest observed value being 76° . Four such solns. (from 71 g. salt) were treated with an excess of Cl in CHCl_3 , and evapd. *in vacuo*, giving 30 g. residue which on recrystn. from 150 cc.

AcOH yielded 21 g. showing in 3.6% AcOH soln. α 13.4° (the filtrate was inactive and on concn. yielded 8.6 g. *dl*-(a)). Expt. having shown that the activity was not diminished by heating 0.5 hr. at 100° in AcOH or boiling a few min., the 21 g. above was dissolved in 150 cc. AcOH at 100° and allowed to cryst., giving 13 g. (the filtrate was again inactive); another crystn. from 150 cc. and one from 50 cc. yielded 1.7 g. of prisms with asbestos luster, striated owing to twin formation, m. 171–3° (gas evolution) (the filtrate in the final crystn. was strongly *d*-rotatory, indicating that the purification was complete), $[\alpha]_D^{20}$ 130° in AcOH, sol. in aq. soda but soon seps. as the lactone. Concn. of the final filtrate yielded 0.9 g. more of this *d*-form of (a), making the total yield 2.6 g. while that present in the original 21 g., calcd. from its activity, should have been only 2.2 g. This too high yield may be due to varying values of α and 0.1–0.2 g. is to be ascribed to a resolution of the *dl*-form, for on recrystn. there was obtained at a certain stage, as a result of supersatn., a *l*-rotatory filtrate which, from its activity, must have contained 0.1–0.2 g. of the *l*-form in excess; from this soln. was obtained as above 0.15 g. of the *l*-form, m. 173°, $[\alpha]_D^{20}$ 129.4°; mixed with an equal part of the *d*-form, it m. 146–7°. *l*-Dihydroisocoumarinhydrindone-3,2-spirane, in 0.43 g. yield from 0.5 g. *d*-(a) treated with soda and filtered after 1 hr., needles, m. 177°, $[\alpha]_D^{20}$ –65° in C₆H₆ (the values previously found were 176° and –65.3°, resp.). *d*-Form, similarly obtained from the *l*-(a), m. 177°, and when mixed with an equal part of the *d*-form shows the m. p., 154°, of the *dl*-lactone.

CHAS. A. ROUILLER.

Otto N. Witt. E. NOELTING. Lausanne. *Chem. Ztg.* 39, 441–9(1915).—A review of his work in organic chem.

J. H. MOORE.

Trichloroacrylic acid and some of its derivatives. II. J. BÖHSEKEN AND J. F. CARRIÈRE. Delft. *Rec. trav. chim.* 34, 179–86(1915); cf. C. A. 7, 3490.—Although the m. p. of CCl₃.CClCO₂H (a) is nearly 73° it forms 2 liquid layers with H₂O at room temp. It seemed that the system H₂O + (a) might be an example of the H₂O + PhOH class and it was studied for that reason. The (a) was prepd. as described before by heating hexachloropropene at 130° with 90% H₂SO₄, except that a little Al₂(SO₄)₃ is now added to the mixt. The reaction mixt. is poured into a little ice and forms 2 liquid layers, of which the lower solidifies at temps. below 14°. After recrystg. several times from CS₂ the acid is placed in a desiccator over NaOH until free from CS₂. This pure acid b₁₀ 133°, but the liquid solidifies only partly and in H₂O it does not give 2 layers at once, but a solid which m. 40°. The acid thus treated probably contains some anhydride, which m. 39–40° and is insol. in H₂O (Fritsch, *Ann.* 297, 317 (1897)). No change in elec. cond. could be shown, which indicates that hydration probably takes place more rapidly than soln., which is in accordance with previous observations of B., *et al.* (C. A. 6, 1610) on other anhydrides of strong acids. (a) b₇₀₀ 221–3° and solidifies slowly to a waxy mass. In C₆H₆ solns. at less than 1% concns. the mol. wt. is double; in PhNO₂ 58% is dimol. Aq. solns. (≈0.09 *N*) are nearly completely dissociated but this diminishes rapidly with increase in concn. For the system H₂O + (a) the 1st 3 points on the f. p. curve were detd. with a Beckmann thermometer: 99.86 mol. % H₂O, f. p. –0.267°; 99.79%, –0.357°; 99.49%, 2.8°. The following points were detd. by fusing the mixt. in sealed tubes and detg. the f. p. in an illuminated thermostat: 99.20 mol. % H₂O, 37.2°; 98.85%, 46.6°; 97.68%, 54.1°; 95.98%, 57.8°; 93.61%, 60.0°; 93.58%, 60.85°; 92.43%, 60.85°; 87.73%, 53.0°; 86.32%, 46.5°; 84.51%, 19.5°. The following points were detd. by the f. p. method, some in a H₂O bath and some in a Dewar flask: 26.47 mol. %, 60.5°; 41.54%, 54.0°; 51.03%, 42.3°; 58.77%, 32.8°; 62.81%, 26.5°; 66.97%, 20.3°; 68.27%, 17.7°; 70.39%, 14.9°; 72.04%, 12.7°; 73.34%, 11.2°. The following points were identified: f. p. of H₂O, 0°; eutectic for ice + (a).2.5H₂O (liquid I + H₂O: 99.5 mol. % H₂O), –0.6°; critical point of the miscibility 60.85° (≈92.5 mol. % H₂O);

eutectic for liquid (I + II) + (a).2.5 H₂O (84.5 mol. % H₂O) 13.70°; m. p. of (a).2.50 H₂O 19.2° (71.4 mol. % H₂O); eutectic for (a).2.5 H₂O (69.4 mol. % H₂O) 17.0°; f. p. of (a).72.9° (0 mol. % H₂O).

E. J. WITZEMANN.

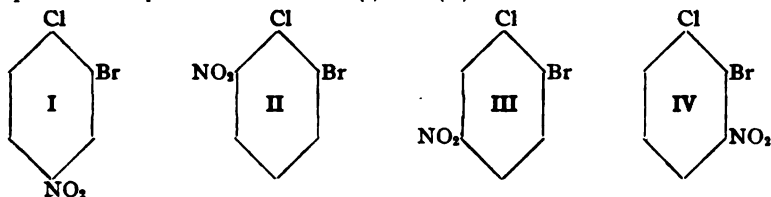
The nitration of methylurea. H. J. BACKER. Univ. Leyden. *Rec. trav. chim.* 34, 187-203(1915); cf. C. A. 8, 2346.—The behavior of methylurea and ethylurea toward nitrating agents is considered as a striking example of the different influences that Me and Et may exercise on the properties of a compd. Degner and v. Pechmann (*Ber.* 30, 652(1897)) have said that in methylurea the imino NH is nitrated and Thiele and Lachman (*Ann.* 288, 285(1895)) found that in ethylurea the NH₂ is nitrated: i. e., the products are MeN(NO₂)CONH₂, and EtNHCONHNO₂. B., in prepg. the substances for other expts. found that the statements for methylurea are untrue. D. and v. P. treated methylurea in H₂SO₄ with the theoretical amt. of EtNO₂ and obtained methylnitroamine and a methylnitrourea (m. 156-7° (decompn.)). B. nitrated methylurea as above, also by adding HNO₃ to the H₂SO₄ soln. and by adding methylurea nitrate to H₂SO₄ but always got methylnitrourea, decomp. 90-100°, and no methylnitroamine. When the product was dissolved in cold NH₄OH and the soln. acidified methylnitrourea (a) m. 159° (decompn.), seps. This compd. was shown to be α,β -methylnitrourea, by reduction to semicarbazide and by its decomp. action on bases. (a) reduced and condensed with BzH gave benzaldehyde methylsemicarbazide, m. 166°, which with dil. H₂SO₄ gave free methylsemicarbazide (b), m. 118°. This on hydrolysis gave N₂H₄ so that (b) ought to be hydrazinoformmethylamide, NH₂NHCONHMe, and (a) must be NH(NO₂)CONHMe. In order further to prove this N₂H₄ was treated with CO:NMe and gave NH₂NHCONHMe, m. 118°, identical with (b). The constitution of (b) was further proved by the fact that with CH₃Ac₄ (b) gives 3,5-dimethyl-1-methylaminoformylpyrazole: the isomer of (b), NH₂NMeCONH₂, does not give a pyrazole. Hydrolysis by bases is of value in detg. whether one has a primary nitroamine or an alkylnitroamine. The 1st gives NH₂NO₂ which decomp. into N₂O while AcN(NO₂)R gives a monoalkylnitroamine, RNHNO₂. Accordingly the equations would be MeN(NO₂)CONH₂ + 3KOH $\longrightarrow$ MeN(NO₂)K + K₂CO₃ + NH₃ + H₂O or MeNHCONHNO₂ + 2KOH $\longrightarrow$ MeNH₂ + K₂CO₃ + N₂O + H₂O. Since (a) gave N₂O when treated thus, the latter reaction is correct and (a) must be the α,β -deriv. Similar reactions occur with NH₃ thus: MeN(NO₂)CONH₂ + 2NH₃ $\longrightarrow$ MeN(NO₂)-NH₂ + (NH₂)₂CO or MeNHCONHNO₂ + NH₃ $\longrightarrow$ MeNHCONH₂ + N₂O + H₂O. (a) heated with NH₃ gave MeNHCONH₂, showing again that (a) is the α,β -deriv. When the product, m. 90-100° (decompn.) was treated with NH₄OH for purification it gave only about a 50% yield of the α,β -deriv. When treated with KOH and NH₃ it gave methylnitroamine. Quant. decompn. with Ba(OH)₂ showed the presence of 40% of the α,α -methylnitrourea in the crude product. With KOH the crude product liberated N₂O corresponding to 55% of α,β -deriv. It was desirable to prep. α,α -methylnitrourea. Expts. in methylation of nitrourea with MeI, CH₂N₂, and Me₃SO₄ gave poor results. The action of MeNHNO₂ on CONH was found to give condensation products of CONH. Attempts to nitrate α,β -methylacetylurea should have given AcNHCON(NO₂)Me but it was decompd. Its decompn. by HNO₃ is explained thus: (1) AcNHCON(NO₂)Me $\longrightarrow$ AcNH₂ + CO₂ + MeNHNO₂; (2) AcNH₂ + HNO₃ $\longrightarrow$ AcOH + N₂O; (3) MeNHNO₂ + HNO₃ $\longrightarrow$ MeNO₂ + N₂O, since the amt. of N₂O evolved corresponds to these reactions. The compd. sought was not obtained. (a) was obtained thus: 15 g. methylurea nitrate were added gradually to 50 cc. concd. H₂SO₄ at -15° with agitation, in 20 min. In 10 min. more the mixt. was poured on 100 g. ice + 150 g. crystd. Na₂CO₃, filtered with suction, the filtrate was extd. with AcOEt and the ppt. dissolved in it, dried with Na₂SO₄, concd. and crystd.; it m. 90-100°. 4.5 g. of the above product in 6 cc. NH₄OH + 10 cc. H₂O were cooled and treated with

10% H_2SO_4 till Congo paper was turned blue: 1.8 g. or 40% α,β -methylnitrourea, m. 159°, sepd. The latter was reduced electrochem. (cf. Backer, *C. A.* 6; 1608); 40 cc. 5% H_2SO_4 in a tinned Cu cylinder (120 sq. cm. surface) to which 2 g. of the α,β -deriv. were added a little at a time served as the cathode chamber. 10% H_2SO_4 in a porous vessel with a Pb anode completed the app. The whole was packed in ice and electrolyzed at 1.5–2.0 v. for 161 amp. min., nearly neutralized with Na_2CO_3 and treated with BzH as indicated above. Details of the treatment of the α,α - and α,β -derivs. with KOH , NH_4OH and $\text{Ba}(\text{OH})_2$ are given. 3.7 g. MeNCO (from $\text{KOCN} + \text{KMeSO}_4$) added to 2.1 g. N_2H_4 gave 4.7 g. of 4-methylsemicarbazide (b), long, white needles from C_6H_6 , sol. in H_2O , MeOH and EtOH and AcOH , behaves like N_2H_4 toward oxidizing agents; aromatic aldehydes in alc. give well crystd. semicarbazones in calcd. amts. in aq. soln. slightly acid with AcOH . The 4-hydrazinoformmethylamides described below are little sol. in petr. ether, H_2O and Et_2O but are sol. in EtOH and AcOH . Salicylal, $\text{HOCH}_2\text{CH}=\text{CH}:\text{NNHCONHMe}$, nearly colorless needles, decomp. on heating; anisal, needles, m. 175°; piperonal, needles, m. 203–5°; p-nitrobenzal, yellow needles, m. 236° (gas). A careful crystallographic description of 3,5-dimethyl-1-methylaminoformylpyrazole is given.

E. J. WITZEMANN.

The nitration of mixed dihalogen benzenes. A. F. HOLLEMAN with H. P. HEINEKEN, *et al.* Univ. Amsterdam. *Rec. trav. chim.* 34, 204–35 (1915).—In his book (*Einführung von Substituenten in den Benzolkern*) H. deduced from qual. expts. given in the literature that the decreasing order of velocity of substitution, caused by groups already present in the nucleus, for groups that direct para-ortho is $\text{OH} > \text{NH}_2 > \text{halogens} > \text{Me}$. For example, in cresol the influence of OH will predominate over Me in such a way that the substituent that enters the nucleus will place itself *o*- or *p*- to the OH . Recently, Wibaut (*C. A.* 8, 1268) studied the nitration of chlorotoluenes quant. and found that the velocity of substitution caused by the Cl and Me is as 1.475:1. The present paper is a report on the relative velocities caused by the halogens. For this purpose the mixed halogen derivs. $\text{C}_6\text{H}_4\text{XY}$ have been nitrated. These compds. have been very little studied; it is known that some of the *I* derivs. are decompd. by HNO_3 . The mixed *F* derivs. are hardly known at all and the nitration has not yet been studied. I. Nitration of *p*-chlorobromobenzene. *p*- $\text{ClC}_6\text{H}_4\text{Br}$, prepd. by the method of Holleman and van der Linden (*C. A.* 5, 1436), f. 64.6°, n_D^{20} 1.5531. 2,5- $\text{ClBrC}_6\text{H}_3\text{NO}_2$ (a) was prepd. in 2 ways. (1) 52.5 g. *o*- $\text{ClC}_6\text{H}_4\text{NO}_2$ + 1 g. Fe powder + 20 cc. Br_2 was boiled under a condenser in an oil bath until HBr was no longer evolved, when it was poured into H_2O , treated with dil. HCl to remove Fe , dried and (a) recrystd. from EtOH as white crystals, m. 72°, f. 69.7°, n_D^{20} 1.5839. (2) 5 g. 2,5- $\text{Br}_2\text{C}_6\text{H}_3\text{NO}_2$ + 20 cc. 3.9 *N* NH_4OH in sealed tubes for 8 hrs. at 168° gave 4,2- $\text{Br}(\text{NO}_2)\text{C}_6\text{H}_3\text{NH}_2$, m. 111°, which diazotized, etc., according to v. d. L.'s method, gave (a). It was attempted to obtain 5,2- $\text{ClBrC}_6\text{H}_3\text{NO}_2$ (b) by treating *o*- $\text{BrC}_6\text{H}_4\text{NO}_2$ with Cl in the presence of SbCl_5 or FeCl_3 but the complex mixt. obtained could not be sepd. even in several months. 5 g. 2,5- $\text{Cl}_2\text{C}_6\text{H}_3\text{NO}_2$ heated 12 hrs. with 20 cc. NH_4OH at 185° in the sealed tube gave the chloronitroaniline (c), m. 116°, which diazotized, etc., gave (b), m. 70°, n_D^{20} 1.5832. (c) was obtained thus: 28 g. *p*- $\text{ClC}_6\text{H}_4\text{NHAc}$ were added gradually to 140 g. HNO_3 (d. 1.50), decolorized with urea, at -10° ; the mixt. was poured on ice, filtered, etc., and the *Ac* deriv. sapond. to give (c). The m. p. curve for the system (a) + (b) was detd. The course of the curve is unusual since it indicates that the 2 isomers give a continuous series of mixed crystals, with a minimum m. p. It is the 1st case of the kind for isomeric aromatic derivs. The formation of mixed crystals explains why Körner and Mouneyrat and Pouret obtained a mononitrated product from *p*- $\text{ClC}_6\text{H}_4\text{Br}$ (m. 68.6° and 68.2°) which remained unchanged with repeated crystn., for it is now well known that these mixts. cannot be sepd. in this way. The thermal method will not work

for the analysis of this system. 5 g. $p\text{-ClC}_6\text{H}_4\text{Br}$ were added to 25 g. HNO_3 (d. 1.52) at 15° ; after 15 min. the mixt. was poured into H_2O , the NO_2 deriv. recrystd. from EtOH (m. 70°), the EtOH soln. heated 12 hrs. in the sealed tube with excess of $\text{NH}_3\text{-EtOH}$ at 170° , poured into H_2O and crystd. from EtOH; 4,2,1-bromonitroaniline, m. $111\text{--}2^\circ$, sepd., which shows that (a) was present in the nitration products. The mother liquors were evapd. to dryness, heated over a bare flame to sublime the NH_4 salts, dissolved in H_2O , treated with $\text{Cl-H}_2\text{O} + \text{CS}_2$ and the brown color obtained proved that (b) was also present because Br in (b) is displaced in this but not that in (a). Since it is certain that in (a) only the Cl is mobile and in (b) only the Br, by heating a known wt. of the mixt. with MeONa a mixt. of NH_4Cl and NH_4Br would be obtained having the same mol. ratio as the original (a) and (b). The NH_4 salts were analyzed by pptg. as $\text{AgCl} + \text{AgBr}$ and weighing. The ppt. was treated with Cl and weighed again and from these data the amts. of each were calcd. 2 g. $p\text{-ClC}_6\text{H}_4\text{Br}$ added slowly to 28 cc. HNO_3 (d. 1.50), decolorized with urea, + 20 cc. ordinary HNO_3 at 0° to 3° was poured on ice; the product washed with H_2O and distd. *in vacuo*, f. 65.2° , $n_{70} 1.5842$. The analysis and values of n show that some di- NO_2 derivs. are present. The H_2O contained a small amt. of Cl or Br since it gave a ppt. with AgNO_3 . The nitration was carried out under slightly different conditions without a marked change in the result. Test expts. with (a) and (b), in which the compd. + 18 cc. of 0.35 N MeONa in MeOH were heated in sealed tubes at 85° for 5 hrs., showed that 98% of Cl in (a) and 98% of Br in (b) could be recovered as AgX , after pptg. the nitroanisoles by adding H_2O , filtering and washing free from alk. The slight error was found to be due to the formation of some NaNO_2 from (a) and (b) and since neither Cl nor Br are mobile in the chlorobromoanisole the halogen detn. was deficient to that extent. Known mixts. of the isomers (a) and (b), as well as the nitration product, were subjected to the same treatment. In one in which 74.3% (a) and 25.7% (b) were used 75.8% (a) were found. In another containing 83.9% (a) and 16.1% (b) 83.6% (a) were found. Analyses of the nitration product showed that 45.2% of (a) is formed: the remainder is (b). II. Nitration of $o\text{-ClC}_6\text{H}_4\text{Br}$. 10 g. of this compd. were added slowly to 5 g. HNO_3 (d. 1.50) at 0° , and the mixt. poured into H_2O . The solid product was distd. *in vacuo* as a white cryst. mass, m. $30\text{--}40^\circ$. Four products are possible in this case: (I) and (II) under the influence of Cl and (III)



and (IV) under the influence of Br. In (I) and (II) only Cl is mobile; in the others only Br is mobile. By treating with MeONa the ratio of the 1st group to the 2nd can be detd. The analysis was done as above and it was found that the mol. ratio for (I) + (II): (III) + (IV) is 1:0.80, so that the effect of Cl and Br on the velocity of substitution when both are present in the same ring is as 1:0.80. From these data it was also shown that all the nitration product was reacted upon by the MeONa. In the nitration of PhCl 30.1% of $o\text{-ClC}_6\text{H}_4\text{NO}_2$ were formed; with PhBr 38.3% $o\text{-BrC}_6\text{H}_4\text{NO}_2$ were formed. In nitrating $p\text{-ClC}_6\text{H}_4\text{Br}$ 54.8% (b) and 45.2% (a) were formed. Thus the ratio of the velocities of substitution caused by Cl and Br are $30.1:38.3x = 45.2:54.8$ where $x = 0.96$. III. Nitration of $p\text{-FC}_6\text{H}_4\text{Cl}$. The $p\text{-FC}_6\text{H}_4\text{Cl}$ was obtained from $p\text{-FC}_6\text{H}_4\text{NO}_2$ which in turn was obtained by diazotizing $p\text{-NO}_2\text{C}_6\text{H}_4\text{NH}_2$ or by nitrating PhF . The $p\text{-FC}_6\text{H}_4\text{NO}_2$ was reduced: 37 g. in 108 cc. 25% HCl + 208 g. Sn powder added slowly was finally warmed 2 hrs. on the H_2O bath. The $\text{FC}_6\text{H}_4\text{NH}_2$ (d) was sepd. by steam distn.

52 g. (d) diazotized by v. der L.'s method gave 34 g. $p\text{-FC}_6\text{H}_4\text{Cl}$, b. $130-1^\circ$, m. 27.7° , n_D^{20} 1.4990. 6 g. $p\text{-FC}_6\text{H}_4\text{Cl}$ added dropwise to 20 cc. HNO_3 (d. 1.50), decolorized with urea, at -3° to -5° was poured into H_2O after some hrs. and gave a yellow oil, which was partly dissolved in dil. NaOH , leaving 2 cc. of an insol. oil. The alk. soln. was acidified and extd. and gave $4,3,5\text{-Cl}(\text{O}_2\text{N})_3\text{C}_6\text{H}_2\text{OH}$, m. 82° . Thus the F was eliminated in part in the nitration so that these expts. were abandoned. IV. Nitration of $p\text{-FC}_6\text{H}_4\text{Br}$. $p\text{-FC}_6\text{H}_4\text{NH}_2$ diazotized by v. der L.'s method gave $p\text{-FC}_6\text{H}_4\text{Br}$ (d) (yield, 68%), b. $151-2^\circ$, f. -17.4° , n_D^{20} 1.5310. Although the conditions of nitration were varied it was not possible to get a quant. nitration of (d). In every case part of the F was eliminated and $4,3,5\text{-Cl}(\text{O}_2\text{N})_3\text{C}_6\text{H}_2\text{OH}$ was obtained. The best result was obtained as follows: 10 g. (d) were added dropwise to HNO_3 (14 cc. ordinary HNO_3 + 14 cc. (d. 1.50) decolorized with urea), cooled with EtOH + CO_2 snow, and kept at -5° to 0° . The mixt. was poured into H_2O , the oil sepd. and distd. *in vacuo*; the higher fractions crystd. The crystals were sepd. (m. 70°) and the oil washed with dil. alk. and distd. without decompn. The analysis of the oil corresponds to $\text{FBrC}_6\text{H}_2\text{NO}_2$. By treating with MeONa , as above, the oil was found to contain 30.5% of $4,2\text{-F}(\text{NO}_2)\text{C}_6\text{H}_3\text{Br}$. The presence of the 4,3-isomer was proved by the presence of NaF in the reaction products. V. Nitration of $o\text{-ClC}_6\text{H}_4\text{I}$. Körner (*Gass. chim. ital.* 4, 305 (1874)) studied the nitration of $p\text{-ClC}_6\text{H}_4\text{I}$ and in repeating his expts. H. got no better results. Considerable I was eliminated if it was introduced into concd. HNO_3 , and when it was dild. with glacial AcOH nitration did not occur. The product of nitration, $p\text{-ClC}_6\text{H}_4\text{NO}_2$, m. 83° , was easily obtained. The $o\text{-ClC}_6\text{H}_4\text{I}$ was obtained thus: 64 g. $o\text{-ClC}_6\text{H}_4\text{NH}_2$ in 1 l. H_2O + 200 cc. concd. H_2SO_4 were treated at a low temp. with 40 g. NaNO_2 in 200 cc. H_2O and the whole poured into 85 g. KI in 200 cc. H_2O , distd. with steam, washed with dil. alk., dried and distd. *in vacuo*. The sepn. of I in the nitration of the p -deriv. is explained as due to the fact that NO_2 prefers the p -position with respect to Cl and removes the I. Thus only 30% $o\text{-ClC}_6\text{H}_4\text{NO}_2$ are formed when PhCl is nitrated. Accordingly with $o\text{-ClC}_6\text{H}_4\text{I}$ less I should be eliminated by the HNO_3 ; this was found to be true. 5 g. $o\text{-ClC}_6\text{H}_4\text{I}$ was added slowly to 25 g. HNO_3 (d. 1.50) at -5° , poured into ice- H_2O and the ppt. washed with dil. alkali. The wash alkali was added to the acid filtrate and gave a violet color. The I was dissolved out with CS_2 and detd. with $\text{Na}_2\text{S}_2\text{O}_3$ to be 0.0673 g. The nitration products weighed 5.6 g. (calcd. 5.97 g.). The halogen content was a little too low so that it seemed probable that some $o\text{-ClC}_6\text{H}_4\text{NO}_2$ was formed by the elimination of I. Assuming this to be true H. calcd. the amt. that ought to be present from the free I detd. as 1.5%. Calcd. from the halogen detns., 4.47% should be present. Considering everything this is a good agreement. Taking the mean there ought to be 97% $\text{C}_6\text{H}_4\text{ClINO}_2$ and 3% $\text{ClC}_6\text{H}_4\text{NO}_2$. The nitration product was treated with MeONa for 22 hrs. at 85° as before. The solns. were dild. with H_2O , the org. compds. filtered off, the filtrate treated with AgNO_3 , etc. The AgCl + AgI was finally treated with Cl near the m. p. From the data it was detd. that the relative velocity of substitution caused by Cl and I in the same nucleus is 1:1.84. This result is again based on the suppositions (1) that MeONa reacts quant. on $\text{C}_6\text{H}_4\text{IClINO}_2$ and (2) that only the Cl or I in the p - or o -positions with respect to the NO_2 reacts. Special calculations showed that (1) is nearly quant. and that the error due to (2) must be very small if it exists. VI. Nitration of $o\text{-BrC}_6\text{H}_4\text{I}$. Having detd. the effect on the relative velocities of nitration of $\text{Cl}:\text{Br}$ as 1:0.80 and $\text{Cl}:\text{I}$ as 1:1.84 the ratio of $\text{Br}:\text{I}$ ought to be 0.80:1.84 if the Br and I act independently. Experience gives a different ratio so that it must be admitted that the 2 substituents act upon one another. $o\text{-BrC}_6\text{H}_4\text{I}$, prepd. like $o\text{-ClC}_6\text{H}_4\text{I}$ above, f. 5° . 5 g. $o\text{-ClC}_6\text{H}_4\text{I}$ were introduced into 25 cc. colorless HNO_3 (d. 1.51) at -10° . The product was treated as above. Free I equiv. to 0.1719 g. $o\text{-BrC}_6\text{H}_4\text{NO}_2$ was found. The nitration products weighed 5.4 g. (calcd. 5.79). The nitration product contained, therefore, 3.2% o -

$\text{BrC}_6\text{H}_4\text{NO}_2$, but from the halogen detn. it was calcd. to be 5.73% or an av. of 4.4%. As a result of the analyses of the product from the action of MeONa the relative velocity of substitution is $\text{Br:I} = 1:1.75$. *Theoretical considerations.* The relative velocities of substitutions caused by halogens in the same C_6H_5 ring are thus: $\text{Cl:Br} = 1:0.96$ (detd. by nitrating $p\text{-ClC}_6\text{H}_4\text{Br}$); $\text{Cl:Br} = 1:0.80$ (from $o\text{-ClC}_6\text{H}_4\text{Br}$); $\text{Cl:I} = 1:1.84$ (from $o\text{-ClC}_6\text{H}_4\text{I}$); $\text{Br:I} = 1:1.75$ (from $o\text{-BrC}_6\text{H}_4\text{I}$). So that as in the research of Wibaut the values for p -derivs. are not always identical with those for the o -derivs. Thus in the nitration of p -dihalogenbenzenes the NO_2 group cannot enter its favorite p -position because it is already occupied so that a certain amt. of perturbation would be expected. A comparison of the relative % of the isomers provided for by the 2 ratios shows that the perturbation is not large. With the o -derivs. some perturbation might be expected but it is hard to det. how much. With the p -I derivs. there is considerable elimination of I, but this is much less in the o -I derivs. From the ratios detd. that for Br:I should be 1:2.3 but only 1:1.75 was found. This error is significantly large but it is impossible to know how much, if not all, is due to the errors arising from the elimination of I (this was taken into account in the calcs. as nearly as possible) and in the detn. of the ratio of the 2 Ag halides. It has been shown by this work, together with that of Wibaut, that it is possible to calc. approx. the quantity of isomers which ought to be formed in the nitration of a compd. o - or p - $\text{C}_6\text{H}_4\text{XYZ}$ by knowing the quantities of isomers that are present in the products of the nitration of the compds. $\text{C}_6\text{H}_4\text{XY}$ and $\text{C}_6\text{H}_4\text{XZ}$. It will thus be possible to calc. in what proportion the nitrobromotoluenes will be present in the products of nitration of the bromotoluenes after having studied quant. the nitration of $p\text{-ClC}_6\text{H}_4\text{Me}$ and $p\text{-ClC}_6\text{H}_4\text{Br}$.

E. J. WITZEMANN.

The constitution of phenyl- o -nitroindone and its products of scission. M. BAKUNIN AND T. ANGRISANI. Univ. Naples. *Gazz. chim. ital.* 45, I, 197-204 (1915). —From the work done so far on the action of O_3 on the phenylnitroindones, which results in oxidation and hydrolysis, they are transformed into BzOH and 3-, 4- and 5-nitro-2-aldehydobenzoic acids, resp., and the formulas of the phenylnitroindones are 3-, 4- or 5- $\text{O}_2\text{N.C}_6\text{H}_4\text{CH:CPh.CO}$, resp. A comparison of the 3 formulas shows that

in the ring formation by the elimination of H_2O between the CO_2H group of BzOH and the Ph group of $\text{O}_2\text{NC}_6\text{H}_4\text{CH:CHCO}_2\text{H}$ the CO group always becomes o - with respect to the CH:CH group, whatever the position of the NO_2 may be. Of the 3 phenylnitroindones only the o -compd. gives a solid cryst. ozonide (a) which m. $100\text{--}50^\circ$, while the others are almost completely hydrolyzed during ozonization but the ozonides could be detected by their behavior. The position of the NO_2 or the greater solubility in CHCl_3 may have some influence on this result. (a) is sol. in C_6H_6 and is pptd. by petr. ether. H_2O , EtOH or NaOH soln. hydrolyzes it to give BzOH and 2,3- $\text{OHC-(O}_2\text{N)C}_6\text{H}_3\text{CO}_2\text{H}$. When (a) is boiled with Ba(OH)_2 a double compound of benzoic acid with m -nitrobenzoic acid (1:1 mol.) is pptd. on the addition of acid. This may be crystd. unchanged from H_2O , EtOH , C_6H_6 or AcOH , m. 139° . In H_2O it is dissociated. When the aq. soln. of the Ba salt is crystd. ($m\text{-O}_2\text{NC}_6\text{H}_4\text{CO}_2$) $_2\text{Ba}$ crystals out first. In C_6H_6 the double compd. is somewhat dissociated as shown by f. p. detns.; in AcOH and veratrole it is nearly completely dissociated. That this is a true chem. compd. and not a solid soln. is shown graphically by the melting curve of the system $\text{BzOH} + m\text{-O}_2\text{N.C}_6\text{H}_4\text{CO}_2\text{H}$. The curve shows 2 eutectics with the m. p. of the double compd. lying as a max. between them. The m. p. of BzOH is 120° . The first eutectic is at 109° with 88 mol. % BzOH . The other eutectic is at 120° with 20% mol. % BzOH . The $m\text{-O}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$ m. 141.5° . The double compd. with 50 mol. % of each m. 139° .

E. J. WITZEMANN.

4,4'-Diphenylsemicarbazide as a reagent for the recognition of carbonyl derivatives. B. TOSCHI AND A. ANGIOLANI. Univ. Bologna. *Gazz. chim. ital.* 45, I, 205-13 (1915).—In a preceding paper (C. A. 8, 3018), the prepn. of $\text{Ph}_2\text{NCONHNH}_2$ (a) was described. As a result of further work it has been found to be an excellent reagent for the detection of C:O groups and is in many cases to be preferred to $\text{NH}_2\text{CONHNH}_2$, because it is quite stable as the free base, gives less sol. and more easily purified derivs. and reacts more quickly. The diphenylsemicarbazones of the aliphatic C:O derivs. are obtained most conveniently by treating the (a)-HCl in H_2O with an aq. or aq. EtOH soln. of the C:O compd. and the calcd. amt. of NaOAc. They are cryst., little sol. in H_2O , sol. in dil. acids, by which they are hydrolyzed with the formation of the original C:O deriv. The diphenylsemicarbazones of the sugars will be described in another paper. To obtain the diphenylsemicarbazones of the aromatic aldehydes it was best to treat the aldehyde with free (a) in EtOH. These are mostly difficultly sol. in cold EtOH and are pptd. in cryst. form. They are easily hydrolyzed by hot dil. acids. The aromatic ketones also react instantaneously with (a), while the reaction with $\text{NH}_2\text{CONHNH}_2$ is very slow. Several diphenylsemicarbazides of the terpene series and of hydroaromatic compds. were also studied. The action with carvone is peculiar and needs further investigation. Two g. of (a)-HCl + 0.5 g. acetone + excess NaOAc gave a white cryst. ppt. of acetone 4,4'-diphenylsemicarbazone, sol. in dil. HCl (warm HCl regenerates both components), m. 119° . In the same way were obtained the 4,4'-diphenylsemicarbazones of acetaldehyde, needles from Et_2O , m. $133-4^\circ$; *enanthole*, needles from dil. EtOH, m. $133-4^\circ$; *ethyl acetoacetate*, crystals from Et_2O , m. $103-4^\circ$; *glucose*, white needles with 1 H_2O , m. $164-6^\circ$, loses H_2O in *vacuo* gradually but not completely; *cinnamaldehyde*, yellow needles from MeOH, m. $164-6^\circ$; concd. H_2SO_4 gives an orange-red color; *cuminaldehyde*, crystals, m. 162° ; *salicylaldehyde*, needles from EtOH, m. 209° ; concd. H_2SO_4 gives a yellow color, *vanillin*, needles, m. $180-1^\circ$; concd. H_2SO_4 gives a yellow color; *piperonal*, yellow needles from EtOH, m. 173° ; concd. H_2SO_4 gives an orange-red color; *benzophenone*, needles, from EtOH, m. $186-7^\circ$; *citronellal*, crystals, m. $109-110^\circ$; *camphor*, needles from petr. ether, m. $154-5^\circ$.

E. J. WITZEMANN.

The action of bromine on carbon monoxide. A. PIVA. Ist. tech. Palermo. *Gazz. chim. ital.* 45, I, 219-37 (1915).—In a preceding paper with G. Levi (cf. C. A. 8, 2037) the compn. of gases formed by the decompn. of Na and Ca formates by heat was studied and the question whether or not CO reacts with Br in the analysis of the gases was considered. The literature, which is carefully reviewed, gives conflicting statements as to whether CO acting with Br in the sunlight gives COBr_2 or not. Careful expts. were made under a variety of conditions. The method used was as follows: approx. equal quantities of Br were sealed into small glass tubes which had been previously carefully cleaned and dried in a desiccator over CaCl_2 . The Br in each tube was weighed by weighing the tubes before filling and after sealing. They were then introduced into 100 cc. gas pipets of the proper form, the pipets were filled with carefully dried CO and the ends also sealed. The Br tube was broken inside by shaking roughly and the contents exposed to the kind of illumination selected for a definite interval. At the proper time the Br remaining unchanged was detd. as follows: One end of the pipet was broken off by striking it against the bottom of a suitable vessel containing 100 cc. of neutral 10% KI soln. The free I was finally titrated with 0.1 N $\text{Na}_2\text{S}_2\text{O}_3$. It was found in 6 expts. in diffuse light exposed 10, 20, 40, 160, 240 and 320 hrs. that 1.75, 2.77, 3.55, 6.40, 8.92 and 10.56%, resp., of the Br was used up by the CO. Thus the quantity combined increases with the time but the velocity of reaction very quickly diminishes so that an equil. is reached. Another series of expts. was made to see if the light is indispensable. In the dark for 32 hrs. only 0.94% Br was used and since with

dry N_2 0.82% Br was apparently used the apparent effect is ascribed to impurities in the Br. In direct sunlight for 2, 4, 8 and 32 hrs., resp., CO absorbed 2.96, 6.90, 7.63 and 9.49% Br, showing that in the light equil. is approached much faster. In the 1st series the Br combined in the first 10 hrs. was 1.75%; in the 2nd for the 1st hr. it was 1.48%. The Br was especially and carefully purified and the CO now combined in the sunlight 1.89 and 2.29% Br in the 1st 8 and 32 hrs., resp., thus showing that the reaction is very much diminished by the removal of the impurity, which was thought to be mostly H_2O . The blank expt. with N_2 here showed an apparent loss of Br of only 0.018%. There are 2 possible interpretations of the disappearance of Br: (1) $CO + Br_2 \rightarrow COBr_2$ and $COBr_2 + H_2O \rightarrow CO_2 + 2HBr$; (2) $Br_2 + H_2O \rightarrow 2HBr + O$ and $CO + O \rightarrow CO_2$. Since it cannot be certain that the last traces of H_2O were removed it cannot be said that either process was excluded. The expts. were repeated using moist CO. In 80 and 160 hrs. 40.39 and 48.07% Br, resp., were combined in diffuse light. In direct sunlight 46.01% Br was combined in 32 hrs. With the idea that the HBr pressure interfered with the reaction some H_2O was placed in the tubes and the reaction repeated. In diffuse light in 10, 40, 60 and 160 hrs. 31.10, 58.20, 63.00 and 79.95% Br, resp., were combined. In the direct sunlight in 16 and 32 hrs. 70.48 and 78.7% Br, resp., were combined. In the dark 21.1% Br were combined in 32 hrs. Other expts. show even more clearly the quant. effect of the presence of H_2O . Since the velocity of reaction in the expts. made in conditions as nearly dry as possible was not quite zero it must still be admitted that $COBr_2$ may be formed as an intermediate product, even if only in small amts. Definite exclusion of this possibility could not be attained since very small traces of H_2O cannot be readily excluded. So that it is possible that $COBr_2$ is formed as an intermediate product in the oxidation of CO with Br and H_2O and is always formed only in the amts. capable of being decompd. by the H_2O present. The end products are in every case only HBr and CO_2 . E. J. W.

Ferric salts of organic acids (WEINLAND) 6. Reactions of sodium ethylate with methyl iodide and with substituted benzenes (ROBERTSON) 2.

II. BIOLOGICAL CHEMISTRY.

WILLIAM J. GIES, EDGAR G. MILLER, JR., PAUL E. HOWE.

A. GENERAL.

FRANK P. UNDERHILL.

The influence of acids on the activity of dialyzed maltase. W. KOPACZEWSKI. *Ann. inst. Pasteur* 29, 157-64 (1915). See C. A. 8, 1791. GEO. T. CALDWELL.

The chemistry of rice-polishings. H. FRASER AND A. T. STANTON. Kuala Lumpur. *Lancet* 1915, I, 1021-22.—Fowls weighing about 1200 g. ordinarily consumed about 60 g. of unpolished rice daily. If fed on 60 g. of polished rice, they required in addition 5 g. of polishings for the maintenance of wt. and health. Polishings were extd. twice with 0.3% HCl. The polishings after extn. were tested and found valueless. Alc. was added to the ext. so as to bring the mixt. up to the strength of proof spirits. The ppt., which consisted of phytin, was rejected. The filtrate was nearly neutralized, concd. at a low temp. and its vol. so adjusted that 30 cc. of this soln. contained the material sol. in proof spirit from 5 g. of polishings. Fowls were fed on polished rice and once daily were given 30 c. of this soln. Their health was maintained. By making the proof spirit alk. to the extent of 0.5% with NaOH, a ppt. was obtained which in daily amts. representing 5 g. of polishings failed to maintain the health of the fowls. Likewise fowls which received this filtrate after neutralization and the removal of the alc. developed a polyneuritis. The inference from these expts. is that NaOH in weak soln. destroys the active substance. G. T. CALDWELL.

Enzymic adaptations. II. Lactase. R. BOMPIANI. Rome. *Arch. farm. sper.* 19, 423-38(1915).—The blood, the pancreatic and enteric secretions, and extracts of the pancreas, intestine and salivary glands of the adult dog contain no lactase. Although it was not possible to demonstrate lactase in the salivary glands after administration of lactose, the presence of this enzyme in the pancreas and the intestine was demonstrated beyond doubt after parenteral, intravenous or subcutaneous injection of lactose. A. W. DOX.

The membrane as the seat of chemical work. A. TSCHIRCH. Univ. Bern. *Arch. Pharm.* 252, 537-46(1914).—The conception that chem. work is due solely to plasma is held to be untenable. On the contrary, it appears certain that the membrane, especially that of intercellular nature or derivation, which must be colloidal in character, acts as the seat for very energetic work, both analytic and synthetic, either alone or through the help of enzymes. W. O. E.

Action of butyric acid in fertilization. A. BRACHET. *Compt. rend.* 159, 642-4 (1914).—B. claims that the fertilization membrane that is formed by the action of butyric acid in artificial fertilization is an accessory rather than an essential feature of the process. E. M. FRANKEL.

The influence of balanced and non-balanced salt solutions upon the osmotic pressure of the body liquids of Fundulus. JACQUES LOEB and HARDOLPH WASTENEYS. Rockefeller Inst. *J. Biol. Chem.* 21, 223-38(1915); cf. *C. A.* 7, 617, 1887.—The depression of the f. p. of the body juices of *Fundulus* was detd. after keeping the fish in sea water (and other balanced solns.) and in non-balanced solns. of different concns. In 0.5 *M* sea water, the osmotic pressure of the body juices diminished to a certain limit. This decline can be inhibited by feeding. Balanced solns. in excessive concn. increase the osmotic pressure of the body juices. In non-balanced solns. this change is much more marked. It is less with hypertonic solns. of NaCl than with solns. of the same concn. of Na₂SO₄, NaBr, etc. This is probably due to the fact that in the latter case the fish die as a result of the toxic action of the salt before a marked increase in the osmotic pressure of the body juices can occur. The expts. are regarded as supporting the view that non-balanced solns. increase the permeability of the cell.

I. GREENWALD.

The relation of the quality of proteins to milk production. E. B. HART and G. C. HUMPHREY. Univ. Wisc. *J. Biol. Chem.* 21, 239-53(1915).—Expts. on cows, with diets containing 9-10% protein, of which 7% was digestible, showed that milk proteins were more efficient in securing a positive N balance and continued milk flow than were corn or wheat proteins. When the latter were fed, there was a negative N balance but no decrease, at least for some time, in the amt. of milk protein or of milk solids produced. The loss of flesh was quite evident. The importance to the dairyman of the relative efficiency of different proteins in milk production is emphasized. I. GREENWALD.

Studies on the reductase of liver and kidney. III. The influence of heat, light and radium emanations on the activity of reductase. DAVID F. HARRIS and HENRY J. M. CREIGHTON. *J. Biol. Chem.* 21, 303-8(1915); cf. *C. A.* 9, 1489.—The reductase of cat liver is inhibited by heat, temp. as low as 30° producing a perceptible diminution in activity. The degree of inhibition increases slowly with the temp. to about 65°, then very rapidly. At 72°, heating for 3 min. completely inactivates the enzyme. Light and Ra Em have no appreciable effect on the activity of reductase.

I. GREENWALD.

Tissue fibrinolysins. MOYER S. FLEISHER and LEO LOEB. Barnard Hosp., St. Louis. *J. Biol. Chem.* 21, 477-501(1915).—Tissues have the power to dissolve coagulated plasma. This may be coagulated about the piece of tissue or may be coagu-

lated first and the tissues then placed upon it. The action is assumed to be due to the presence of fibrinolysins. "Certain organ systems, especially the genito-urinary and nervous systems, contain fibrinolysins. Heating organs to 56° for 30 min. renders them inactive. Various species of animals differ in the fibrinolytic power of their organs; there also exist great variations in the solubility of different kinds of blood. The liver counteracts the effect of the fibrinolysins. The substances found in certain organs, which inhibit the coagulation of the blood, are perhaps identical with the fibrinolysins. The fibrinolysins have a considerable biological significance in preventing growth processes; they are antagonistic to the tissue coagulins which promote growth processes. The fibrinolysins do not seem to be identical with those splitting ferments which produce autolysis."

I. GREENWALD.

Relative efficiency of various parts of the spectrum for the heliotropic reactions of animals and plants. J. LOEB AND H. WASTENEYS. *J. Exp. Zoölogy* 19, 23-35(1915).—The most efficient region in the spectrum for the production of heliotropic curvatures in the hydroid *Eudendrium* is situated in the blue at 4735 Å.u. This region coincides approx. with the one found by Blaeuw for the seedlings of oats, namely 478 Å.u. (cf. *Rec. travaux botaniques Néerlandais* 5, 209(1909)). The regions in the red, orange and yellow are practically without effect in both *Eudendrium* and *Avena*. B. H.

Problems of biochemistry in the next twenty-five years. F. QUADE. *Z. angew. Chem.* 28, I, 265-8(1915).—A general statement of the present state of progress of biochemistry and suggestions for future development. E. H.

Osmotic equilibrium between blood and milk. F. H. VAN DER LAAN. Utrecht. *Chem. Weekblad* 12, 522-41(1915).—Freezing-point detns. were made on milk and on defibrinated blood, to det. whether or not osmotic equil. exists between them. With the same cow, the mean of 26 f.-p. lowerings for the blood and for the milk were identical (0.546°). The mean f.-p. depression detd. by the author for blood from 21 cows was 0.522°; all the f.-p. detns. found in the literature lead to a general mean of 0.55°, the values ranging from 0.53 to 0.57°. Increase or decrease in food supply is without effect on the f.-p. depression of the blood. Strong artificial diln. or concn. of the contents of the alimentary canal may influence the f. p., but both blood and milk are affected the same. Udder diseases which do not affect the general health of the animal do not affect the f.-p. depression of the milk; that of milk from a diseased teat is the same as that from a sound teat on the same cow. Increases occasionally observed are due to bacterial infection.

GEORGE W. MOREY.

Experimental study of lipolytic action. K. G. FALK. *Proc. Nat. Acad.* 1, 136-142(1915).—A review of the author's work (cf. *C. A.* 6, 2625; 7, 2230, 2580; 8, 1435, 2733; 9, 634, 1922) on the influence of various conditions upon the activity of esterases and lipases. The hydrolytic action of lipase owes its specific character to 2 effects: (1) The pptn. or coagulation of the enzyme by the substrate; (2) the effect of the enzyme on substrate, which is due to the presence in the former of special groupings. These groupings may be similar to those contained in simpler nitrogenous substances, such as amino acids, which also bring about hydrolysis of esters. W. A. PERLZWEIG.

Relation of mitochondria to granules of the vital azo-dyes. KATHERINE J. SCOTT. Johns Hopkins Med. Sch. *Science* 41, 834-5(1915).—A cytological study of those cells in the subcutaneous tissue of mice that react to azo dyes revealed no cases of identity between granules produced by azo dyes and mitochondria. W. A. P.

Catalase reaction of milk (TAYLOR) 12. Determination of chlorine in vegetable matter (DE JONG) 7.

B. METHODS AND APPARATUS.

STANLEY R. BENEDICT.

The use of the naphthaline-sulfochloride method for detecting the partial hy-

drolysis of flesh albumin. WALTHER LOB. *Chem. Ztg.* 39, 369-70(1915).—L. gives results confirming those of Bergell and Fischer (*C. A.* 8, 2404). The following improved method has been devised: The albumin is removed from the soln. from fresh meat, or ext., prepared exactly according to B.'s method, by boiling with salt and AcOH, the filtrate neutralized and treated in the usual way with naphthaline-sulfochloride and the alk. aq. layer filtered and acidified. The viscous and finely divided ppt. is allowed to stand long in the cold, the supernatant liquid poured through a filter, the ppt. washed well by decanting with cold H₂O, then dissolved in a little hot dil. NaOH soln. which is poured through the filter into a graduated flask, washed and the N found in an aliquot part by Kjeldahl's method. J. H. MOORE.

Simple and accurate method for the estimation of chlorides in albuminous liquids. C. GAZZETTI. *Arch. fisiol.* 11, 81-8(1914).—A small, measured quantity of the liquid is dild. with H₂O in a 100 cc. flask, 3 cc. of 50% ferric alum soln. are added, the pptd. ferric albuminate is dissolved by the addition of conc. HNO₃ drop by drop, and a measured excess of 0.02 N AgNO₃ soln. is added to the clear soln.; the colloidal matter in the soln. prevents the pptn. of AgCl. The mixt. is dild. with H₂O to about 97 cc., and is then made up to the mark by the addition of conc. HNO₃. This causes the flocculation of the albumin and the pptn. of AgCl. The whole is filtered, and in 50 cc. of the clear filtrate the excess of AgNO₃ is estd. by titration with 0.02 N KCNS soln.

H. S. PAINE.

Detection of albumin in urine. ZOICHER. *Boll. chim. farm.* 52, 504(1913).—Z. recommends the substitution of a 20% citric acid soln. for the 20% AcOH soln. in the detection of albumin in urine; citric acid tablets of 0.5-1.0 g. may be used to advantage. The use of citric acid together with K₄Fe(CN)₆ is believed to afford an accurate test for albumin in urine.

H. S. PAINE.

Modification of the Heller ring test for the detection of albumin in urine. MICHEL. *Boll. chim. farm.* 52, 718(1913).—M. recommends the substitution of HNO₃ of sp. gr. 1.4 satd. with NH₄NO₃ for the HNO₃ usually employed in the Heller test. The use of the new reagent facilitates the production of a distinct zone of contact between the HNO₃ and urine, thus rendering the ring more readily perceptible in case albumin is present. When the 2 layers of liquid are mixed a distinct turbidity is produced; the latter disappears with the production of a light yellow coloration when the mixt. is heated and reappears on cooling if a considerable amt. of albumin is present. When ordinary HNO₃ is employed as a reagent the turbidity is dissipated on mixing the 2 layers and does not reappear.

H. S. PAINE.

Detection of albumin in urine. R. C. HOLT. *Boll. chim. farm.* 52, 719(1913).—In the Heller test a dense, dirty white ring (sometimes merely a cloudy appearance), which differs from the ring formed at the point of contact with albumin, is formed above the zone of contact of the urine and HNO₃. This reaction is obtained only in cases of pneumonia and then only in fresh urine; it is not produced in 24 hr. urine.

H. S. PAINE.

Diascopy of traces of blood. ANGELO DE DOMINICIS. *Boll. chim. farm.* 53, 162-3(1914).—In the case of dried blood adhering to certain objects it is sufficient to remove a tiny particle and carefully crush it in a trace of oil of origanum upon a glass slide with the rounded end of a small glass rod. A small drop of a satd. soln. of eosin in paraldehyde is then added and the prep. is ready for observation; artificial light (with proper manipulation of the diaphragm) is employed. The prep. may be preserved with a drop of euparal. If the blood has been absorbed by some substrate material, a portion of the latter (including both blood and substrate) is rasped with a scalpel to a fine powder and treated as above. A more lightly tinted paraldehyde soln. of eosin may be employed and the object under exam. may be crushed directly in the

paraldehyde soln. of eosin if desired. The stained corpuscles may be readily detected (either isolated or in groups). This procedure is superior to other methods of investigating blood traces in that it may be applied to very minute particles of blood. This method is especially advantageous in examining traces of blood upon rusty Fe; the blood pigment is soon destroyed under these conditions and the stroma becomes colorless, so that diascopy is the only means of detecting such blood traces. H. S. P.

Determination of quinine in the urine. M. NISCHL. *Boll. chim. farm.* 53, 737 (1914).—Quinine in the urine may be detd. quant. as the citrate. The latter may be obtained by satg. the quinine (extd. with Et_2O) with citric acid dissolved in Et_2O . The urine is rendered strongly alk. before shaking with Et_2O . Detn. by this method showed that 34.35% of the quinine introduced into the organism was excreted in the urine after 72 hrs. (25% in the first 24 hrs.). Fe and As ingested with the quinine had no influence either on the absorption or the elimination of the quinine.

H. S. P.

A simple colorimeter for use in the phenolsulfonephthalein test for kidney function. J. S. BROTHERHOOD. Grand Rapids. *J. Am. Med. Assoc.* 64, 1757(1915).—This consists of a rack to hold 14 test-tubes containing the standard solns. and a sliding shield to hold the tube whose content is to be measured.

L. W. RIGGS.

Thorium—a new agent for pyelography. J. E. BURNS. Baltimore. *J. Am. Med. Assoc.* 64, 2126-7(1915).—Solns. of $\text{Th}(\text{NO}_3)_4$ cannot be used on account of their irritating action and the pptn. of insol. salts in the urine; also when intravenously administered, intravascular clotting is produced. The neutral soln. of $\text{Th}(\text{NO}_3)_4$ and $\text{Na}_2\text{C}_2\text{H}_3\text{O}_7$ possesses the necessary opacity to Röntgen rays, and apparently all other desirable qualities. To make 100 cc. of a 10% soln. 10 g. of $\text{Th}(\text{NO}_3)_4 \cdot 6\text{H}_2\text{O}$ are dissolved in as little H_2O as possible; to this soln., kept hot on a water bath, 30 cc. of a 50% soln. of $\text{Na}_2\text{C}_2\text{H}_3\text{O}_7$ are added in small amts. with stirring. A white ppt. is formed after the first addition of the citrate; this dissolves on further addition. This mixt. is then made neutral with N NaOH and H_2O added to 100 cc. On filtering a clear limpid soln. is obtained; its stability is not affected by boiling. "This soln. can be injected intravenously up to 1.5 cc. per kg. of body wt., and given by the stomach up to 4 cc. per kg. of body wt. in dogs without causing any change in the phenolsulfonephthalein output, blood urea content, hemoglobin content, or cellular elements of the blood."

L. W. RIGGS.

Retention stomach-tube for continuous study of stomach functioning. L. R. LANZA. *Riforma medica* 31, No. 21(1915); *J. Am. Med. Assoc.* 65, 208.—A very fine tube is used and is not introduced until after the meal in order to avoid stimulating the stomach to extra secretion or peristalsis. The tube is then retained, and the stomach contents examd. every 10 or 15 min. for a period of 2 hrs.

L. W. RIGGS.

Microchemical color reaction in the blood corpuscles. C. RUBINO. *Riforma medica* 31, No. 20(1915); *J. Am. Med. Assoc.* 65, 207-8.—The reagent is a filtered 10% alc. soln. of benzidine to which is added just before using 1 drop of H_2O_2 for each 25 drops of the benzidine soln. Freshly drawn blood is allowed to evap. and the reagent, prepd. as above, is added to the residue and left in contact for 3 min. The reagent is then washed off first in alc., then in running water and the specimen mounted in neutral balsam. The figured elements of the blood, when thus treated, assume different colors, none like that of the benzidine soln. itself.

L. W. RIGGS.

Goeldner's test for cocaine. LEON A. RYAN. *J. Am. Chem. Soc.* 37, 1960-1 (1915).—A repetition of G.'s test (*Pharm. Z. Russland* 28, 489; *Z. anal. Chem.* 40, 820(1901)) with chem. pure materials gave no response. Pure resorcinol and concd. H_2SO_4 give a faint yellowish color but cocaine-HCl does not bring out the "beautiful

corn flower-blue color." H_2SO_4 containing minute traces of nitrates or nitrites, however, does produce such a color with resorcinol alone. An amt. of KNO_3 equiv. to 0.000001 g. of N is sufficient to give the color. CHAS. A. ROULLIER.

The possibility of titrating the monosubstituted amino group of amino acids with formol. ANTONINO CLEMENTI. Univ. Rome. *Atti accad. Lincei* 24, I, 352-9(1915).—The Sørensen formol titration method (*Z. physiol. Chem.* 60, 2; 64, 120), which is based on Schiff's expts. and which permits of the titrimetric detn. of the quantity of amino groups in amino acids, has not as yet been applied to amino acids in which the amino group is partly or completely substituted. C. made expts. of this kind with sarcosine (methylglycine), $\text{MeNHCH}_2\text{CO}_2\text{H}$. It was shown that the amino group even if monosubstituted in this way, reacts with HCHO . It was found that sarcosine reacts with HCHO to give methylenedisarcosine, $\text{CH}_2(\text{NMeCH}_2\text{CO}_2\text{H})_2$, and reacts in the Sørensen formol titration like a monobasic acid. Sarcosine conducts itself in the titration just like glycine, except that the values are a little lower, so that in titrating monosubstituted amino acids according to Sørensen's method it is necessary to titrate to the intense red coloration of the phenolphthalein. E. J. WITZEMANN.

C. BACTERIOLOGY.

ERNEST D. CLARK.

The action of the rare earths on bacteria. A. SIMONINI. Wien. *Centr. Bakt. Parasitenk.*, I Abt. 76, 398-407(1915).—The cultural and morphological characteristics of bacteria are changed when they are treated with Th salts and grown again in bouillon. Cf. C. A. 8, 3315. JULIAN H. LEWIS.

The lipoids of blastomyces. A. AMATO. Univ. Palermo. *Centr. Bakt. Parasitenk.*, II Abt. 42, 689-98(1915).—Lipoids were demonstrated microchemically and chemically in *Saccharomyces ellipsoideus*. JULIAN H. LEWIS.

Bacterial action on tryptophan and indole. E. HERZFELD AND R. KLINGER. Univ. Zürich. *Centr. Bakt. Parasitenk.*, I Abt. 76, 1-12(1915).—Not only can indole-producing bacteria (*B. coli* and *Vibrio cholerae*) decompose tryptophan, but also those that do not produce indole (*B. typhosus* and others). The consumption of tryptophan is decreased markedly if other protein cleavage products are supplied, as is the case with peptone culture media. Many bacteria produce more tryptophan through peptolysis than they can destroy; others have such a small peptolytic action that the tryptophan is all decomposed as quickly as it is formed. Several bacteria can destroy free indole but cannot form indole. JULIAN H. LEWIS.

The *Streptococcus mucosus*. Its capsule and its pathogenic properties. W. L. HOLMAN. Univ. Pittsburg. *J. Path. Bact.* 19, 478-85(1915).—*Streptococcus mucosus* grown in lactose serum develops a capsule that is plainly visible in moist unstained preps. The capsule is probably made visible by the action of its own acids of fermentation on the albuminous material in the capsular substance. The resistance of this capsule to the solvent power of water, alc., ether, dil. acids and other substances is very high. It is rapidly dissolved by *N* NaOH and by glacial AcOH. A glucoprotein was not demonstrated in the capsules. Considerable discussion of the pathogenicity of the organism is given. JOHN T. MYERS.

Use of ethyl chloride in the sterilization of bacterial cultures and the preparation of bacterial vaccines. ALBERT BERTHELOT. Pasteur Inst. *Compt. rend. soc. biol.* 76, 29-30(1914).—B. claims priority, as against L. Camus, for the application of Et chloride in the sterilization of bacterial cultures and the purification of vaccines. The following technic is recommended: Reduce the temp. of the bacterial culture or vaccine to 0° by placing the container in ice and introduce 1-2 cc. of liquid Et chloride for each 10 cc. of emulsion, using a capillary jet. Shake the mixt. gently, place the container in a Dewar tube and allow to stand 24-48 hrs. The Et chloride may then be rapidly

expelled by placing the container in a bath of warm H_2O . In the case of certain bacteria sterilization by means of Et chloride is slower than that produced by Et_4O . Some bacteria which are very resistant to heat must be in contact with Et chloride for more than 48 hrs. in order that sterilization may be effected, while other species merely suffer a diminution in vitality after a period of 24 hrs. contact. It is, therefore, necessary, before expelling the Et chloride, to ascertain definitely that sterilization has been effected. Et chloride is preferable to Et_4O in that the former is less volatile, less sol. in H_2O and does not contain transformation products.

H. S. PAINE.

Identification of the pathogenic members of the typhoid-colon group of bacilli. J. H. SMITH. *Brit. Med. J.* 1915, II, 1-5.—The method is based on the literature and the experience of the Lister Inst. One full and 3 abbreviated methods are described. Two tables show fermentations and other properties. A. H. RAHE.

Ger., 282,755, Feb. 4, 1914. E. BEINTKER. A stain for bacteria is prepared in solid form, and for use need only be dissolved in H_2O . These preps. are made by substituting sugar or the like for the alc. heretofore used. E. g., to obtain carbol fuchsin in solid form, for use as a stain for the tubercle bacillus, 1.0 part fuchsin, 5.0 of crystd. carbolic acid, 15.0 of lactose or pulverized sugar, are rubbed together. The resulting powder is made up into tablets. To obtain the soln., 2 g. of the powder are boiled with 10 cc. H_2O in a test tube.

Ger., 283,072, Feb. 11, 1914. K. HERTHA. Closure for side and bottom openings in glass vessels for growing bacteria and other organisms.

Ger., 283,112, Aug. 20, 1913. Addition to 229,970 (C. A. 5, 2698). F. BRAMIGK. Prepn. in powder form of dehydrated culture media for bacteria. In order to prevent increase of temp. above the necessary 37° , in the process of the principal patent, and yet to secure a rapid dehydration, the desiccation is effected *in vacuo*, whereby the period of drying is materially shortened and the danger of bacterial growth is at the same time lessened. In order to entirely remove this danger, the medium is sterilized with steam before subjecting to vacuum. The drying *in vacuo* can be favored by drawing preheated, filtered or sterilized air over the medium. The constituents of the medium may be separately prepared and dried and then mixed. This is especially desirable when one constituent (agar) can only be dehydrated after a very long treatment; so long a period of drying is not desirable for other constituents (albumin mols.).

D. BOTANY.

CARL L. ALSBERG.

The nuclein bases found in the shoots of *Aralia cordata*. K. MIYAKE. Tohoku Imp. Univ., Japan. *J. Biol. Chem.* 21, 507-9(1915).—An attempt to separate the nuclein bases of *Aralia cordata* was made. The presence of guanine and xanthine was proved. Adenine and hypoxanthine were not detected. I. GREENWALD.

Nature of the sugars found in the tubers of sweet potatoes. K. MIYAKE. Tohoku Imp. Univ., Japan. *J. Biol. Chem.* 21, 503-6(1915).—Sweet potatoes contain glucose, fructose and sucrose, but not pentose, galactose, mannose or maltose. I. G.

Inheritance of color in melandrium. GEORGE HARRISON SHULL. *Ber. deut. botan. Ges.* 31, 40-80(1913).—The presence of the inheritance factor *L*, which Bauer considers most necessary for the synthesis of chlorophyll, is corroborated. Without this factor the plant is entirely chlorophyll-free, and dies of starvation. Three various, non-Mendelian cases of bright-colored leaves are described, and their color inheritance discussed.

B. HOROWITZ.

Effects of illuminating gas on root systems. E. M. HARVEY AND R. C. ROSE. *Botan. Gas.* 60, 27-44(1915).—When illuminating gas is passed through soil the odorous constituents of the gas are readily absorbed by the soil particles and strongly held.

These odorous substances are very slightly, if at all, toxic to roots of plants growing in a soil containing them. The constituents of illuminating gas that remain in a gaseous state in the soil interstices are the chief cause of injury to root systems. Among these constituents ethylene is probably the most harmful, except in extremely high concns. of illuminating gas, where the toxicity of other substances, together with other factors, would be expected to play a part. With illuminating gas abnormalities appear in certain tree seedlings within 8-21 days, with concn. 1 part illum. gas to 4 parts air (air of the soil), or as low as 1 part of illum. gas to 40 of air. Ethylene alone, when used in concns. corresponding with those found in illum. gas, gives abnormalities similar in type and degree. High concn. of illum. gas results in the rapid killing of the roots. If illum. gas is allowed to flow very slowly through a soil in which woody plants are growing, abnormal tissue development in the root will very often ensue. In low concn. of illum. gas hydrolysis of starch and some other related chem. reactions are accelerated. By the use of etiolated sweet-pea seedlings, small amts. of illum. gas in the soil could be detected where the odor of gas was indistinguishable by the usual methods.

B. HOROWITZ.

Oxidation in healthy and diseased apple bark. DEAN H. ROSE. *Botan. Gaz.* 60, 55-65(1915).—Ext. of apple tree bark affected with Illinois canker causes greater and more rapid oxidation of pyrogallol than does the ext. of healthy bark. Diseased bark ext. is less acid than healthy bark ext., from which R. concludes that oxidation is in approx. inverse ratio to the acidity of the ext. in the range of concns. used. B. H.

A three-salt nutrient solution for plants. J. W. SHIVE. *Am. J. Botany* 2, 157-60 (1915).—S. found that the soln. giving best growth of wheat tops contained the 3 salts in the following volume-molecular partial concn.: KH_2PO_4 0.0180 *M*, $\text{Ca}(\text{NO}_3)_2$ 0.0052 *M*, MgSO_4 0.0150 *M*. This soln. produced better growth than Knop's soln. of the same total osmotic concn., and Tottingham's 4-salt soln. composed of KNO_3 , KH_2PO_4 , $\text{Ca}(\text{NO}_3)_2$ and MgSO_4 .

J. J. SKINNER.

The exchange of ions between the roots of *Lupinus albus* and culture solutions containing one nutrient salt. R. H. TRUE AND H. H. BARTLETT. *Am. J. Botany* 2, 255-78(1915).—Roots of *Lupinus albus* grown in darkness in distd. H_2O gave up their salts to the H_2O at a varying rate until the death of the plants through exhaustion of the reserves. KH_2PO_4 and KCl solns. act essentially like distd. H_2O in the concn. studied. Solns. of K_2SO_4 and KNO_3 show a slight absorption phase resulting in a minimal net gain in salts to the plant but otherwise differ little from the P and Cl. Absorption and growth take place in NaCl essentially as in KNO_3 and K_2SO_4 . Solns. of $\text{Mg}(\text{NO}_3)_2$ and MgSO_4 support a slight but clearly developed absorption phase resulting in a net gain in salts to the plant. A net leakage of salts is seen in the more dil. solns. and the toxic action in those of greater concn. $\text{Ca}(\text{NO}_3)_2$ and CaSO_4 in all concns. studied are actively absorbed by the roots and apparently enable the plants to retain possession of the salts already present.

J. J. SKINNER.

Biochemical investigation of the "Rübenschwanzfäule" of the sugar beet. J. BODNAR. Budapest. *Biochem. Z.* 69, 245-56(1915).—The first of the following figures is for the sound beet, the second for the diseased: H_2O -content, 73.8-78.9, 71.1-74.8; acidity, 14.2-20.2 cc. 0.1 *N* KOH, 24.8-63.1 cc.; cane sugar, 15.2-17.1, 6.9-14.8; invert sugar, 0.00-0.10, 0.35-1.62; ash, 3.92-5.16, 6.26-8.08; Al in ash, 1.42-2.57, 6.86-10.21.

C. J. WEST.

The diminution of electrolytes in germinating seeds. S. DEZANI AND T. BAROCELLI. Univ. Turin. *Atti accad. sci. Torino* 50, 169-80(1914).—In earlier expts. (C. A. 8, 3454) it was found that the elec. cond. of distd. water in which seeds were germinating gradually increased. These observations were followed out accurately

with *Zea mais* and it was found that in 48 hrs. 3.26% of the total inorganic matter, on the average, was transferred to the water.

E. J. WITZEMANN.

F. PHYSIOLOGY.

ANDREW HUNTER.

Composition and physiological activity of the pituitary body. FREDERIC FENGER. Chicago. *J. Biol. Chem.* 21, 283-8(1915).—"The posterior lobe of the pituitary body of the hog is twice as large in proportion to the wt. of the entire gland as in cattle. The physiol. activity of the posterior lobe, when detd. according to the isolated uterus method, is practically the same for cattle as for hogs. No distinct variation in activity and chem. comp. of the posterior lobe of the pituitary exists in cattle. Approx. 10% of beef glands contain colloid masses secreted between the anterior and posterior lobes. This material is insol. in acidulated H_2O and does not possess any pronounced uterine contracting power.

I. GREENWALD.

The synthesis of hippuric acid in nephrectomized dogs. F. B. KINGSBURY AND E. T. BELL. Univ. Minn. *J. Biol. Chem.* 21, 297-301(1915).—Using the methods described by Kingsbury (*C. A.* 9, 2259), hippuric acid was found in the blood and tissues of nephrectomized dogs, after administration of Na benzoate and glycine, thus proving that the kidney is not the only organ capable of synthesizing hippuric acid. I. G.

Vividiffusion experiments on the ammonia of the circulating blood. ALICE ROHDE. Johns Hopkins Univ. *J. Biol. Chem.* 21, 325-30(1915); *Proc. Nat. Acad.* 1, 357 (1915).—Confirming the observations of Medvedev (*C. A.* 5, 3292) it was found that in aseptically drawn blood there is a liberation of NH_3 on standing. In a dialysate obtained from circulating blood by the vividiffusion method (*C. A.* 8, 725, 3314) there is no liberation of NH_3 on standing. If the dialysis is continued until equil. between blood and dialysate is attained, the NH_3 content is the same.

I. GREENWALD.

Significance of certain internal conditions of the organism in organic evolution. F. H. PIKE AND E. L. SCOTT. *Am. Naturalist* 49, 321-59(1915).—The regulatory mechanisms are interpreted in terms of chem. equil.

B. HOROWITZ.

The cholesterol content of individual organs and the blood in hunger. V. Physiology of cholesterol metabolism. M. A. ROTHSCHILD. Univ. Freiburg. *Beitr. path. Anat.* 60, 227-31(1915).—In animals starved 2-9 days there was found an increase of cholesterol in the blood, bile, adrenals, and liver. The gall bladder epithelium and bile capillaries were free of anisotropic droplets. The increase of cholesterol in starvation indicates that it is the result of catabolism.

JULIAN H. LEWIS.

The relation of the spleen to cholesterol metabolism. VI. Physiology of cholesterol metabolism. W. B. SOPER. Univ. Freiburg. *Beitr. path. Anat.* 60, 232-44(1915).—If the lymphatic tissue of the rabbit is destroyed by mesothorium emanations, there is no change in the cholesterol content of the blood and the reticulo-endothelium is not injured. After extirpation of the spleen a gradual and marked increase in the cholesterol of the blood follows. The results can only be due to the removal of the reticulo-endothelium. The relation of the spleen to cholesterol metabolism, then, can be concerned only with this part of the organ. In hypercholesterolemia there is an increase of cholesterol in the spleen, especially in the reticulo-endothelium.

JULIAN H. LEWIS.

Nature of the nerve impulse. SHIRO TASHIRO. *Proc. Nat. Acad.* 1, 110-4(1915).—On the basis of his expts. on the correlation of the degree of irritability, of the direction and rate of the nerve impulse on one hand, and the production of CO_2 on the other, T. maintains that 2 chem. conditions are necessary for the conduction of the nerve impulse: (1) Excitability due to the presence of a chemically unstable substance of unknown constitution; (2) increase in chem. change at the place of stimulation must

be sufficiently greater than in its vicinity, the impulse then going in that direction, or there must be present a gradient of chem. activity. The nerve impulse is believed to be a propagation of chem. change, due to restoration of a metabolic equil. disturbed at the point of stimulation. This propagation proceeds toward the point of lesser chem. activity, as measured by the CO_2 output. W. A. PERLZWEIG.

The oxidizing power of oxyhemoglobin and erythrocytes. J. F. McCLENDON. Univ. Minn. *J. Biol. Chem.* 21, 276-81(1915).—Dog oxyhemoglobin and methemoglobin and goose hemoglobin rapidly oxidize α -naphthol, aloin, *p*-phenylenediamine and Vernon's substrate (α -naphthol and *p*-phenylenediamine) but not benzidine and guaiacol. H_2O_2 is not necessary. Laked erythrocytes oxidize Vernon's substrate more rapidly than do the same concns. of intact cells. This is probably due to the fact that in the latter case the hemoglobin is in the cells and cannot act until the substrate has reached it by diffusion. The use of induction shocks to increase the permeability led to inconclusive results. Cf. C. A. 9, 1920. I. GREENWALD.

Physiological climatology. II. W. A. OSBORNE. *J. Physiol.* 49, 133-8(1915).— H_2O evapd. from the skin of man was compared with that lost simultaneously from a moist sphere subjected to the same climatic conditions. Air temp. is the leading factor in causing skin evapn., but the relationship is not of the simple linear type. At high temps. H_2O is lost relatively more rapidly by the skin because of difference in temp. between the body surface and the evaporimeter, the latter being that of the wet bulb thermometer, the former more nearly that of the atm. J. F. LYMAN.

Influence of tonsil extract on the blood picture. C. B. FARMACHIDIS AND A. VATTUONE. *Policlinico* 22, No. 3(1915); *J. Am. Med. Assoc.* 64, 1537.—Both white and red corpuscles were increased in number under the influence of treatment with tonsil ext. Previous research described points to a glucolytic action by the ext.; also that this ext. is able to arrest the fatal toxic action of epinephrine. L. W. RIGGS.

Ventilation (WINSLOW) 14.

G. PATHOLOGY.

H. GIDEON WELLS.

The diagnostic value of uric acid determinations in blood. OTTO FOLIN AND W. DENIS. *Arch. Intern. Med.* 16, 33-7(1915).—"In gout the blood is invariably high in uric acid (U. A.), while the other waste-products represented in the non-protein N (N. P. N.) of the blood are usually within the normal limits. In arthritis also, the blood is not infrequently abnormally high in U. A., but such cases usually have abnormally high N. P. N. as well. Neither qual. tests for U. A. in the blood nor quant. detn. of the U. A. alone can be depended on in the differential diagnosis of gout and other joint diseases." For this purpose the patient must be put on a purine-free diet and the U. A. detns. accompanied by detns. of the N. P. N. (or urea). I. GREENWALD.

The relation of calcium to the delayed coagulation of the blood in obstructive jaundice. ROGER I. LEE AND BETH VINCENT. *Arch. Intern. Med.* 16, 59-66(1915).—Blood from a case of obstructive jaundice showed a very slow coagulation time. The addition of CaCl_2 shortened this to within normal limits. The administration of Ca lactate to the patient led to a shortening of the coagulation time after a few days. The addition of a small amt. of bile to normal blood delayed clotting. This delay could be obviated, if not too much bile were used, by the addition of CaCl_2 . In a dog, in which an exptl. obstructive jaundice was produced by ligation and resection of the common bile duct, there was a marked lengthening of the coagulation time, which could be shortened by the addition of CaCl_2 . It is suggested that the bile delays clotting by combining the Ca of the blood in such a manner as to make it unavailable for the clotting process. I. GREENWALD.

Complement fixation in pertussis. MIRIAM OLMSTAD AND PAUL LUTTINGER. N. Y. Board of Health. *Arch. Intern. Med.* 16, 67-85(1915).—"Complement fixation tests on sera from 111 cases of pertussis or suspected pertussis support the theory that the Bordet-Gengou bacillus is the etiological factor in the disease. The complement-fixation test may be of value in the diagnosis of doubtful cases of pertussis."

I. GREENWALD.

A study of the several factors of acid excretion in nephritis. WALTER W. PALMER AND LAWRENCE J. HENDERSON. *Arch. Intern. Med.* 16, 109-31(1915).—"The cases of nephritis studied are divided into 2 groups: (1) Cases in which the vol. of urine is large, its acidity intense and the total acid excretion much diminished (due to very low urinary NH_3). "In this group the later stages of glomerulonephritis predominate. It is usual to find high non-coagulable N, a much reduced phenolsulfonephthalein excretion, a high blood pressure, large amts. of albumin and a low sp. gr. of the urine." (2) Cases in which the vol. appears to be almost normal, acidity high, total acid excretion low, but not infrequently normal. The degenerative type of nephritis and earlier stages of glomerulonephritis occur more frequently in this group. The non-coagulable N, though often increased, is not always strikingly so. Phenolsulfonephthalein excretion is moderately, or even markedly, diminished. Blood pressure varies widely and albumin occurs in small amts. The sp. gr. of the urine is higher than in the first group. Cf. C. A. 8, 1982.

I. GREENWALD.

The Wassermann reaction in typhus exanthematicus. CONSTANTIN DELTA. *Centr. Bakt. Parasitenk., I Abt.* 76, 50-4(1915).—"The Wassermann reaction is constantly positive in typhus exanthematicus with either syphilitic or typhus antigen. It is negative at first, positive during defervescence, then negative after 2 mos.

JULIAN H. LEWIS.

The transmission of immunity against fowl cholera from mother to offspring. PHILIP B. HADLEY. *Centr. Bakt. Parasitenk., I Abt.* 76, 196-208(1915).—"This paper presents data on the inheritance in rabbits of immunity to infection with the bacterium of fowl cholera (hemorrhagic septicemia). It is demonstrated (1) that, contrary to previous results of other workers, female rabbits immunized by inoculation with a certain avirulent strain of fowl cholera bacterium, are able to transmit to their offspring a high degree of resistance to a virulent culture; (2) that some mothers are able to produce such immune offspring for more than 2 yrs. and 3 mos. after the date of immunization; (3) that resistance is not transmitted by immune males; (4) that as a rule the inherited resistance of the offspring does not endure for more than 40 days; (5) that this transient, inherited, passive resistance can be transformed into a durable active immunity by inoculating the young animals, sometimes within the first 40 days of life with small amts. of virulent culture; (6) that the method of immunity-transmission may have a practical application in the protection of animals against infection. JULIAN H. LEWIS.

The presence of so-called complement in milk. R. T. HEWLETT AND CECIL REVIS. Univ. London. *Centr. Bakt. Parasitenk., I Abt.* 76, 337-47(1915); cf. C. A. 9, 1197.—"In the case of mastitis milk, amboceptor may be present as well as complementary substance, but this would not be detectable in admixture with other milk. Colostrum gives evidence of its presence in 5% diln. with other milk. Even in the slighter forms of mastitis, complementary substance is present in the milk long after subsidence of the inflammatory condition. There is no connection to be traced between the number of cellular elements and the presence of the complementary substance, though the appearance of the latter is often accompanied by a rise in the number of the former. The above mentioned hemolytic system is of extraordinary delicacy in the case of milk. There is some doubt as to the true nature of the complementary substance in milk.

JULIAN H. LEWIS.

The biological reactions of the vegetable proteins. VI. The anaphylactic reaction with so-called proteoses of various seeds. H. GIDEON WELLS AND THOMAS B. OSBORNE. *J. Infect. Dis.* 17, 259-75(1915); cf. *C. A.* 8, 1824.—Substances that correspond in their solubility to animal proteoses obtained by dialyzing NaCl soln. exts. of seeds are distinguishable by means of the anaphylactic reaction from the other reserve proteins of the seeds. The proteoses obtained from different seeds and grains are also quite distinct from one another. They exhibit strong anaphylactic properties and cause very severe anaphylactic intoxication when injected into sensitized guinea pigs, even in minute doses (0.001 to 0.0005 g. being fatal doses with some of them). Their activity in this respect resembles that of the sol. animal proteins, such as egg-white, serum, etc., and greatly exceeds that of any of the other vegetable proteins (globulins, alc.-sol. proteins, etc.) which have been studied. This high anaphylactic activity seems to depend upon their great solubility in the body fluids. Their activity is not destroyed by heating to 100° for 1/2 hr., presumably because of their incoagulability. In their anaphylactic power these natural proteoses differ sharply from proteoses obtained from animal proteins by digestion with enzymes, or by chem. hydrolysis, such artificial products being almost, if not entirely, non-anaphylactogenic. Furthermore, those products of hydrolysis which result from heating vegetable proteins with acids, with H₂O under pressure, or by peptic digestion, have, so far as they have been tested, no anaphylactic properties. From these facts it would seem that the vegetable proteoses belong to a group of proteins which are chemically different from any heretofore recognized. They resemble highly sol. native proteins in their anaphylactogenic capacity, and are probably quite as complex in their chem. constitution. Their designation as proteoses is consequently improper. This differentiation of so many of these proteose preps. from the other proteins in the same seed is a striking example of the fact that the specificity of the anaphylaxis reaction is not dependent on biologic origin, but on chem. constitution. These expts. show also that these sol. proteins, which occur in the seeds of so many species of plants, are as distinct from one another as are the other more abundant proteins. The results described in this paper demonstrate that anaphylaxis furnishes a useful means for detg. the purity of protein preps. obtained from plant exts., in so far as contamination with the other proteins of the same seed are concerned.

JULIAN H. LEWIS.

Sensitization by protein cleavage products. E. HAILER. *Arb. kais. Gesundh.* 47, 527-40(1915).—Guinea pigs may be sensitized toward various sera by the use of protein cleavage products obtained by the digestion of beef or pork with steam, acids, or peptic or tryptic enzymes, also by the use of various com. exts. or preps. either containing coagulable protein or not. However, such sensitization is not specific, even when a sp. protein is present in the sensitizing serum. This confirms the observations of Uhlenhuth and Haendel. Cf. *C. A.* 4, 1198.

BERNARD RAYMUND.

Chemical constituents of water and diseases (MORGEN) 14.

H. PHARMACOLOGY.

ALFRED N. RICHARDS.

Is strychnine an antagonist of stovaine? ITALO SIMON. Univ. Padua. *Arch. farm. sper.* 19, 412-22(1915).—Injection of strychnine does not increase the resistance of rabbits to stovaine, nor modify the behavior of the respiratory center toward this drug.

A. W. DOX.

A case of fatal poisoning by the American water hemlock. ANON. *Pub. Health Bull. of Mass. Board of Health* 2, 50-2(1915).—Symptoms are nausea, vomiting, vertigo, widely dilated pupils, convulsions, loss of consciousness, quickly passing into coma and rigor mortis. All of this happens in an hour. An ext. was made of the root of the plant and from its action on a frog it was found that a poison of the picrotoxin or cicu-

toxin group was present. This plant is sometimes taken for "*Sium cicutaefolium*," which is eaten by children. They differ in that the stems of the poisonous plant are quill-like while those of "*Sium*" are strongly corrugated or furrowed. Because of odor and texture, it is also sometimes mistaken for parsnips, artichokes, sweet cicely, horseradish or other edible roots.

J. GAUB.

The relation of the purgative action of magnesium sulfate to peristalsis and the general law of crossed innervation. S. J. MELTZER. Rockefeller Inst. *Arch. Intern. Med.* 15, 955-63 (1915); cf. *C. A.* 5, 711; 8, 2575, 3695.—There are 2 phases to peristalsis: (1) contraction of a portion of the intestine; (2) relaxation of that portion of the intestine immediately below the contracted part. $MgSO_4$ given intravenously or introduced directly into the lumen of the intestine of rabbits inhibits peristalsis. It is believed to increase the intensity of the inhibitory phase. The combination of a substance having this action with one, such as ergot, that augments the contractile phase of peristalsis, leads to a very rapid peristaltic wave. It is suggested that when $MgSO_4$ is given by mouth some Na_2SO_4 is formed (by interaction with $NaCl$). This increases the active phase of peristalsis; the remainder of the $MgSO_4$ intensifies the inhibitory phase. The consequence, as in the case of ergot and $MgSO_4$, is a very rapid peristalsis or purgation.

I. GREENWALD.

Digitalis dosage. CARY EGGLESTON. Cornell Univ. Med. College. *Arch. Intern. Med.* 16, 1-32 (1915).—"The cat method of standardization of digitalis yields results on which the dose for man can be based. The av. therapeutic dose of digitalis, given orally to man in the form of the tincture or infusion, is 0.146 "cat unit" (cat unit = the amt. of the drug which is just sufficient to kill 1 kg. of cat when slowly and continuously injected into the vein), or about 0.146 cc. of an av. high-grade tincture, per lb. of body wt., as established by 33 observations. Fifteen observations have established 0.066 cat unit or 0.023 mg. per pound as the av. therapeutic dose of cryst. digitoxin. In approx. 0.5 of a total of 48 courses of administration of either digitalis or digitoxin, full therapeutic effects were secured with doses falling within 15% above or below the av. dose. Doses considerably larger than the av. were taken in 17 instances without the production of more than mild toxic symptoms. The activity of the prep. of digitalis has no material influence on the dose required in terms of cat units. Age, sex and cardiac condition do not seem to influence the size of the dose required. Both digitalis and digitoxin are probably rapidly and fairly uniformly absorbed from the alimentary canal of men, but digitalis is less completely absorbed than is digitoxin. Stropanthus, the stropanthins, ouabain, true digitalin and some others are poorly or irregularly absorbed when given by mouth or to the higher animals and are unsuitable for therapeutic use in this way."

I. GREENWALD.

The clinical action of veratrum. RUSSEL J. COLLINS. *Arch. Intern. Med.* 16, 54-8 (1915).—"The therapeutically effective dose of the tincture of *Veratrum album* for adults ranges from 30 to 75 minims. Clinically, the effects of veratrum resemble the pharmacologic effects, and consist of a slowing of the pulse-rate amounting to from 12 to 42 beats per min. and a fall of systolic blood pressure amounting to about 39, of the diastolic, 32 mm. The 2 hypertension cases showed a fall of systolic blood pressure amounting to about 49 mm., of the diastolic, of about 8 mm. The circulatory effects produced by veratrum take place independently of the "toxic" symptoms such as nausea and vomiting."

I. GREENWALD.

The symptoms of urined poisoning. FRANK A. HARTMAN. *Arch. Intern. Med.* 16, 98-108 (1915); cf. *C. A.* 8, 3816.—Urined is toxic to frogs, lizards, mice and man. The lethal dose in frogs is from $1/800$ to $1/800$ of the body wt. Of this, most is not absorbed, so that the true lethal dose is probably much smaller. "The symptoms produced by urined ordinarily are: nausea, headache, loss of appetite, heaviness of the stomach

after meals, twitching, irritability of temper, mental dullness, physical weariness, drowsiness, dyspnea, convulsions and a state of non-irritability. The symptoms of urino poisoning resemble the nervous symptoms of uremia. Urino retention, therefore, might partly account for these nervous symptoms." I. GREENWALD.

The influence of salicylates upon the uric acid concentration of the blood. MORRIS S. FINE AND ARTHUR F. CHACE. *J. Biol. Chem.* 21, 371-5(1915).—The administration of Na salicylate or of aspirin lowered the concn. of uric acid in the circulating blood. Except in 1 case, the concn. of uric acid in the blood returned to its former level after medication ceased. I. GREENWALD.

Quantitative criteria of antagonism. W. J. V. OSTERHOUT. *Botan. Gas.* 58, 178-86(1914).—The method of mixing equally toxic solns. furnishes the best criterion of antagonism, since it is known at the outset just what effect each mixt. must have, provided there is no antagonism. Mixts. of 2 equally toxic solns. must have precisely the same effect on growth as the pure solns. themselves, provided that the effects of the salts are additive. If antagonism exists there is increased growth in the mixts. The amt. of this increase, expressed as % of the growth obtained in the pure solns., is a means of measuring antagonism. The most reliable results are obtained by the use of uniform material and by taking for measurement only such parts as come into immediate contact with the soln. B. HOROWITZ.

Anesthesia by phenylethylmalonylcarbamide. W. L. SYMES. *J. Physiol.* 49, 126-32(1915).—Physiol. action of the Na salt of methylethylmalonylcarbamide (luminal) is described for cats. 0.2 g. per kg. body wt. produces prolonged anesthesia, which reaches a max. after several hrs. There is no marked diuresis. Cats may be kept unconscious for days and recover completely. The anesthetized animal is markedly poikilothermic; hence the temp. of the room must be carefully regulated during the expt. Rabbits may be rapidly anesthetized by intravenous injection of a 10% soln. J. F. LYMAN.

Note on the treatment of the symptoms arising from inhalation of irritant gases and vapors. W. L. SYMES. *Brit. Med. J.* 1915, II, 12-3.—A preliminary report. Br vapor was administered to pithed cats under artificial respiration: The effect of the vapor is rapid, or gradual, obstruction of trachea. In some cases profuse broncharrhea appeared in the course of an hour. Little or no relief is afforded by intravenous injection of broncho-dilator drugs, but inhalation of same or similar drugs moderated symptoms. Amyl nitrite, atropine, adrenaline, stramonium (leaf infusion), lobelia, tobacco, opium and CHCl_3 were tested. Stramonium was the most successful. A. H. RAHE.

Action of the opium alkaloids, individually and in combination with each other, on the coronary artery and the coronary circulation. D. I. MACHT. Baltimore. *J. Am. Med. Assoc.* 64, 1489-94(1915); cf. *C. A.* 8, 175, 1466, 1997, 3694.—Rings about 2 mm. thick from the fresh coronary arteries of the pig were used. Two, 3 or 4 of these are joined together tandem fashion, and suspended in a glass chamber filled with Locke soln. at 37°; through this a const. stream of O is kept bubbling. In case of narcotine, Ringer soln. must be used in place of the alk. Locke which ppts. the alkaloid. Great care must be taken to keep the temp. and flow of O constant. The Locke soln. should be prepd. with glass-distd. water to avoid metals in soln. The prep. is then weighted by trial; the optimum condition of tonus for each prep. has to be detd. by selecting the proper wts. The test is then made by removing the Locke soln. and introducing in its place the substance to be tested dissolved in oxygenated Locke soln. at 37°. The alkaloids tested were morphine, narcotine, papaverine, codeine, narceine, and thebaine. The first three produced the greatest dilatation of the coronary, increasing in the order indicated. Codeine produced much less dilation, narceine and

thebaine practically none. Heroin behaved like codeine. Comparatively small therapeutic doses of the alkaloids produced relaxation. In the case of papeverine-HCl, 1 mg. in 100 cc. of soln. gave a distinct dilation. A combination of morphine and narcotine produces much less relaxation of the coronary artery than that produced by each of them individually. It is suggested that this antagonism is due to the different molecular structures of these alkaloids in their respective pyridine-phenanthrene and benzyl-isoquinoline groups. Expts. were made on excized hearts, and on the intact animal (cat). Caffeine singly was found to dilate the coronary artery, and this action was not antagonized by the opium alkaloids. L. W. RIGGS.

Lead neuritis from cosmetics. L. R. SANTE. St. Louis. *J. Am. Med. Assoc.* 64, 1573-4(1915); cf. *C. A.* 9, 1204.—Cases of poisoning by the use of "flake white" as a cosmetic are reported. L. W. RIGGS.

Distribution of arsenic in liver tissue in cases of poisoning. LEON A. RYAN. *J. Am. Chem. Soc.* 37, 1959-60(1915).—Analyses of the left lateral, left + right central, and caudate + right lateral lobes of the livers of dogs to which Na_3AsO_3 had been administered subcutaneously or in the food until death resulted showed that the As was uniformly distributed throughout the liver tissue. CHAS. A. ROUILLER.

Two poisonous plants. A critical review and experimental study of the yew (*Taxus baccata*) and the bryony (*Bryonia alba* and *B. dioica*). DIETRICH JENSEN. *Rostock Inst. Pharm. physiol. Chem.*, Separate 1-57(1914); through *Chem. Zentr.* 1915, I, 211-2.—The pulp of the ripe fruit of the yew is non-poisonous; the kernel contains the taxin. This substance is pptd. from its satd. soln. in very dil. NaCl soln., by NaCl, NH_3 , NaOH, phosphotungstic acid, phosphomolybdic acid, potassium mercuric iodide, KI_3 , Esbach's reagent, AuCl_3 and $(\text{NH}_4)_2\text{SO}_4$. With concd. H_2SO_4 it gives a red color and with Killiani's reagent a red ring; KMnO_4 is decolorized in both acid and neutral soln. In CHCl_3 with a layer of concd. H_2SO_4 a brown ring is formed. The unripe fruit is perhaps more poisonous than the ripe. Taxin is not toxic to fish. Rabbits, guinea pigs, and cats, if the dosage is cautiously increased, can stand many times the lethal dosage subcutaneously without harm. These animals thus become comparatively immune to this poison very quickly. Game and cud-chewing domestic animals stand moderate amts. of yew needles without harm; horses and other solipeds, though more susceptible, likewise soon easily accustom themselves to taxin. It may be exdtd. from the urine, into which it passes unchanged, by Et_2O , after adding Na_2CO_3 . The action of taxin consists in motor excitation of the central nerve system, followed by paralysis. Fresh bryony root is much more active than the dried, and the former gives a good yield of active substance only in late autumn. Two glucosides can be obtained from the roots gathered in October; *bryonin* (sol. in H_2O), which is inactive, and *bryonidin* (insol. in H_2O), which paralyzes the nerve system when parenterally applied. Taken internally, bryonidin may act as a purgative. *Bryonia* does not merit therapeutic use. NORMAN A. SHEPARD.

Various cases of poisoning. FLEISSIG. *Schweiz. Apoth. Ztg.* 53, 252-3(1915).—Kanngieser records the symptoms of exptl. self-poisoning with berries of *Daphne mezereum* and the use of uzara as antidote. R. Beck reports on poisoning by nutmeg, A. Guth (*Corresp. Bl. f. Schweizer Aerzte* 1915, No. 9) on a toxic effect on the kidneys, bladder and urethra by a certain porous plaster. Other poisonous principles reported on are fungi (Roch), *Solanum nigrum* (Kanngieser and Hager) and *Euphorbia lathyris* (H. Wegelin). S. WALDBOTT.

Toxic symptoms among workers in calcium cyanamide factories (KOELSCH) 4.

I. ZOÖLOGY.

R. A. GORTNER.

Formation of fats from proteins in the eggs of fish and amphibians. J. F. Mc-

CLENDON. Univ. Minn. *J. Biol. Chem.* 21, 269-81(1915).—"During the development of the *Cryptobranchus* egg there is an increase in the fatty acids of about 8%. During the development of the brook-trout egg this increase is about 5.6%. In these eggs the vitellin is the chief reserve material and it seems probable that it is transformed into fatty and other substances."

I. GREENWALD.

Conditions of activation of unfertilized starfish eggs under the influence of high temperatures and fatty acid solutions. RALPH S. LILLIE. *Biol. Bull.* 28, 260-303 (1915).—In order to induce favorable development an exposure of 3-4 times the minimum for membrane formation (*e. g.*, 7-8 min. at 32°) is required; more prolonged exposures are followed by failure to develop. Brief exposure to *N*/260 butyric acid causes membrane formation followed by a breakdown; longer exposures cause cleavage and development to larval stages, and still longer exposures produce cytolysis without development.

B. HOROWITZ.

Absorption of fat by fresh water mussels. E. P. CHURCHILL, JR. *Biol. Bull.* 29, 68(1915).—The first of a series of papers in which C.'s object is to state whether or not animals living in water use dissolved food from the surrounding medium in addition to "formed" food, and also whether, if such dissolved food be used, it is absorbed by the alimentary tract alone or to some extent by the epidermis. He found that fat dissolved in water is absorbed by fresh-water mussels, through the epithelium of the intestine, and probably also by that of the gills, mantle and foot. The fat is transported both by the blood corpuscles and by the plasma directly.

B. HOROWITZ.

Respiratory function of the air stores carried by some aquatic insects (Corixidae, Dytiscidae and Notonecta). RICHARD EGE. *Z. allgem. Physiol.* 17, 80-124(1915).—The air store carried by some air-breathing aquatic insects has a respiratory and not a hydrostatic function alone. When the O pressure in the supply is lowered, O must diffuse into it on account of the O tension-difference between the air and water. The amt. of O that diffuses into the animal's supply of air depends on the tension-difference and on the area of the free surface of the supply. The surface through which the invasion takes place is, in the insects examined, so considerable that the O invasion is able to maintain the life of the animals, even at a temp. of 15-20°. As the CO₂ produced by the animal diffuses out much more rapidly than the O diffuses in, a tension-difference is established for N. N therefore diffuses from the supply of air into the water. During the stay of the animal in the water, the supply of air therefore decreases and finally disappears. This is the chief reason why the animals cannot live indefinitely in the water.

B. HOROWITZ.

Autolysis and involution. MAX MORSE. *Am. J. Physiol.* 36, 145-52(1915).—Tails from involuting and non-involuting frog larvae underwent autolysis at equal rates as shown by N not pptd. by tannic acid and by amino acids produced; hence it appears that autolysis is not accelerated in the atrophying tissues of the larval frog.

J. F. LYMAN.

12. FOODS.

W. D. BIGELOW AND F. F. FITZGERALD.

Tamarind sirup. W. C. TABER. *J. Ind. Eng. Chem.* 7, 607-9(1915).—Six sirups were prepared and analyzed. Organoleptic tests agree closely with the opinions of the best manufacturers that 2 lbs. of whole tamarinds to the gal. are necessary to produce the distinct flavor and desirable degree of acidity.

ISADOR MILLER.

Hydrolysis of sugar solutions under pressure. W. S. HUBBARD AND W. L. MITCHELL. *J. Ind. Eng. Chem.* 7, 609-10(1915).—An attempt has been made to det.

under what conditions hydrolysis of sugar (for the prepn. of invert sugar sirups for industries requiring a heavy sirup) can be carried on successfully without caramelization.

ISADOR MILLER.

Concise group method for the detection of gelatinizing agents, pasty material and thickeners used in food products. L. A. CONGDON. *J. Ind. Eng. Chem.* 7, 606-7 (1915).—C. divides all the above products into 6 groups according to the reagent (reactions given) used in their detection: (1) I soln.; (2) Millon's or Stoke's reagent ($\text{HgH}(\text{NO}_2)_2$); (3) concd. soln. Na borate; (4) soln. of NaOH; (5) soln. of HgCl_2 ; (6) Schweitzer's reagent (soln. of cupra-ammonia).

ISADOR MILLER.

The cause of dark color in canned corn. W. D. BIGELOW AND H. M. MILLER. Research Lab., National Canners Assoc., *Bull.* 6, 7 pp. (1915).—The cooker and filler used in canning corn sometimes is not completely tinned. When for any reason a period of several days elapses without the app. being used, a film of oxide appears to form; this is invisible, but yields a trace of Cu to the first corn passing through it, probably because of the salt that is added to the corn. This Cu combines with H_2S (always formed in the cooking of foods containing nitrogenous material), with the formation of CuS. The presence of 0.001% CuS gives corn a preceptibly dark color, while 0.003% makes it practically black. A method for obviating the difficulty is suggested.

The relation of the refraction, specific gravity and solids in tomatoes and tomato pulp. W. D. BIGELOW AND F. F. FITZGERALD. *J. Ind. Eng. Chem.* 7, 602-6 (1915).—As a result of the exam. of a considerable number of fresh and canned tomatoes, and of pulps made up under known conditions, tables have been constructed to facilitate analytical work. The generalizations given below are within the limits of analytical error. The filtrate referred to is obtained by throwing a sample of tomato pulp, or crushed tomato product, on a folded filter. Raw tomatoes should be cooked previously in a reflux condenser. The solids are determined by drying *in vacuo* at 70° and under atmospheric pressure at the temperature of boiling water; solids of pulp *in vacuo* = solids of pulp at atmospheric pressure $\times 1.085$; solids of pulp *in vacuo* = solids of filtrate *in vacuo* $\times 1.12$; solids of filtrate *in vacuo* = solids of filtrate at atm. pressure $\times 1.125$. From the sp. gr. of the filtered liquid at 20° the % of solids of the pulp (not of the filtrate) may be ascertained from the Windish wine table (Table V, *Bull.* 107, Bureau of Chem.). The figure 0.05 should be deducted from the percentage of solids given in that table. The solids of the filtrate may be ascertained from the index of refraction, using Wagner's table for beer and wine ext. This table is applicable without correction to the juice of fresh or canned tomatoes. When applying it to the filtrate from pulp of the usual concn., the figure 0.17 should be deducted from the % of solids as given. If the product has been salted, the NaCl should be detd. and a corresponding correction made in the refractive index.

Carrying over of silicic acid in milk by sterilization in glass flasks. B. PRYL. *Arb. kais. Gesundh.* 48, 321-9 (1915).—A process was devised for the detn. of minute amts. of SiO_2 in milk. Using this method tests were made on the amt. of SiO_2 in raw milk and milk which had been sterilized in the usual manner in glass bottles. While 500 cc. of the original sample of milk contained from 0.8 to 1.1 mg. of SiO_2 , the increase in SiO_2 in milk which had been heated in previously used glass bottles amounted to only 0.0 to 0.7 mg. Unused bottles employed for the first time yielded 0.2 and in the case of cheap bottles 13.2 mg. SiO_2 to 500 cc. of milk. These amts. of SiO_2 are negligible as compared with the amts. taken by children in the form of barley water, infants' foods, spinach, etc. Comparatively speaking the amts. of SiO_2 taken by adults in their food are quite appreciable.

C. A. NOWAK.

Studies relating to the chemistry of milk and casein. New York Agr. Expt. Sta., *Tech. Bull.* 37, 3-11(1914). 1. The cause of acidity of fresh milk of cows and a method for the determination of acidity. LUCIUS L. VAN SLYKE AND ALFRED W. BOSWORTH. 2. The phosphorus content of casein. ALFRED W. BOSWORTH AND LUCIUS L. VAN SLYKE. See C. A. 8, 3663. 3. The action of rennin on casein. II. ALFRED W. BOSWORTH. See C. A. 9, 810.—The acidity of fresh milk is due to the presence of acid phosphates. To det. the acidity, the Ca must be removed previous to titration by treatment of 100 cc. of milk with 2 cc. of satd. soln. of (COOK).

R. C. ROARK.

Examination of evaporated milk. W. D. BIGELOW AND F. F. FITZGERALD. Research Laboratories, National Canners Association, *Bull.* 5, 23 pp.(1915).—The results are given on collaborative work on several methods for the detn. of fat in evapd. milk. The Adams method is only of value from a historical standpoint. If the fat obtained by it is purified by soln. in petr. ether, the results are always low. The Paul method is unreliable for the same reason. "On the whole, this method is long and tedious, and the results are unsatisfactory." The Babcock method and two modifications, which were studied, were found to be only approx. It is pointed out that the method usually employed for reading the fat column in the Babcock tube (reading over all) gives too high results with evapd. milk. The Röse-Gottlieb method alone was found to give accurate results.

Hydrocyanic acid content of bitter and sweet cassava. A. E. COLLENS. Dept. Agr., Trinidad and Tobago, *Bull.* 14, 54-6(1914); *J. Soc. Chem. Ind.* 34, 630.—The following quantities of HCN were found in (a) sweet and (b) bitter cassava plants, the detns. being made immediately after the plants had been dug up: Leaves, (a) 0.0162, (b) 0.041; peel of stem, (a) 0.043, (b) 0.113; pith of stem, (a) 0.019, (b) 0.076; edible portion of root, (a) 0.0048, (b) 0.053%. The HCN content of different parts of the freshly dug roots was the same, but after keeping for 3 days the upper part of the sweet roots contained about twice as much as the bottom portion; loss of water during air-drying also caused the HCN content to increase. When sweet cassava was boiled with water for 1 hr., or roasted, no HCN was developed.

E. J. C.

Baking without grain flour. A. FORNET. Berlin. *Chem. Ztg.* 39, 388(1915).—Potato starch or rice starch used as a substitute for wheat flour in baking, gives a product which is not light and porous, because the dough is not sufficiently elastic and tough to retain the CO₂ during baking. The "Versuchsanstalt für Getreideverarbeitung" has overcome this difficulty by adding materials which give to the dough physical properties similar to those of gluten. (It is not stated what those substances are.) The product is very similar to wheat bread in appearance and taste. Analysis gave H₂O, 39.25; ash, 3.43; fat, 4.35; crude fiber, 0.32; protein, 2.28 and starch, 50.37%.

J. H. MOORE.

Catalase reaction of milk. H. B. TAYLOR. *Proc. Roy. Soc. N. S. Wales* 48, 319-32(1914).—T. discusses the action of milk and an active product obtained from it on H₂O₂. Two methods of study were used. The first, which is suitable for work with milk and H₂O₂, consisted in treating a definite vol. of a mixt. of milk and H₂O₂ at any stage of its reaction, with H₂SO₄ which stops all action and ppts. the caseinogen. The method is as follows: Treat 5 cc. of a mixt. containing 15 cc. 0.1 M H₂O₂ and 50 cc. of milk with 20 cc. 0.2 N H₂SO₄. Filter and analyze the filtrate for H₂O₂ colorimetrically by comparison with a standard soln. of H₂O₂, Ti sulfate being used for the color indicator. Tables are given showing the effect on the rate of decompn. of H₂O₂ when milk is present. The second method is intended for use with pure catalase prepd. from milk. To prep. the soln. of catalase add to 500 cc. of milk HOAc to ppt. the caseinogen; with NaOH make alk. to methyl red and acid to phenolph and filter; treat

the filtrate with 800-900 cc. 90% alc. Filter off the ppt., free from alc. by drying *in vacuo* and treat with H_2O in presence of $CHCl_3$. The resulting soln. is used directly or after dialyzing through parchment paper. Increasing concn. of H_2O_2 decreases the rate at which it is decompd. by the catalase. Increasing temp. increases the rate of decompn. up to an optimum of about 25° and then the rate decreases, due to the destruction of the enzyme by higher temps. The rate of destruction is increased by increasing concn. of H_2O_2 and by increasing temp. At 15° it is $2\frac{1}{2}$ times and at 50° over 200 times as great as at 0° . KCN and HCN decrease the activity of the enzyme, but increase its resistance to destruction by H_2O_2 . Numerous tables show the exptl. data and the velocity consts. of decompn. of H_2O_2 and of destruction of the catalase under varying conditions.

P. J. DONK.

The manufacture of condensed milk, milk powders, casein, etc. R. T. MOHAN. *Chem. Eng.* 22, 11-5(1915); see C. A. 9, 1515.

E. J. C.

Quantitative determination of the amino acids of feeding-stuffs by the Van Slyke method. H. S. GRINDLEY, W. E. JOSEPH AND M. E. SLATER. *J. Am. Chem. Soc.* 37, 1779-81(1915).—The V. S. method applied to cottonseed meal, tankage and alfalfa hay gave the following resp. results, expressed in % of the total N of the feeding-stuff: Ammonia N, 10.45, 6.58, 8.44; melanine N, 7.78, 4.40, 15.79; arginine N, 19.52, 14.15, 7.68; cystine N, 0.65, 1.28, 0.88; histidine N, 5.47, 4.97, 7.44; lysine N, 4.78, 7.48, 4.10; amino N in filtrate from bases, 42.82, 52.39, 44.02; non-amino N in filtrate from bases, 5.43, 7.27, 9.79. A table is also reproduced, giving the results in % of the feeding-stuff.

CHAS. A. ROUILLER.

Tests of the Humphries-Thomas method for the moisture treatment of grain products. J. BUCHWALD AND M. P. NEUMANN. *Z. ges. Getreidew.* 5, 24(1913); *Chem. Tech. Rept.* 38, 48(1914).—The baking properties of flour are improved by exposing it to a current of warm moist air and adding at the same time Na_3PO_4 and malt ext. Flour with more than 15% H_2O does not keep well.

H. L. OLIN.

Determination of lint in cottonseed meal. R. N. BRACKETT. Clemson College. *J. Ind. Eng. Chem.* 7, 611-2(1915).—Soln. by $ZnCl_2$ is employed. ISADOR MILLER.

The use of potatoes in baking. M. P. NEUMANN. *Ber. pharm. Ges.* 25, 131-41 (1915).—An address dealing mainly with the prep. of various potato products and their application in making domestic and commercial bread.

W. O. E.

The chemical analysis of molasses. R. O. BAIRD. N. Dakota Agr. Expt. Sta., *Special Bull.* 3, No. 17, 291-4(1915).—Analyses of 29 samples of molasses are given.

R. C. ROARK.

A comparison of the value of the four types of hard red spring wheat, namely: Marquis, Velvet Chaff, Bluestem and Fife. T. SANDERSON. N. Dakota Agr. Expt. Sta., *Special Bull.* 3, No. 17, 294-303(1915).—Results of milling and baking tests are given in tables. From the data at hand, Marquis is best, followed by Bluestem, Fife and Velvet Chaff.

R. C. ROARK.

Determination of chlorine in vegetable matter (DE JONG) 7. Sugars in sweet potatoes (MIYAKE) 11D.

U. S., 1,145,021, July 6. F. M. KELLOGG. A puffed cereal food is made by mixing wheat bran with twice its wt. of gluten dough, heating to expand the mixt. into a puffed cellular state and then baking.

U. S., 1,145,140, July 6. V. HENRI, A. HELBRONNER and M. VON RECKLINGHAUSEN. Apparatus for sterilizing milk, etc., by the action of ultraviolet light. Cf C. A. 9, 111, 1214.

U. S., 1,145,333, July 6. G. O. PENN. Candied fruit peel. See Brit., 24,224, 1913 (C. A. 9, 1082).

U. S., 1,145,609, July 6. J. NEELY. Apparatus for generating bleaching gas for treating flour.

U. S., 1,145,862, July 6. J. L. GOUCHER. Apparatus for purifying milk or other foods by electrolysis.

U. S., 1,147,489, July 20. J. J. EASTICK and J. J. A. DE WHALLEY. Feed for cattle and other stock is made by heating sphagnum with about 3.5% of SO_2 and then steaming under 100 lbs. pressure per sq. in. to hydrolyze the material.

U. S., 1,147,558, July 20. A. SHELMEKDINE. Apparatus for electrically sterilizing milk or cream. Cf. C. A. 8, 187, 1628.

U. S., 1,147,626, July 20. K. ERSLEV. Margarin is treated with 0.5-1.0% of lactate of an alkali metal during the process of manuf. to preserve the buttery aroma.

Brit., 6,365, Mar. 13, 1914. R. T. SEWELL. An app. for treating palm fruit, etc., consists of an upper vessel wherein the fruit is acted upon by beaters, and a steam generator beneath, from which the steam passes to the material under treatment.

Brit., 6,930, Mar. 19, 1914. J. SCHWARTZ and W. H. SCHWARTZ. A prepn. for making horse-radish sauce consists of dry powdered horse-radish, corn-flour, etc., and condiments such as mustard, cayenne pepper, salt, and sugar, with or without milk powder. The sauce is prepared with hot milk or H_2O , and, if desired, butter and vinegar.

Brit., 7,383, Mar. 24, 1914. J. E. SHACKLETON. Treating wheat, flour, or stock with the liquor obtained in the usual conditioning process of steeping or washing wheat in H_2O . Dust or other matter removed from wheat by scouring may be steeped in the liquor, which may also be used several times in the conditioning process, may be concd., is preferably allowed to stand till acid, and may be filtered. The liquid, which contains proteins, N, H_3PO_4 , and H_2SO_4 , potash, MgO , and sugars, is utilized for soaking wheat, the skin of which may be cracked or perforated while still damp, for spraying on flour or stock or for mixing dough in bread-making, and acts as a yeast food and nutritive ingredient. Matter recovered from the liquor by concn. may be added to flour or stock.

Ger., 281,644, Sept. 4, 1913. W. F. L. BETH. Process and app. for drying bananas, or other fruit. The skinned fruit (bananas) is steamed, powdered with banana meal, and then dried.

Ger., 282,369, Aug. 31, 1913. P. FERCHLAND. Construction of a drying apparatus for potatoes.

Ger., 282,799, Sept. 30, 1913. F. MÜLLER. Machine for sepgg. the press mats from oil cakes.

Ger., 282,973, July 3, 1913. K. M. SPENGLER. Manuf. of a cola preparation. The roasting of the cola bean with a view to obtaining a permanent prepn. results in the conversion of a portion of the alkaloids (caffeine with some theobromine) from the combined to the free form, which is less active. This conversion is prevented in the improved process by fermenting the ground beans in their own juices for a time before roasting. At the same time the volatile oils, which give rise to the unpleasant taste, are removed. In carrying out the process the fresh beans are first ground and allowed to lie in heaps for 3-6 days to ferment in their own juices. The resulting product is then subjected to a roasting process at $180-200^\circ$ until the granules have been thoroughly roasted. The product thus obtained has a mild aromatic taste and does not differ in its action, in any way, from the fresh bean, but may be kept for a year.

The prepn. is used by boiling up in hot H_2O , and thickening the resulting liquor by the addition of sugar. The ext. can, moreover, be used directly, as coffee or tea, for a beverage.

Ger., 283,044, July 2, 1912. A. SAMUEL. In mfg. artificial sausage skins, a suitable absorbent material, such as a fabric, or the like, having the form of the intestine, is impregnated with fresh flesh. Raw meat is ground repeatedly until it forms a thin slurry; a suitably shaped skin of fine mull, or the like, is coated with this slurry, and the impregnated fabric is dried. The slurry may be further dild. with H_2O , and binders or preservatives may be added. The blood plasma and serum of freshly slaughtered animals may be used as diluent and binder. This product does not crack and upon drying the sausage it does not wrinkle. Any desired form may be given to it. Smoking is facilitated and the material is cleaner than the natural skin.

Ger., 283,346, Sept. 4, 1912. A. QVALE. Preserving fish and other foodstuffs by packing in shredded peat which has been taken from a depth. The preservative constituents of peat are missing from the surface layers.

14. WATER, SEWAGE AND SANITATION.

EDWARD BARTOW.

Report of committee on water purification. W. H. DURBIN, Chairman. *Proc. 8th Ann. Conv. Ind. San. & W. S. Assoc.* 1915, 50-56.—The final report of the N. E. W. W. A. Comm. on Stan. Statistics is referred to as applying to the Evansville filter plant. Very little data are given. D. K. FRENCH.

The Madison, Ind., water supply. J. W. MOORE. *Proc. 8th Ann. Conv. Ind. San. & W. S. Assoc.* 1915, 87-90.—The first supply was taken direct from the Ohio River, then from the infiltration wells in the bed of the river, now from wells sunk near the bank of the river. The first two methods were unsatisfactory from a sanitary point of view. The water at present is pronounced good. D. K. FRENCH.

Determination of reaction in waters. H. KLUT. *Wasser u. Abwasser* 9, 337-41 (1915).—A critical discussion (nothing new) of the use of various indicators such as litmus, rosolic acid, Congo red, methyl orange and phenolphthalein. A. L.

Boiler waters of Iloilo province. G. W. HEISE. *Philippine J. Sci. (A)* 10, 75-9 (1915).—Analyses of water for boiler purposes from 34 sources are given. It is concluded that much better supplies are available than are being used at the present.

W. F. LANGEЛИER.

Water supply for city of Iloilo. G. W. HEISE. *Philippine J. Sci. (A)* 10, 65-72 (1915).—Three proposed sources of supply were investigated. Artesian water contains from 300 to 1800 p. p. m. Cl. Tigon River if impounded would furnish abundance of good water but estimated cost of the project is too high. Analyses of water from Tigon R. indicate turbidity 0, color 0, residue 390, Cl 16, SO_4 54, Fe 0.7, alkalinity 50 p. p. m. Spring water from upland sources of Guimaras Is., 3 km. across the straits, is of good quality and could be delivered to consumers at reasonable cost.

W. F. LANGEЛИER.

The new water supply of the fishing harbor at Ymuiden (Holland). ANON. *J. Gasbel.* 58, 250-3 (1915).—The plant consists of an intake, an iron removal app. and filter house, a clear water reservoir, and a water tower. A max. of 100 cu. m. per hour can be furnished. ARTHUR LEDERER.

The effect of filtration and sterilization on typhoid fever in Philadelphia. F. D. WEST. *Munic. J.* 39, 111-2 (1915).—The bacterial results at the Torresdale plant, together with typhoid statistics, demonstrate conclusively the benefits of water disinfection. ARTHUR LEDERER.

Akron's water purification plant. *Munic. J.* 38, 725-8(1915).—This rapid filter plant handles a population of 75,000. The novel feature is the filter bottom of the Wheeler strainer type, using graded spherical balls in pyramidal cups 8.8 in. sq. on the base. A brass tube $\frac{3}{4}$ in. diam. enters the apex, the jet of water lifting the balls slightly during wash. L. PEARSE.

Slow sand filtration of water. JOSEPH RACE. *Can. Engr.* 28, 595-9(1915).—Slow sand filtration depends on mechanical, physical and biochem. action. The changes effected chemically, largely reduction of free NH_3 , are slight. The bacterial reduction should be high. A table shows the relation between rate of filtration and removal of bacteria. Slow rates prolong runs, but the quantity filtered remains const. The rate of 6.05 mil. gal. per acre per day appears economical. The rate of filtration should be kept const. Color is not affected by slow sand filters. Excessive turbidities require use of a coagulant. L. PEARSE.

The war and potable water. E. A. MARTEL. *Rev. hyg. pol. sanit.* 37, 449-90 (1915).—M. discusses the contamination of subterranean waters, inhumation and exhumation on battle fields, sanitation of devastated regions, and safeguards of potable waters. W. H. FRY.

The Moor water of Schwartau, its composition and use, Niederstadt. Z. öffent. Chem. 31, 71-3(1915).—This is a deep brown, clear water (sp. gr. 1.0030), which gives no ppt. on standing. It is recommended as a bath water. In 1 liter there is 1.7592 g. of residue composed of SiO_2 0.0245, Fe_2O_3 0.0154, CaSO_4 0.0812, K_2SO_4 0.0256, Na_2SO_4 0.0208, KCl 0.0444, NaCl 0.0348, MgCO_3 0.0268, K_2CO_3 0.6350, Na_2CO_3 0.4870, humic acid 0.3637 g. H. A. LEPPER.

Water works of Valparaiso, Ind. E. L. LOOMIS. *Munic. Eng.* 49, 9-12(1915). ARTHUR LEDERER.

Chemical constituents of water and their relation to non-specific diseases. H. G. MORGAN. *Proc. 8th Ann. Conv. Ind. San. & W. S. Assoc.* 1915, 94-99.—M. describes the relation of alk. earth and other salts in water to such diseases as goiter, kidney and bladder stones, arterio-sclerosis, diarrhea, indigestion, etc., laying special stress upon the subject of goiters. This has been considered more or less of a water-born disease, but investigation has failed to show any decided relation between sol. salts and goiters. A deficiency in I is suggested as the most probable cause. D. K. F.

The standards for drinking waters used in interstate carriers. H. E. JORDAN. *Proc. 8th Ann. Conv. Ind. San. & W. S. Assoc.* 1915, 38-42.—J. discusses and criticizes the recent govt. standards (C. A. 9, 675) and their relation to municipal supplies. D. K. FRENCH.

Potash waste lyes and drinking water. J. H. VOGEL. *Chem. Ind.* 38, 1-5(1915).—A general review and discussion of the permissible limits of the content of waste lyes in drinking H_2O with especial consideration of the recent publications of Gärtner (*Z. Hyg. Infekt.-Krankh.* 79, 1-129 (1914)). F. W. SMITHER.

The utilization of the "upper surface-subterranean" water for bathing purposes. H. KÜHL. *Z. öffent. Chem.* 20, 393-7(1914).—The term "upper surface-subterranean" water is used to designate water of ponds or lakes owing their origin to subterranean streams. Results of chem. and mycological exam. of a water from a lake of this type are given with conclusions drawn therefrom. H. A. LEPPER.

Fat from precipitated muck and the disposal of the residue. H. BECHHOLD. Frankfurt a/M. *Chem. Ztg.* 39, 283-4(1915).—B. discusses the utilization of the fat present in sewage in connection with the war and the great decrease in the amt. of fats and oils at present imported into Germany. It is estd. that each inhabitant contributes 10 g. of fat (in all forms) daily to the waste H_2O of a household, thus making a daily

total of 670,000 kg. for 67 million inhabitants; this fat can only be recovered in case the sewage is collected in settling basins for clarification. The fat which collects upon the surface of the sewage in the settling basin constitutes only a small proportion of the total fat; most of the fat is absorbed by the flocculating, suspended particles of the sewage and thus carried to the bottom of the basin. The fat content of the muck varied from 12 to 22% in different cities. In previous expts. at Kassel the pptd. muck was first dried (after addition of H_2SO_4) and then extd. with benzene; this expt. was an economic failure because of the fuel expense in drying, the muck being especially difficult to dry because of the enveloping layer of adsorbed fat on the particles. In subsequent expts. at Frankfurt a/M, the muck (with the contained H_2O) was treated with a fat solvent, the highest temp. employed in the preliminary treatment of the muck being considerably below 100° ; the muck, after removal of the fat, was passed through presses to remove the remaining H_2O . The muck contained 90-95% H_2O , according to the speed with which the sewage passed through the basin; by careful treatment it was possible considerably to reduce this H_2O content. A brownish black crude fat of the consistency of grease was finally obtained; by distn. under reduced pressure it was possible to obtain a yellow fat which was sepd. by pressing, into approx. 50% liquid olein and 50% solid stearin. The m. p., sapon. no., acid no., I no. (Hübl) and % of unsaponifiable substance of the olein and of stearin were (undetd.), 167.5, 160.5, 62.85, 19.37 and 45.3° , 199.0, 195.2, 25.07, 6.07, resp. The capacity of the muck for retaining H_2O is so greatly diminished in the process of extg. the fat, that the H_2O content may be readily reduced to approx. 50% in the app. employed. The principal value of this partially dried muck is in the production of heat or for fertilizer. H. S. PAINE.

The electrolysis of sewage. E. SCHNECKENBERG. *Elektrochem. Z.* 21, 294-6 (1915).—Data are given showing the disinfecting properties of Cl when added as NaOCl to sewage. The Stahl electrolyzer is built for the purpose of producing NaOCl from NaCl. W. E. RUDER.

The Indianapolis sewage testing station. C. H. UNDERWOOD. *Proc. 8th Ann. Conv. Ind. San. & W. S. Assoc.* 1915, 139-144.—The testing station comprizes an Imhoff tank of reinforced concrete, and is a full sized unit. Dimensions: diam. 24 ft., depth 29 ft. 4 in. from the water level; the bottom is conical. The settling chamber has a capacity of 21,000 gals. and the sludge digestion chamber 47,000 gals. There are also 2 sprinkling filters 16 ft. in diam. The plant is built over the main intercepting sewer and the results of the work have shown the tank to be suitable for preparatory treatment. A 2-hr. rate of operation is considered satisfactory for Indianapolis sewage. Eight-foot filters produce effluents that cause no visible nuisance when mixed with river water. D. K. FRENCH.

Activated sludge in America. W. N. BAKER. *Eng. News* 74, 164-71 (1915).—Notes on the new process of sewage treatment gathered by B. on visits to the several experimental plants. Sewage is aerated in the presence of an accumulation of aerated sludge. There is reason to hope that a high degree of clarification (and perhaps bacterial reduction, when necessary), with a stable effluent and a quick-drying sludge, high in fertilizing value, can be produced by this process. ARTHUR LEDERER.

The sewage disposal works at Fitchburg, Mass. D. A. HARTWELL. *J. Boston Soc. Civil Eng.* 2, 203-22 (1915); cf. *C. A.* 9, 1522.—The disposal works now in operation serve 35,000 population. In Jan., 1915, 68.6% of the suspended solids were removed by the Imhoff tank. The sprinkling filter effluent contained 3.9 p. p. m. of nitrates, and 60% of the daily samples were stable. Owing to the partial completion of the sewer not all the population is yet connected. The total cost exclusive of excavation for the disposal works was \$347,000, or for 55,000 people \$6.31 per capita.

L. PRARSE.

Activated sludge experiments at Milwaukee, Wisconsin. CH. T. HATTON. *Eng. News* 74, 134-7(1915).—Tests of the activated sludge method of sewage treatment are described. A large fill-and-draw tank, and a continuous flow tank of the same size and also two small tanks provided with glass windows are included in the studies which are being made. Methods of air diffusion, vol. and time of air application and cost records are given.

ARTHUR LEDERER.

The purification of industrial wastes. H. KLUT. *Naturwissenschaften* 2, 415-9, 444-8(1914); *Wasser u. Abwasser* 9, 385-8(1915).—K. discusses methods of treatment for wastes produced by several industries. Suspended matter and fibrous material should be removed previous to the discharge of trade wastes.

ARTHUR LEDERER.

Reduction of garbage. ANON. *Munic. J.* 39, 35-9(1915).—The plant on Barren Island, New York, disposes of the garbage of that city by the reduction process. A description of the plant, together with a report on the further elimination of odors, is given.

ARTHUR LEDERER.

Three residential sewage treatment plants near Cleveland. R. F. MACDOWELL. *Eng. News* 74, 56-7(1915).—The first plant consists of a 2-story sedimentation tank and a glass-covered rapid sand filter. The purpose of the glass is to produce heat which aids in drying the surface of the beds and thus makes the scum and grease deposits more readily removable. The total cost of the plant was about \$2,000.00. The second plant consists of screens, a 2-story sedimentation tank, dosing tank and intermittent sand filters. The plant was designed to treat a max. daily sewage flow of 4500 gal. The third plant consists of a septic tank, dosing tank, and sub-surface irrigation. All 3 plants operate successfully and have produced effluents of satisfactory character.

ARTHUR LEDERER.

Sewage disposal in Maryland. *Munic. J.* 38, 842-4(1915).—The need of adequate state supervision is outlined. The organization of sewerage districts is recommended. The state has passed a law (just declared constitutional), giving full powers over water supply and sewerage systems for the construction of which the municipal authorities may issue bonds up to 2%.

L. PEARSE.

Albany's sewage treatment plant. *Munic. J.* 38, 837-40(1915).—Albany (N. Y.) is constructing intercepting sewers, pumping station and sedimentation plant (Imhoff tanks) at a cost of \$1,100,000 to settle the sewage before discharge into the Hudson River. The tanks have a period of detention of 3 hrs. at 30 mil. gal. flow per day.

L. PEARSE.

Garbage and rubbish disposal in Los Angeles. S. C. SIMONS. *Munic. J.* 38, 799-803(1915).—A contractor pays the city 51 cents a ton for garbage delivered at the works. A reduction plant handles about 175 tons daily, on the Cobwell system. The garbage is treated under 85 lbs. per sq. in. steam pressure, with a liquid resembling naphtha to ext. the grease. The tankage is dried and bagged. One ton of green garbage yields 600 lbs. tankage and 85 lbs. grease. The tankage contains 2.68% N, 2% P₂O₅ and 1.9% potash.

L. PEARSE.

Sewage works of Morristown. CLYDE POTTS. *Eng. News* 73, 1105-8(1915).—Morristown had a population of 12,507 in 1910, with a low water consumption of 40 gal. per cap. per day. The plant was designed on a basis of 66 gals. per cap. per day, and 15,000 pop., and comprises (1) a settling tank of capacity 100,000 gal.; (2) 5 contact beds in a pentagon of total area 1.25 acres, each 6 1/4 ft. deep, with 1/2 to 2 in. stone, underdrained; (3) contact bed control housed in; (4) 4 sand filters of total area 1.5 acres. The dried tank sludge contains, in %, N 0.51, total P₂O₅ 0.14, potash 0.10. The effluent has been stable, with a bacterial reduction of 96.8%. The plant cost \$94,889.00.

L. PEARSE.

Refuse incinerator, Florence, S. C. McKEAN MAFFITT. *Eng. News* 73, 1166-7 (1915).—A 12-ton incinerator is used to burn night-soil, garbage and other refuse.

L. PEARSE.

Garbage reduction at Columbus, Ohio, in 1913 and 1914. T. D. BANKS. *Ann. Report*, Columbus, 1914; *Eng. News* 73, 1030(1915).—Tables give detailed figures on itemized costs. A net profit of \$1.226 per ton of garbage was made or \$26,501.57 for the year 1914.

L. PEARSE.

Sewage disposal plant for Akron. ANON. *Munic. J.* 39, 71-4, 112-4(1915).—The plant consists of Imhoff tanks, sprinkling filters, secondary sedimentation tanks and sludge beds. Novel features in details of Imhoff tank construction and in control chambers are shown. There is in addition a garbage reduction plant with a capacity of 25 tons in 8 hrs.

ARTHUR LEDERER.

Sewerage system and sewage disposal farm at Cairo, Egypt. *Eng. News* 73, 1030(1915).—The sewage is lifted by compressed air ejectors in a central station and discharged through a sewer 12 miles long to a sewage farm of 3,000 acres.

L. PEARSE.

Sewage treatment plant for a small sanatorium. R. F. MACDOWELL. *Eng. News* 73, 1014-6(1915).—This was designed for a tuberculosis sanatorium for 250 persons. A 2-story settling tank, a dosing tank, a sludge bed, 2 intermittent sand filters (3 ft. deep), an absorption tile (1650 lineal ft. of 10 in. pipe) and a disinfection app. complete the equipment. The plant, including 2000 ft. of sewers, cost \$9,000.

L. PEARSE.

Success of two municipal garbage reduction plants. ANON. *Eng. News* 73, 1042.—The revenue at Columbus, O., pays the entire operating and fixed charges, including interest and depreciation. The cost of operation at Cleveland, O., was \$2.54, at Columbus \$1.86 per ton of garbage, with gross earnings, \$3.49 and \$3.08, resp.

L. PEARSE.

The typical Iowa sewage treatment plant and its proper operation. ANON. Report of San. Committee of Iowa Eng. Soc.; *Eng. Contrg.* 44, 7(1915). A. LEDERER.

The disposal of creamery refuse. H. R. CROHURST AND A. D. WESTON. *Eng. Contrg.* 44, 7-9(1915).—A summary of previously published data and conclusions bearing on the subject of creamery refuse disposal.

ARTHUR LEDERER.

Sewage disposal (tannery waste). J. M. SELTZER. *J. Am. Leather Chem. Assoc.* 10, 370-2(1915).—The effluent (95,000 gal. daily) from a tannery working 260 hides per day, is treated in a settling tank. There is a by-product formed for which no successful means of disposal have been found.

L. B.

The Great Lakes in their relation to typhoid fever. TALLAFERRO CLARK. *Proc. 8th Ann. Conv. Ind. San. & W. S. Assoc.* 1915, 122-30.—There is an undue prevalence of typhoid fever in cities and towns bordering on the lakes. Virtually all water supplies taken from the lakes are unsatisfactory for drinking without treatment. Wind is a factor of importance in distribution of harbor pollution. All of the lakes, with the exception of Lake Michigan, which is badly polluted in its southern portion, have water of a high degree of purity outside of the zone of pollution surrounding large cities or river outlets. The pollution in every case is due to sewage discharge from municipalities. Proper treatment of sewage before ultimate disposal is just as important as treatment of the water supplies used by the various municipalities.

D. K. FRENCH.

The sanitation of schools. TALLAFERRO CLARK. *Proc. 8th Ann. Conv. Ind. San. & W. S. Assoc.* 1915, 100-104.—A general discussion. School sanitation in addition to the medical inspection of the child considers the character of the water supply,

sewage disposal, ventilation and illumination. Considerable attention is paid to the influence of CO₂ and that of dust in connection with the health of the pupils.

D. K. FRENCH.

Disinfectants for clinical, surgical and sanitary purposes. HERBERT C. HAMILTON. *Am. J. Pharm.* 87, 315-23(1915).—Comparisons are made which indicate that even the ordinary coal-tar disinfectants when properly prepared are superior to phenol under all conditions, and surpass all other disinfectants aside from the purpose for which the latter are peculiarly adapted.

W. G. GAESSLER.

New York State Commission on ventilation. C. E. A. WINSLOW. *J. Am. Pub. Health* 5, 85-118(1915); *Science* 41, 625-32(1915).—The following tentative conclusions are indicated by the expts. of the first year. A room temp. 86° F. with 80% relative humidity, produces a slight elevation of body temp., an increase in reclining heart rate, an increase in the excess of standing over reclining heart rate, a very slight lowering of systolic blood pressure, and a marked fall in the Crampton value. There is shown no effect upon the rate of respiration, dead space in the lungs, acidosis of the blood, dissociation of oxyhemoglobin, respiratory quotient, rate of heat production, rate of digestion, carbohydrate or protein metabolism, conc. of the urine and skin sensitivity. Only the inclination and not the power to do work is diminished by a high room temp. A temp. of 75° and with 50% relative humidity has all of the effects noted for the higher temp. but in a less degree. Stagnant air, containing 20 pts. per 10,000 of CO₂ and other impurities of breathed air, if kept at fresh air temp., showed no effect upon (1) the physiol. responses above mentioned, (2) the power or inclination to do work, (3) the sensations of comfort of the subjects breathing it. It may, however, slightly reduce the appetite for food.

W. F. LANGELEIR.

Ozone—an aid to factory ventilation. V. D. GREENE. *Eng. Mag.* 49, 517(1915).
C. G. F.

Public health in Springfield, Illinois. FRANZ SCHNEIDER, JR. *Russell Sage Foundation*, May, 1915.—This is a report of 159 pp. covering a thorough sanitary survey. Particular comment is made on the water supply, sewerage, sewage disposal, milk and food supplies. The abolition of privies and private wells is urged. Both typhoid and venereal disease death rates are high.

L. PEARSE.

Stream pollution and sewage disposal. R. L. SACKETT. *Proc. 8th Ann. Conv. Ind. San. & W. S. Assoc.* 1915, 45-46.—S. emphasizes the necessity of protection against stream pollution rather than methods for purification.

D. K. FRENCH.

Stream sanitation. EARLE B. PHELPS. *Proc. 8th Ann. Conv. Ind. San. & W. S. Assoc.* 1915, 47-50.—A general article.

D. K. FRENCH.

U. S., 1,145,497, July 6. J. A. MANAHAN. Water still.

U. S., 1,145,845, July 6. T. C. PARDINGTON and J. G. ASHBY. Method of steaming garbage to recover volatile substances and fatty oils.

U. S., 1,146,942, July 20. C. P. LANDRETH. Method of handling water, sewage or other liquids while subjected to electrolytic purification. Cf. C. A. 8, 2767.

U. S., 1,147,515, July 20. V. KOBELT. Water-purifying material (for removing Fe and Mn from H₂O) is made by heating "Gesteins Glas" or volcanic glass from trachytes and tuffs, with dil. HCl and treating the residue with a NaCl soln.

Brit., 6,260, Mar. 12, 1914. A. B. OGDEN. App. for drying sewage sludge, etc., on a steam-heated floor. Cf. C. A. 9, 1524.

Brit., 6,328, Mar. 12, 1914. A. B. DRÄGER. Regenerating air for breathing. To the impure air in breathing app. and in rooms, etc., is added O produced by re-

action between an easily deoxidizable substance, such as H_2O_2 , and a catalyst, such as KMnO_4 . Suitable app. is specified.

Brit., 7,179, Mar. 21, 1914. W. M. MACKAY. Construction of an app. for clarifying liquids containing sludge or other finely divided matter in suspension.

Ger., 282,060, May 3, 1913. H. HERZBRUCH. App. for drawing off surface or middle stratum water from settling tanks or the like, by means of an exit tube system kept in proper position by means of a float. The tube is vertically movable and consists of telescoping sections.

Ger., 282,122, Oct. 1, 1913. F. RAFFENSDORFER. Constructional details of a drum filter for back waters containing suspended matter.

Ger., 282,268, July 7, 1914. J. HOMBACH. Separating element for app. for de-oiling, drying, and purifying steam. Cf. C. A. 8, 5.

Ger., 282,408, June 6, 1912. A. KRÜGER and G. RADLIK GEB. AHR. Removing iron from earth waters by means of H_2O satd. with air, in a closed system. A suitable construction is specified.

Ger., 282,612, Apr. 12, 1914. E. RIENS. Device for removing boiler scale from fire tubes.

Ger., 282,731, Oct. 8, 1913. OELWERKE-STERN-SONNEBORN AKT.-GES. Preventing boiler scale formation from softened H_2O . The lime-soda and baryta processes used heretofore for purifying and softening boiler feed H_2O are open to the objections that in the first process the softened H_2O is caustic and corrosive while by the latter process not less than 6-7° hardness can be secured. To overcome these objections, the feed water, softened by one of the processes mentioned, and clarified as much as possible, is treated before it enters the boiler with an organic ext., which prevents the deposit of scale. This addition may be made with the softening agents, or the H_2O may be softened by means of Na_2HPO_4 .

Ger., 282,908, Aug. 2, 1913. W. LOEBEL. Clarifying apparatus for back waters and other liquids, wherein a curved course is imparted to the liquid by means of surfaces, beneath the surface of the liquid, bent outwards and upwards from the inflow.

Ger., 282,909, June 25, 1913. RICHTER & RICHTER. App. for clarifying turbid water. Cf. C. A. 9, 2119.

Ger., 283,154, Nov. 6, 1913. J. TILMANS and O. HEUBLEIN. Regenerating manganiferous filtering materials used for removing manganese from water, by filling the container with an alk. liquid, then drawing this liquid off and passing air through the material for some time. When washed out to neutral reaction the mass is ready for re-use. A 2% NaOH soln. is used for the alk. liquid. The layer of MnO_2 granules, of 2-3 mm. diam., in a bed 7 cm. deep, and satd. with the alk. soln., is aerated for 1 hr. and washed until the alk. reaction disappears. Water with 15 mg. Mn in 1 liter is freed from all but 0.6 mg. Mn per liter.

Ger., 283,155, Dec. 18, 1912. O. VOLLMAR. Removing iron and manganese from water by passing the H_2O through a filter or clarifier, which is charged with algae. Algae such as *Siderocapsa dresdensis*, *S. treubii*, *Clonothrix fuxa*, *Crenothrix polyspora* and *Leptothrix ochracea*, are used, as these possess the property of pptg. and retaining the Fe and Mn rapidly. Indifferent substances are used for the filter or clarifier. The introduction of air, in this process, is not necessary.

Ger., 283,340, Mar. 13, 1913. F. & M. LAUTENSCHLÄGER G. M. B. H. Disinfecting by means of HCHO in closed chambers. The HCHO is mixed with the vapor of acetone, MeOH , or like liquid, which boils under 100° at atm. pressure and which has a greater d. than air, and this mixt. is conducted through the disinfecting

app., expelling from the chamber and from the materials contained therein for treatment, the specifically lighter air. *E. g.*, 15 parts formalin vapor are mixed with 100 parts acetone vapor so that in the app. a mixt. of vapors containing about 2% HCHO is brought into action. A suitable construction is specified.

Ger., 283,475, Jan. 10, 1913. G. ERLWEIN. Process of removing H_2O_2 from sterilized water. The removal of the excess of H_2O_2 used in sterilization is necessary on account of the taste, and also the deleterious action as a constituent of potable water. This is effected by treatment with MnO_2 , or its hydrate, Mn_2O_4 or its hydrates, or with mixts. of these. A sand or gravel filter containing these Mn-compds. is prepared, as in the removal of Mn-compds. from H_2O , and the H_2O containing H_2O_2 is passed through this filter at a suitable rate of flow. As carrier for the active mass, neutral or artificial zeolites, or their Mn compds., can be employed. Or, the specified Mn-compds. can be used in powder or granular form as the filter mass. Or, the specified Mn-compds. may be added to the H_2O and left in contact therewith for some time. Shaking or stirring hastens the action. If the filter is exhausted, it can be regenerated by permanganate or chloride of lime soln., when it is ready for use.

15. SOILS AND FERTILIZERS.

R. O. E. DAVIS.

Progress in the field of agricultural chemistry in 1914. PAUL EHRENBURG. Göttingen. *Chem. Ztg.* 39, 453-5, 470-2 (1915).—A review, with bibliography.

J. H. MOORE.

Ideas concerning agricultural analysis. C. GUÉDROITZ. *Russ. J. Exp. Landw.* 16, 83-94 (1915).—G. discusses loss by calcination in soils, the total mineral substances of soil which are sol. in water, and the decomp. of soil by treatment with HF in the presence of HCl.

W. H. FRY.

Potassium from the soil. CYRIL G. HOPKINS AND J. P. AUMER. Illinois Agr. Expt. Sta., *Bull.* 182, 10 pp. (1915).—(1) "K can be liberated as needed from the inexhaustible supply naturally contained in the normal soils of Illinois. (2) The amt. of K taken up from ordinary Illinois soil by clover is from 2 to 3 times the amt. required for plant growth. The excess probably is merely tolerated, as is Na and Si, both of which are present in the soil soln. and are taken up by plants in considerable amts., although neither is essential for plant growth."

B. E. B.

Effects of variations in moisture content on certain properties of a soil and on the growth of wheat. F. S. HARRIS. New York Cornell Sta., *Bull.* 352, 805-68 (1914).—A report on greenhouse and laboratory expts. with wheat plants grown in pots containing clay loam soil subjected to varying moisture and fertilizer treatments; and also on studies of certain properties of cropped and uncropped soils standing for long periods under such conditions. The cropped soil was found to be more compact than the uncropped and the vol. of the soil decreased as the moisture content increased; this was especially true when fertilizers were added. Flocculation was greater in cropped soils and was greater with a medium amt. of soil moisture than with a very great or very small amt. of moisture. Flocculation was increased by fertilizers. NO_3 content was always greater in uncropped soils and in soils to which nitrate fertilizers had been added, and was also greater in the presence of 30% moisture than where the limits were above or below this amt. No nitrates were present, practically at least, when a satd. condition was maintained. NO_3 content was always low but ran higher in the uncropped soil. NH_4 content, on the other hand, was higher in the cropped soil. The ratio of sol. salts to nitrates was higher in cropped soil. The % of N in both grain and straw was highest on the driest soil and gradually decreased as the moisture

increased up to 37 $\frac{1}{2}$ %, increasing slightly, however, as the point of satn. was approached. High N fertilization always increased the N content of the crop. The content of crude ash, Ca, Mg, K, and P₂O₅ in wheat straw grown with high moisture was lower than when a low amt. of moisture was maintained.

B. E. B.

The effect of some organic soil constituents upon nitrogen fixation by *Azotobacter*. H. S. REED AND BRUCE WILLIAMS. *Centr. Bakt. Parasitenk., II Abt.* 43, 166-76 (1915).—This paper reports a study on the effect of various organic compounds on the growth of *Azotobacter*. The purpose was to exam. the theory that the soil contains organic substances which are deleterious to plant growth and which are important factors in influencing soil fertility and especially to det. whether or not this toxicity extended to the lower plants. *Azotobacter* was chosen as a representative of the soil flora since it is of recognized importance in the maintenance of soil fertility and its growth may be accurately measured by analytical means. The compds. used were those likely to be constituents of the soil. Fixation of N by *Azotobacter* was only slightly influenced by most of the compds. investigated. A depression is noted in many cases, but it is usually the result of a relatively high concn. of the compd. used. Hydroquinone and salicylaldehyde had the most toxic action of any of the compds. studied. Esculin, quinic acid and borneol caused marked stimulation in the growth of the organism. The effects of the compds. on *Azotobacter* are not, as a rule, in accord with what has been reported of their action on the higher plants. In concs. which are fatal to certain higher plants, many compds. only slightly depressed fixation. A number of nitrogenous compds. were investigated. Such compds. as nicotine, picoline, guanidine, and skatole exhibited toxic properties commensurate to those usually ascribed to these substances. Caffeine appeared to stimulate the growth of the organism. Many of the nitrogenous substances which have been reported as beneficial to higher plants exercised a marked depression on fixation. It appears that the simpler compds. are more pronounced in this respect than are the more complex ones. It is suggested that this condition is not one of toxicity but that the combined N is utilized by *Azotobacter* in preference to that of the atmosphere. Urea, glyocoll, formamide, and allantoin were especially active in depressing fixation.

JULIAN H. LEWIS.

Influence of protozoa upon soil bacteria. T. GOODEY. *Proc. Roy. Soc. London (B)* 88, 437-56(1915); cf. *Ibid* 84, 165(1911).—Expts. on bacterial growth were made on 3 soils from Rothamsted; A had been stored since 1846 and contained no protozoa; B dated from 1870 and contained amebae and flagellates but no ciliates; C was fresh field soil. It is concluded that protozoa, added to soil, do not act as a factor limiting bacterial activity, and therefore that the ciliates, amebae and flagellates obtainable from ordinary soil under cultural conditions do not function as the limiting factor.

R. O. E. DAVIS.

Lake county soils. CYRIL G. HOPKINS, J. G. MOSIER, E. VAN ALSTINE AND F. W. GARRETT. Illinois Agr. Expt. Sta., *Soil Rept.* 9, 52 pp.(1915).—The various soil types are indicated and chem. analyses given. The amt. of limestone present is shown and results for soil acidity are given. A number of important pot and field expts., some covering a number of years, are reported on.

B. E. BROWN.

Investigations on soils and fertilizers in Hawaii. E. V. WILCOX AND W. P. KELLEY. *Hawaii Sta. Rept.* 1914, 14-16, 21, 22, 25-27; *Expt. Sta. Rec.* 32, 721(1915).—Brief summaries are given of the main results of investigations, including the effect of heating on soils (cf. C. A. 8, 976, 1479), fertilizing rice (cf. C. A. 8, 1479), the nature of the nitrogenous compds. of soil (cf. C. A. 8, 1479), effect of fertilizers on the chem. and physical properties of soils and on the fixation of fertilizing constituents by soils, and ammonification and nitrification in soils (cf. C. A. 8, 2770). Continued pot expts. with various forms of phosphate have demonstrated anew that sol. phosphates do not leach through

the soils, but remain permanently available for plant growth. Legumes used as green manure greatly increased the availability of rock phosphate. In comparative tests of various green manure plants it was found that an introduced leguminous weed known as rattlespod (*Crotalaria salsiana*) has the advantage over cultivated legumes, that the seed may be sown without any previous prepn. of the soil and of course without cultivation after seeding. On several plantations fields which had become the poorest on the whole plantation gave the largest yield during the past year as a result of plowing under humus-forming material, but without applying excessive amts. of commercial fertilizers.

E. H. WALTERS.

Nitrogenous fertilizers from refuse substances. C. ELACHNER. *Chem. Eng.* 22, 25-7(1915); see *C. A.* 9, 1217.

E. J. C.

The preparation of fertilizer from kelp. J. W. TURRENTINE. *Chem. Eng.* 22, 16-20(1915); see *C. A.* 9, 1218.

E. J. C.

Systematic scheme for experimental work with fertilizers. A. T. STUART. *Trans. Roy. Soc. Canada* [3] 8, 167-76(1914).—Because of the great number of factors influencing the use of fertilizers it is difficult to make general recommendations. The meaning of the law of minimum as applied to fertilizers is discussed and curves illustrating the law are given. By use of a solid diagram of 4 dimensions with a triangle as the base (thus forming a prism) S. is able to obtain any possible combination of the fertilizer elements N, K and P. The corners of the triangular base represent the elements and the fourth dimension represents the total quantity of all the elements applied. Systematic tests of fertilizers may be made by selecting points on the triangular diagram. Tables are given showing a plan for comparing the relative value of different forms of N, P and K in a 3 years' rotation.

R. O. E. DAVIS.

A study of vanadium and the action of some vanadates in vegetables. E. C. RAMIREZ. *Thesis, Univ. La Plata* 1914; *Anales soc. quim. Argentina* 2, No. 6, 145-6 (1914).—A general discussion on V and the principal V-bearing substances in Argentina is given. R. investigated the effect of V on plant growth. His conclusions are that this element may be absorbed and stored by plants, which may show anomalies of growth as the result of this.

B. E. BROWN.

Readily extractable phosphorus and the adequacy of phosphatic nutrition. Preliminary communication. I. JAKOUCHKINE. *Russ. J. Exp. Landw.* 16, 118-39 (1915).—Expts. show that: for materials poor in fat, especially straw, extrn. with alc. and ether does not sensibly alter the P_2O_5 content of acid exts. Direct pptn. with citric acid may be used to sep. the mineral phosphates of phytin, but more accurate results may be obtained by pptn. with magnesia mixt. in the presence of citric acid soln. by HNO_3 and detn. by the method of Neuman. Straw reflects the condition of the medium supplying P_2O_5 much more than does grain. Phytin of grain is to a great extent produced by the medium. Fertility of the soil is shown most clearly by the contents of mineral phosphates in the straw. A content of 0.07-0.10% indicates that the soil needs phosphatic manure. A content greater than 0.15% indicates a sufficiency. Mineral phosphates of vegetable organs are almost entirely sol. in water. W. H. F.

Results of some experiments with farmyard manure. R. A. BERRY. *West of Scotland Agr. Bull.* 65, 177-251(1914).—After 4 months' storage in well trodden heaps the indoor manure lost 17.5% in wt., the outdoor manure 20.6% (av. rainfall was 39.32 in.). The outdoor manure lost 28.4% of its N, the indoor only 20.4%, and while the indoor lost practically no P_2O_5 or K_2O the outdoor manure lost approx. $\frac{1}{4}$ of each constituent. Stored manure (under cover) caused a 7% better yield of potatoes and turnips than did the uncovered manure. Rotted manures were poorer in total and available N than the fresh, the losses being greater in the outdoor than in the indoor

manure. Ammoniacal N was lost to the greatest extent, the loss amounting to from 70 to 80% of that of the fresh manure, 18 % of the total N of which was in the ammoniacal form. There was a slight increase of amide and of insol. N in the rotted manure. The 2 fresh manures richest in N (those from fattening steers and from horses with peat moss as litter), were left poorer in N after rotting, while the fresh manures relatively poor in N (those from cows, pigs and horses, with straw as litter), were left slightly richer in N after rotting. The average loss of manurial constituents in the 5 manures during rotting was: Total N 2.96, total P_2O_5 12.2, and total potash 33.5%. Rotting lowered the fertilizing value of the different manures, judging by crop yields of potatoes and turnips. Gypsum and $NaHSO_4$ fixed NH_3 in the manure better than other substances and $CHCl_3$ checked fermentation best of all. In tests with fresh and rotted manure applied in fall and spring in 2 different rotation expts., it was found that fresh manure applied in drills in the spring gave the best results. The relative efficiency of the manures was found to be due to the available N. B. E. B.

Phosphatic manures and the root system of beets. V. SAZANOV. *Russ. J. Exp. Landw.* 16, 140-65(1915).—Sol. phosphoric acid of manures becomes fixed in the bed of chernozem to which it is applied and consequently no considerable displacement of phosphoric acid from one bed to another is observed. Superphosphate applied to a soil favors excessively the development of the lesser radicles of the beet to the detriment of the development of the most powerful radicle. W. H. FRY.

Cacao. Report on experiments for the year September 1, 1913, to August 31, 1914. J. DE VERTEUIL. *Bull. Dept. Agr. Trinidad and Tobago* 14, Part 3, 74-97.—Plot expts. with sheep manure, bone meal, K_2SO_4 , $(NH_4)_2SO_4$, pen manure, basic slag, bird manure, lime, mulch, Ohlendorff's cacao manure, and superphosphate, are reported. W. H. F.

Fungicide experiments, 1914. G. P. DARNELL-SMITH. *Agr. Gas. N. S. Wales* 26, 494-5(1915).—Expts. on wheat seed for prevention of infection with bunt were carried out with $CuSO_4$ solns. of varying strength and with solns. of $CuSO_4$ and lime water. Dipping wheat seed for 3 min. in 1.5% soln. of $CuSO_4$, followed by a dipping 3 min. in lime water, has, up to the present, been found the most effective "pickle" for preserving germinating capacity and preventing bunt infection. W. H. FRY.

Studies on changes in the degree of oxidation of arsenic in arsenical dipping baths. ROBERT M. CHAPIN. U. S. Dept. Agr., *Bull.* 259, 1-12(1915).—All arsenical dipping baths contain oxidizing organisms, which work slowly, and reducing organisms, which work very rapidly at times, but spasmodically. Reducing organisms exert an appreciable effect only in vats used at frequent intervals for dipping large numbers of cattle, while the ordinary vat, used once a fortnight, is likely to show only a slow, steadily progressing oxidation of the As; hence a control test of such a vat is necessary. $HCHO$ used in the proportion of 1 gal. to every 1,500 gals. of original liquid introduced into the vat is suggested as a safe and effective means for reducing oxidation to a low figure; however its use is economic rather than essential to the results obtained in dipping. E. H. INGERSOLL.

Sources of potash (MACDOWELL) 18. Fixation of atmospheric nitrogen (PRINSEN-GERLIGS) 18.

U. S., 1,145,107, July 6. T. L. WILLSON and M. M. HAFF. Fertilizer made by mixing phosphate rock with potash and H_3PO_4 and then treating the mixt. with an excess of NH_3 over that required to neutralize the free acid. Cf. C. A. 9, 2282.

U. S., 1,145,370, July 6. L. KERN. Fertilizer is made by mixing raw kieselguhr (containing about 70% SiO_2 , 5% Fe_2O_3 and 4% alkali) with K_2SO_4 , K_2CO_3 or other K

compd., calcining at 100-200° and adding lime and phosphate powder to the calcined mixt. Cf. C. A. 9, 950.

U. S., 1,146,222, July 13. T. L. WILLSON and M. M. HAFF. Dry double superphosphate fertilizer, free from acid, and containing ground phosphate rock combined with pyrophosphoric acid and ammonia. Cf. C. A. 9, 1220.

U. S., 1,146,337, July 13. J. McADAMS. A fertilizer is made by mixing equal amts. of waste molasses and $\text{Ca}(\text{OH})_2$, heating to about 50-5° for 30 min., spreading in a layer and subjecting to a blast of cold, dry air and granulating the product after it has hardened.

Brit., 6,275, Mar. 12, 1914. T. TWYNAM, E. K. SCOTT and F. HOWLES. In mfg. fertilizers, phosphatic basic slags are subjected to the action of the oxides of N and air issuing from a N-fixation furnace, in which the oxides are produced by a high-tension elec. arc, whereby the slag gives rise to a substance containing a sol. phosphate and the nitrates of the bases present in the slag. The temp. of the mass may be controlled to prevent the formation of $\text{Fe}(\text{NO}_3)_3$ by injecting H_2O or steam or a sludge composed of ground slag and H_2O .

Ger., 282,915, Jan. 20, 1914. M. GERLACH. Mfg. fertilizers containing NH_3 and H_3PO_4 by allowing gaseous NH_3 to act on $\text{Ca}_3(\text{PO}_4)_2$ disintegrated by means of H_2SO_4 . Four mols. of NH_3 are used to 1 mol. of the monophosphate of Ca, and by the simultaneous action of the gypsum contained in the superphosphate, $(\text{NH}_4)_2\text{SO}_4$ and $\text{Ca}_3(\text{PO}_4)_2$ are formed. If the disintegrated Ca phosphate is spread out on hurdles, or kept in motion in the chamber by means of stirrers, the process becomes almost quantitative. If small amts. of NH_3 are allowed to react, the conversion is incomplete, and a fertilizer is obtained which is poor in NH_3 . The NH_3 unabsorbed by the superphosphate is recovered by passage through H_2SO_4 and working up to the sulfate. The advantage of the process lies in the fact that NH_3 obtained by the decompn. of CaNCN and nitriles, or by synthesis, can be utilized without the formation of the sulfate.

Ger., 283,133, Jan. 23, 1912. C. PFAUL, NACHFOLGER VON F. BODE. Method of protecting the knives for cutting superphosphate against the attack by the materials under treatment.

Ger., 283,253, Mar. 18, 1913. H. STEIN. Fertilizers are obtained from the slags resulting from the working of Mn, Fe-Mn, and spiegeleisen smelting. The Mn compds. are available in the form of Ca-manganate, or -manganite, or as the double salt, as Ca-Al-manganate-silicate. These salts are insol. in H_2O and therefore retained in the soil. However, by weak acids, e. g., 2% citric acid, the greater part of the Mn is dissolved. H_2O containing CO_2 also has a solvent action when acting for a long period of time, as the Mn-ions go into soln. with the Ca H carbonate. The sepn. of Mn proceeds in proportion to the sepn. of acid from the roots, and is utilized therefore in the nourishment of the plant. To manuf. the fertilizer, Ca compds. are fused together with oxides or salts of Mn at a white heat, a process which is applied on a large scale in the smelting of Mn-ores, Fe-Mn, and spiegeleisen. The slags resulting from this process contain up to 26% Mn, principally in the form of the manganite or manganate of Ca, Mg, and Al. These slags contain also sulfides which are readily converted into H_2SO_4 in the soil and hasten the disintegration of the slags.

Ger., 283,416, July 29, 1914. J. LÜTJENS and W. LUDWIG. Discharging superphosphate from chambers.

Ger., 283,509, Mar. 14, 1913. Addition to 272,915 (C. A. 8, 2669). HOCHOFEN-SCHWEMMSTEIN-SYNDIKAT, G. M. B. H. Disintegrating blast furnace slag of all kinds to form a spongy, porous mass. According to the principal patent, pumice stone, quartz, or like siliceous substances are added to the liquid slag before the latter is poured

into the H_2O . The addition of clay appears to have the same effect, and furthermore increases the strength and firmness of the products made therefrom. So long as the slag is liquid, substances containing SiO_2 and clay are added, and in certain circumstances, readily fusible clay can be employed also. Simple pouring into H_2O , without the simultaneous application of compressed air, is sufficient to cause the slag to become porous.

17. PHARMACEUTICAL CHEMISTRY.

M. I. WILBERT.

Method of preventing the precipitation of tinctures caused by addition of water. ITALO SIMON. Univ. Padua. *Arch. farm. sper.* 19, 439-47(1915).—Tinctures of cinchona, gentian and opium may be dild. with water without formation of a ppt., provided sugar sirup or glycerol is added first. A. W. DOX.

Determination of gum in tragacanth. G. FROMME. *Apoth. Ztg.* 30, 99(1915).—Reply to Otto Frey's criticisms in an article on the same subject (cf. C. A. 9, 2125). W. O. E.

An investigation of the potency of aconite. G. C. ROBINSON. Rockefeller Inst. Hosp. *Arch. Intern. Med.* 15, 645-53(1915).—It was found that large doses (10 cc. 6 times a day) of a tincture of aconite did not produce subjective symptoms and did not slow the heart rate in the tachycardia of exophthalmic goiter. Physostigmine did not augment the effect of the aconite. Although the tincture was not of the chem. standard prescribed by the pharmacopeia, the discrepancy was not sufficient to account for the impotency of the tincture. Physiological assay showed that the activity was less than $1/4$ of that calcd. upon the basis of the chem. assay. The importance of physiological assay is emphasized. I. GREENWALD.

Variations in the toxicity of chloroform for anesthesia. WORTH HALE. *Arch. Intern. Med.* 15, 945-54(1915).—Expts. on mice and brook-trout with 4 different samples of $CHCl_3$ for anesthesia and 1 sample of $CHCl_3$ that had been exposed to light in a colorless bottle for 2 years failed to show any difference in the toxicity. I. G.

Papain: its commercial preparation and digestive properties. D. S. PRATT. *Philippine J. Sci.* 10, 1-33(1915).—A brief review of the properties, uses, native methods of prepn., adulterants, grading, market conditions, etc., of papain is given. *Method of analysis:* Use milk free from butter fat. P. uses a 40% soln. of sweetened condensed skimmed milk. Prepare the enzyme soln. by dissolving 0.75 g. of powdered papain in 150 cc. of H_2O , warming for 30 min. in a thermostat at 40° ; on filtration the active principle is found in the clear filtrate. Well-prepd. gums give a colorless filtrate, which is slightly acid and shows a marked tendency to froth. Measure the milk and H_2O into 150 cc. Erlenmeyer flasks and mix by shaking, add the enzyme soln. from a buret and mix the contents by a few vigorous shakes. Place the flasks at once in the thermostat at 40° ; remove after 30 min. in the same order, add 20 cc. of ice H_2O to each, and place the flasks in melting ice to stop digestion. Wash the contents of each flask successively into a 500 cc. beaker, sufficient H_2O being used to give a final volume of about 75 cc. Ppt. the undigested protein by slowly adding 0.5 cc. of $CuSO_4$ soln. (60 g. per l.), followed by 0.5 cc. of glacial $AcOH$, stirring vigorously. Wash the contents of the beakers into 100 cc. measuring cylinders, let stand a short time to permit the curd to settle, filter on 11 cm. ashless papers previously dried at 100° and weighed. If filtration is slow, do not wait until all the liquid has passed through, but wash the curd back into the cylinders with H_2O warmed to about 60° , disintegrate by means of a rubber-tipped rod and filter, washing 3 more times in this manner, applying gentle suction at the end. Dry to const. wt. at 100° . No correction for the amt. of papain used is necessary,

as it is not pptd. by CuSO_4 and AcOH . The wt. of protein digested by the various amts. of papain may be calcd. from the blank in which no enzyme was used. Detns., except drying, are made in 3-4 hrs.; duplicates agree within about 2%. No anti-septic is necessary with such short periods of incubation. Analyses were carried out as above with commercial samples of papain from various sources. A great divergence in activity was encountered, ranging from gum possessing practically no proteolytic power to highly active material. *Preparation*: Various methods for converting fresh latex into dry papain were investigated, in order to ascertain the extent of deterioration during drying and the possibility of commercially prepg. papain which would exceed the West Indian product in its proteolytic activity. Green fruits were scarified with steel knives in the usual manner, and the juice collected in porcelain evapg. dishes. The entire lot (about 500 g.) was mixed and divided into various portions for study. The fresh latex is considerably more active than dried papain from the Antilles, although both preps. are capable of digesting approx. the same amt. of milk protein with relatively large amts. of enzyme present. The curve for fresh latex shows a rapid increase in digestion with increasing amts. of papain up to about 20 mg. corresponding to 58% digestion of the total protein content, while the West Indian papain gives only 44% digestion at this concn. The fresh latex spread out in porcelain dishes and sun-dried darkened slightly, approximating the West Indian product in color. Analysis gave results approx. the same as fresh latex. It thus appears that sun-dried papain is not necessarily less active than the fresh latex, but, in this case, great care was given the sample to insure rapid drying, exclusion of dust, etc. Small portions of the fresh latex, dried rapidly *in vacuo* over H_2SO_4 , gave a light cream-colored, friable, more porous papain, which showed on analysis little, if any, difference in activity from the original. *Purification*: Mix 20 g. of the fresh latex with 100 cc. of 95% alc., collect the coagulum in a ball, pour off the alc., and replace with 50 cc. of 95% alc.; a fine powder is produced. Filter with suction, wash twice with ether, and dry *in vacuo*, obtaining a perfectly white powder with a faint characteristic odor. (Time from latex to dry papain about 20 min.) This material probably represents the most active papain that could be prepd. commercially, 10 mg. being capable of digesting as much milk protein as 22 mg. of the Philippine sun-dried papain or 40 mg. of the West Indian product. This material is nearly sol. in H_2O , giving an opalescent soln. with small flocks of white insol. matter. The soln. rapidly curdles milk, with the formation of a fine curd that quickly dissolves (use indicated in infant feeding). Expts. with papain from Ceylon on the rate of digestion of milk protein show that digestion proceeded rapidly during the first 10 min. and practically reached its max. within 1 hr. HCl up to 0.06% has only a slight retarding action on the digestion of milk protein; increasing amts., from 0.06 to 0.13%, acid, very greatly reduce the activity of the enzyme, although any further increase up to 0.2% causes practically no change. A sharply defined range of acidity thus reduces the digestion to 0.5, its former value. NaHCO_3 in amts. ranging from 0.0 to 0.2% had no effect on the digestion of milk protein; similar negative results were obtained with concns. of NaCl varying from 0.10 to 1.0%. Expts. with HCN to det. its effect on the digestion of milk protein by pure papain gave results in accord with the data given by Mendel and Blood (cf. *C. A.* 5, 95). Expts. with papain prepd. by the alc. pptn. method were carried out at temps. ranging from 0° to 70° ; all digestions were for 30 min. periods. Papain shows a remarkable activity at low temps.; the results are plotted. There appears to be very little difference in the rate of digestion in the neighborhood of 40 to 50° . The digestions at 70° show that the activity in the presence of large amts. of enzyme is not greatly weakened, but with decreasing percentages of gum the loss becomes more marked. A papain soln. rapidly heated to 100° , let boil 5 secs., and immediately cooled with ice no longer shows any proteolytic activity. *Evaluation of papain*: It is suggested that the average of 6 detns. made as under "method of anal-

ysis," using 25 cc. of milk, 23 cc. of H_2O , and 2 cc. of a filtered soln., representing 10 mg. of papain, digested for 30 mins. at 40° , be accepted as the standard and that the proteolytic activity of the gum be designated by the ratio so obtained of 1 part of papain to the digested protein. This is called the "activity no." of the sample. Investigations with the fresh papaya latex showed absence of invertase and diastase. It is probable that the reported presence of the latter in com. papain is to be attributed to the adulterants used in its prepn. A considerable amt. of a peroxidase is present in the fresh latex and causes the darkening of color on drying. The presence of lipase could not be definitely established, though the possibility of traces was indicated. Cf. C. A. 8, 968; MacMillan, C. A. 9, 1529. F. W. SMITHER.

Further steps toward uniformity in the official preparations of digitalis. FOCKE. *Z. exp. Path. Ther.* 16, 443-66(1914).—A review of recent publications on the biological testing of prepn. of digitalis with a report of expts. on the testing of digitalis and of strophanthus. Focke concludes in part that in Germany the several *Temporaria* are well suited for the testing of digitalis, either on the isolated heart or the intact animal. The values found for the *Temporaria* are applicable to man. The isolated frog heart method, despite recent improvements in the technic, is still too difficult for general use. For use with the intact animal the method of detg. the av. dose is most satisfactory. For ordinary purposes it is not necessary or even desirable to extract digitalis leaves completely. M. I. W.

Digitalis dosage (EGGLESTON) 11H.

U. S., 1,145,487, July 6. A. KAUFMANN. 6-Methylhydroxyquinolyl methyl ketone is made by reacting on 6-methylhydroxy-4-cyanoquinoline with Mg methyl iodide and decomp. the addition product thus formed by treatment with H_2O . It forms yellow needles, when crystd. from ligroin, m. 92° . 4-Cyanoquinoline with Mg phenyl bromide yields quinolyl 4-phenyl ketone distg. at 145° under a pressure of 0.12 mm., sol. in alc., ether and C_6H_6 , and forming a brownish yellow picrate, m. 214° , and a yellow phenylhydrazone, m. $239-40^\circ$. 4-Cyanoquinoline with Mg methyl iodide yields quinolyl 4-methyl ketone, an oil boiling at about 106° under 0.2 mm. pressure, forming a picrate, decomp. $165-70^\circ$, and a dark red cryst. iodomethylate, m. at 172° .

U. S., 1,145,634, July 6. R. UHL. Copper compounds of thio-protein substances are made by dissolving a protein substance, *e. g.*, peptone, casein or serum albumin, in NaOH soln., filtering, adding CS_2 to the filtrate and then adding an ammoniacal soln. of $CuSO_4$, pptg. with acetone, redissolving the ppt. with KOH and repptg. with alc.-ether. The product is dark brown, sol. in H_2O and alkalis and is not pptd. by NaCl or blood serum. It is adapted for use as an antiseptic and therapeutic against *Staphylococcus aureus*, etc.

U. S., 1,146,014, July 13. R. G. MEWBORNE. Concentrating solutions or extracts containing free nicotine by distg. off H_2O in a high vacuum and passing the vapors through a rectifying column from which any nicotine vapor which is produced is returned to the still after condensation.

U. S., 1,146,142, July 13. C. ELLIS. Benzyl chloride is made by vaporizing toluene and PCl_5 , adding Cl sufficient to combine with only part of the toluene and heating the mixt. to about 200° while subjected to the action of ultraviolet light. The $BzCl$ formed is condensed from the HCl and other residual constituents of the mixt., and the latter with the PCl_5 are returned for further treatment, the HCl formed being sep'd. and fresh toluene added as required.

Brit., 7,418, Mar. 24, 1914. CONSORTIUM FÜR ELEKTROCHEM-IND. GES. Acetic acid is manufd. by oxidation of aldehyde by means of air or O in the presence of a catalyst consisting of Mn formate, acetate, butyrate, benzoate, or lactate, or the Mn salts of similar organic acids. Cf. C. A. 9, 355.

Dan., 18,904, May 16, 1912. AKTIEBOLAGET "ASTRA." Mfg. carbohydrate-phosphoric acid alkyl esters and their salts. Most of the *Saccharomyces* varieties and the fermentable sugars can be employed for the manuf. of the alkyl esters, if to the living yeast such compds. are added as can retard the fermentation. The prepn. of the Ca salt is as follows: 100 g. crude sugar, dissolved in 250 cc. H₂O, are mixed with 150 g. compressed-yeast (*i. e.*, yeast containing 30% dry matter), and 10 cc. toluene. After 10 min. a soln. of 75 g. Na₂HPO₄, dissolved in 300 g. H₂O, is added. After 4 hrs. all free phosphate has disappeared. The yeast is then filtered off, and the soln. is freed from the albuminous substances formed by the yeast by heating the liquid to 60°. Then to the filtrate is added so much of a satd. soln. of a Ca salt that for every mol. H₃PO₄, 1 atom Ca is present. Finally, a corresponding amt. of 90% alc. is added, and the liquid is allowed to stand for several hrs. The Ca salt and the carbohydrate-phosphoric acid ester are filtered off and washed with dil. alc. The phosphate is converted in this manner quantitatively into carbohydrate-phosphoric acid alkyl esters. The theory is 44 g. alkyl ester and 75 g. Na monophosphate. Practically 38 g. and 75 g. are obtained.

Ger., 279,313, Jan. 3, 1912. E. SACK. Mfg. a ketone from civet with a musk odor, by preheating the civet with alkali, and then distg. with steam. The residue is extd. with ether or an equiv. solvent, the ext., after evapn of the solvent, is treated with a little alc., filtered from the undissolved portion, and the ketone is sepd. from the soln. by means of semicarbazide or by other known methods. The product has the compn. C₁₇H₃₀O, freezes at 32.5°, b₁₇ 204–205°, and forms a semicarbazone, m. 187°. According to claim 2 the civet is distd. with concd. KOH or NaOH, while maintaining the concn. of the reaction mixt., and then the oil distillate treated with semicarbazide as specified.

Ger., 281,098, Oct. 9, 1913; Brit., 23,945, Oct. 22, 1913. CASSELLA & Co. Mfg. diazo salts in solid form by diazotizing the aromatic amines in concd. H₂SO₄, partly neutralizing the soln. with MgO or MgCO₃, and then adding an alkali sulfate.

Ger., 281,551, July 15, 1911. F. HOFFMANN-LA ROCHE & Co. Mfg. products rich in iron from higher unsatd. halogen fatty acids by melting the latter (diiodotarinic acid, dibromostearic acid) with more freshly pptd. Fe₂(OH)₃ than is necessary for the formation of the normal salts of these acids. In this manner are obtained therapeutically active products containing 25% and more of Fe. These Fe-rich products, as well as those of a lower Fe content, are to be regarded as solns. of Fe₂(OH)₃ in the normal Fe salt (Fe(C₁₈H₃₁O₂I₂)₂).

Ger., 282,002, Jan. 30, 1913. F. HOFFMANN-LA ROCHE & Co. Sepg. the pharmacologically active constituents of the pituitary body by grinding up the glands, as such, or the exts. obtained therefrom, with Na₂CO₃, extg. the resulting powder, first with CHCl₃, then with alc., and evapg. the acidified ext. to dryness. In this manner 2 pharmacologically different constituents of the pituitary gland can be sepd. and converted into dry products, free from inactive constituents.

Ger., 282,097, May 18, 1913. BAYER & Co. Mfg. bromodiethylacetylcarbamide by acting on diethylacetyl isocyanate with Br and treating the resulting product with saponifying agents, such as H₂O, aq. NH₃, and the like.

Ger., 282,108, May 17, 1914. I. BUGARSZKY and L. TÖRÖK, and KERESZTY and WOLF. Separating the constituents of oleum cadinum, especially that portion b₂₀ 220–300° known as cadogel and applied in the treatment of skin diseases. When the oil, or

cadogel, is subjected to fractional soln. or washing with MeOH, it is sepd. into 2 distinctly different constituents; the portion readily sol. in MeOH consists of 1 or more compds. contg. O, while the portion difficultly sol. in MeOH consists of 1 or more hydrocarbons. By repeated fractional soln., with interposed fractional vacuum distn., these 2 products can be sepd. more completely from each other. The portion scarcely sol. in MeOH, after distn. over Na metal, consists of a clear, colorless liquid with strong reducing properties, the compn. of which corresponds to the formula $C_{20}H_{10}$. This product, as well as the portion contg. O, serves as initial material in the manuf. of pharmaceutical preps. Acetone (92%) or EtOH (93%) can be used as solvents instead of MeOH. Cf. C. A. 9, 955.

Ger., 282,133, July 10, 1913. FARBW. v. M. L. & B. Mfg. nucleus-chlorinated aromatic carboxylic acids by heating sulfonic acids of the aromatic series, or their salts, which contain the Me group in the nucleus, with thionyl chloride, with or without the addition of indifferent solvents, to temps. above 200° , and treating the resulting reaction products in the heat with H_2O , alkalis, or dil. acids. E. g., *o*-toluenesulfonic acid may be converted readily by this means into the *o*-chlorobenzoic acid, and the *p*-chlorobenzoic acid may be obtained from *p*-toluic acid.

Ger., 282,134, June 21, 1913. A. HOCHSTETTER. Mfg. chloroformic acid esters, according to the process of Barral and Morel. Phenol is dissolved in H_2O with alkali, and a soln. of $COCl_2$ in a solvent not miscible with H_2O is added—operating in a two-phase reaction mixt. which consists of H_2O and a solvent not miscible therewith. The hydroxy compd. used (alc., phenol) is dispersed between the layers of the two-phase mixt. in such manner that it is contained almost entirely in the non-aq. layer containing the $COCl_2$, or at least shows a marked concn. there. With an alc. readily sol. in H_2O is chosen a solvent, not miscible with H_2O , into which the alc. in question passes from the H_2O to a large extent. The entire amt. of $COCl_2$ to be used is added to the reaction mixt., and then the alc. is introduced gradually, or the $COCl_2$ is added a little at a time. The non-aq. phase of the reaction mixt. can be formed of the chloroformic acid ester which is to be produced, or of $COCl_2$ itself if operating under pressures and temps. at which $COCl_2$ is liquid. In cases in which the dispersion coeff. between the two layers of the alc. to be esterified is not very favorable, the addition of NaCl, $CaCl_2$, or the like, to the aq. layer is necessary. In case the liberated HCl can influence the yield, alkalis or $Ca(OH)_2$ or $CaCO_3$ may be dissolved or suspended in the aq. layer.

Ger., 282,263, Jan. 25, 1914. AKT.-GES. FÜR ANILIN-FABRIKATION. In the concentration of dilute acetic acid, 100 g. 70% HOAc are mixed with 500 g. metaphosphoric acid, the mixt. is heated on the steam bath for 30 min., distd., then fractionated. A 99% HOAc is obtained. The residue is reconverted into metaphosphoric acid by heating.

Ger., 282,264, May 18, 1913. I. ABELIN, E. BÜRG and M. PERELSTEIN. 4-Dimethylamino-1-phenyl-2,3-dimethyl-5-pyrazolone compound of *p*-aminophenyl ω -dimethylaminosalicylate, an antipyretic narcotic compd. of the formula $C_{27}H_{30}O_7N_4S$, decomg. at $141-142^{\circ}$, is prepared by the action of 4-dimethylamino-1-phenyl-2,3-dimethyl-5-pyrazolone on ω -methylsulfonic acid of *p*-aminophenyl salicylate.

Ger., 282,265, Dec. 7, 1913. BAYER & Co. Unsaturated acids of the anthraquinone series are obtained by condensation of anthraquinone-2-aldehyde or ω -dihalogen-2-methylantraquinone or their derivs. with acetates. These products serve for the production of dyes and medicinal preps., as e. g., the heretofore unknown *anthraquinonyl-2-acrylic acid*.

Ger., 282,266, Dec. 25, 1913. FARBW. v. M. L. & B. The manuf. of amyl acetate. By the action of Al amylate on acetaldehyde in amyl alc. soln., instead of the expected

EtOAc, amyl acetate and EtOH are obtained, *i. e.*, the lower homologous alc. is expelled by the higher homolog, contrary to the assumption of Kremann. *E. g.*, in 100 parts of isoamyl alc., 10 parts of Al isoamylate are dissolved, or, with the aid of a little Hg, 1 part of Al is dissolved, and into the cooled soln. (temp. below 18°), 100 parts of acetaldehyde are allowed to flow, with stirring. After standing for 12 hrs., the mass is fractionated, whereby from the high-boiling fraction 110–120 parts of amyl acetate are obtained.

Ger., 282,296, Sept. 19, 1913. FRAU MATHILDE GROLL. Manuf. of permanent fermentation preparations, especially of lactic acid bacteria, in convenient culture form for transportation. The moist mass is made, not from ordinary sugar, but from sugar, the crystallizing power of which has to be minimized or destroyed, *i. e.*, from so-called fondant-sugar which is made by boiling down ordinary sugar to 40–45° of the sugar scale, washing repeatedly to prevent crystn., adding some potato or grape sugar, pouring on to a marble plate, spraying with H₂O, cooling well, and finally making it into tablets. By this treatment the sugar becomes completely sterile, loses its crystg. property, becomes doughy and does not dry out, retaining 22–24% moisture for a very long time. The product dissolves readily in a great number of liquids and may be combined intimately with bacteria cultures and their culture media, as well as with dyes, ethers, etc. These mixts., after incorporation of the bacterial culture, constitute a sterile mass completely free from foreign organisms and, by virtue of their retained moisture, impart permanency to the life and germinating power of the ferments.

Ger., 282,313, Nov. 19, 1913. BAYER & Co. Water-soluble condensation products, used in the manuf. of therapeutic preps. and as tanning agents, are obtained by dissolving di- or trihydroxybenzenes, etc., wherein at least 1 *p*-position, with respect to the OH group, is not substituted, in an indifferent solvent (H₂O or alc.) at a low temp., mixing this soln. with acetaldehyde and its derivs., and allowing the mass to react, with the addition of acid or basic condensing agents, and with gentle warming.

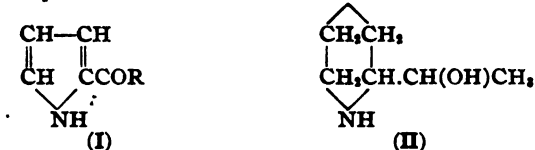
Ger., 282,320, July 31, 1912. W. WIECHOWSKI and O. ADLER. Mfg. a permanently stable laxative, locally active in the intestines, by pptg. with aq. solns. of colloidal Fe₃(OH)₃, at a high temp., vegetable laxative infusions prepared in the usual manner, adding animal black to the filtrate, sepg. the animal black, which contains the active substance, from the supernatant liquid, washing with H₂O, and drying at the ordinary temp. *E. g.*, 50 g. powdered rhubarb is made up into a hot effusion which is strained and mixed with 100 cc. of a soln. of colloidal Fe₃(OH)₃ and brought to a boil. After sepg. the solids, 50 g. pure animal black is stirred in, and the liquid above the rapidly settling animal black is drawn off. The black is then washed thoroughly with H₂O and dried at a moderate temp. There is obtained a black, odorless and tasteless powder possessing uniformly permanent properties.

Ger., 282,376–7, Dec. 31, 1913. L. ROSENTHALER and A. ABELMANN. Mfg. mercurous compounds of basic purine derivatives by allowing mercurous salts, as HgNO₂, in aq. soln., to act upon acid solns. of basic purines, as caffeine, theobromine or theophylline in HNO₃. In this manner are obtained the heretofore unknown mercurous derivs. of basic purine derivs., which are but slightly poisonous, and therefore applicable in the eradication of diseases due to spirochaetes and spirilla. If theobromine or theophylline, in acid soln., be treated with Hg acetate, or if the aq. suspension of theobromine or theophylline be heated in the presence or absence of alkali lyes, with HgO, mercurized compds. of basic purine derivs., *e. g.*, (C₇H₇O₂N₄)₂Hg, are obtained. These also are but slightly poisonous, and are applicable therapeutically.

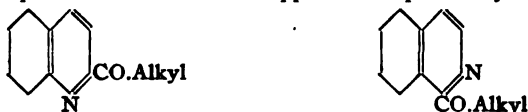
Ger., 282,455, Sept. 16, 1913. BAYER & Co. Mfg. hydroxyquinoline compounds containing iodine and bismuth, their nucleus and substitution products, by boiling

these compds., *e. g.*, 8-hydroxyquinoline, 5-bromo-, 5-methyl-8-hydroxyquinoline, with the calcd. amt. of BiOI in aq. suspension, for several hrs., and extg. the ppt. with alc. and ether. The product is strongly antiseptic.

Ger., 282,456, Oct. 21, 1913. BAYER & Co. Mfg. alcohols of the pyrrolidine series. Acidylized pyrroles of Formula I, in which R = alkyl, may be reduced as readily in the nucleus as in the side chain. 2-Acetylpyrrole, dissolved in 10 parts alc., is reduced in the usual manner with Na in boiling soln., and goes over into the pyrrolidine alc. of Formula II. These amino alcs. are applied as initial material in the manuf. of pharmaceutical products.



Ger., 282,457, June 20, 1913. Addition to 276,636 (C. A. 9, 356). A. KAUFMANN. In mfg. ketones of the quinoline or isoquinoline series, the principal process, as applied to 4-cyanoquinoline, may be applied generally with the cyano derivs. of the quinoline and isoquinoline series which contain the CN group attached to the pyridine ring in the *o*-position to the N. *E. g.*, Mg alkyl halides are allowed to act on quinoline-2-carboxylic acid nitrile or isoquinoline-1-carboxylic acid nitrile, and the resulting addition products are broken down in the usual manner. The heretofore unknown quinolyl-2- and isoquinolyl-1-alkyl ketones of the following constitution serve for manuf. of medicinal preps. and are themselves applicable in perfumery.



Ger., 282,492, Oct. 2, 1913. FARBW. v. M. L. & B. In mfg. aromatic amines, aromatic nitro compds., which are volatile with steam, permit of ready reduction in the presence of H by distn. in a current of steam over suitable catalyzer for carrying the H (Ni, Pd, Pt). The reaction is effected under the b. p. of the nitro compd. *E. g.*, for the manuf. of aniline, a current of steam and H is led through the nitrobenzene heated to about 120°. A long, horizontal tube, half filled with finely divided Ni and heated to about 120°, is used as the reducing app.

Ger., 282,494, Dec. 23, 1913. F. ULLMANN. 4-Chloro-1-hydroxyanthraquinone and its derivs. are obtained by chlorination of 1-hydroxyanthraquinone or its derivs. with SO₂Cl₂ in the presence or absence of catalyzers such as I, with the aid of heat. By the further action of SO₂Cl₂, with the addition of catalyzers, polychloro derivs. are obtained.

Ger., 282,790, Nov. 22, 1913. C. BÜCKEL. Mfg. salves, lubricants, and the like, by mixing acidylarylsulfonimides or their alkali salts, alone or in the presence of soap, with hydrocarbons, oils, fats, or fatty substances. The property of the acidylarylsulfonimides of forming salts with alkalis is of great significance in connection with emulsions for spraying wool for later dyeing of the textiles in the piece, because the emulsifying agent can be washed out, thereby preventing an uneven taking of the dye, clouding, subsequent odor on storing, and the like. Furthermore, by the addition of acidylarylsulfonimides the fats, oils, and fatty substances acquire an increased m. p., which is of value when these mixts. are to be employed as lubricants. *E. g.*, a vaseline (5 kg.) of a m. p. of 35°, does not m. below 75° when 1 kg. palmityl-*p*-toluenesulfon-

imide is added. Olive oil, 10 kg., after the addition of 1 kg. stearyl-*p*-toluenesulfonimide, forms with 3 kg. H₂O a permanent white salve. If 6 kg. NH₄ compd. of palmityl-*p*-toluenesulfonimide and 12 kg. of a 60% soap are boiled up with 200 liters H₂O, 30 kg. CCl₄ added with stirring, and the whole dild. to 1000 liters, a permanent emulsion is obtained. A yellowish white emulsion is obtained by mixing 45 kg. of cod liver oil with 5 kg. NH₄ compd. of palmityl-*p*-toluenesulfonimide, and then stirring up with 50 liters H₂O.

Ger., 282,791, Dec. 13, 1913. Addition to 282,790 (*supra*). C. BÜCKEL. Salves, lubricants, and the like, prepd. by means of alkali salts as specified in the principal patent, can also be obtained by means of the alk.-earth and heavy metal salts of acidyl-arylsulfonimides. *E. g.*, Na compd. of palmityl-*p*-toluenesulfonimide yields white salts with CaCl₂, AgNO₃, and HgCl₂, a light greenish salt with CuSO₄, and a bright yellow salt with Fe₂Cl₆. These salts impart to oils, fats, and fatty substances, the property of yielding permanent emulsions with H₂O. *E. g.*, 9 parts olive oil, after the addition of 1 part Ca salt of palmityl-*p*-toluenesulfonimide, forms with 3 parts H₂O a stable yellowish white salve.

Ger., 282,792, May 5, 1914. J. SCHRIDIG. Mfg. a sterile court-plaster from animal skin, such as the cheap intestinal membranes, by washing and scraping off the fat, treating with powdered burned pyrolusite, rubbing off with powdered pumice, and finally cleaning with a disinfectant, preferably sublimate soln., whereupon the dried skin is coated with gum arabic soln., or the like. The outer skin of the ox rump is especially suitable. Pyrolusite not only absorbs the fat remaining on the skin, but also dries the skin when finely ground pumice is rubbed on.

Ger., 282,819, Nov. 21, 1913. CHEM. FABRIK H. WERTZ. Mfg. salts of boroformic acid by allowing H₃BO₃ and HCOOH, in the free state or in the form of their alkali salts, to react in the presence of alkalies or alkali carbonates. Na boroformate, m. 110–111°, is obtained, *e. g.*, from a soln. of 431 g. crystd. soda and 575 g. borax in 1250 cc. warm H₂O, by introducing, slowly, 347 g. of 80% HCOOH, or by crystg. an aq. soln. of 409.7 g. NaOCO.H and 373.4 g. H₃BO₃, or finally by crystg. 744.0 g. H₃BO₃ and 1716.0 g. soda in H₂O, after the addition of 552.0 g. HCOOH. These alkali salts of boroformic acid (the K salt can be obtained in an analogous manner) have therapeutic application.

Ger., 282,986, Feb. 28, 1913. Addition to 278,868 (C. A. 9, 1096). HENKEL & CRE. Zinc perborate can be obtained by a method analogous to that specified in the principal patent for the manuf. of Mg perborate. *E. g.*, 1 mol. ZnSO₄·7H₂O is intimately mixed with 2 mols. NaBO₃·4H₂O and the mixt. is fused on the water bath at about 70° and kept at this temp. for a long time with stirring. The mass solidifies rather rapidly after cooling, has a uniform granular appearance and may be pulverized easily after thorough drying. The product is a perfectly white amorphous powder of homogeneous compn. The yield of active O is almost quant., and the stability is very satisfactory. The Zn perborate, in consequence of its high O content, in combination with the action of the Zn-boric acid compd., is applied pharmaceutically.

Ger., 283,649, Mar. 8, 1914. CHEM. FABRIK HELFENBERG A.-G. v. E. DIETERICH. A permanently dry calcium chloride preparation is made with the aid of Chinese gelatin agar-agar. The soln., emulsion, fine powder or crushed mass of CaCl₂ is taken up by means of fine cut or coarse agar-agar, adding the CaCl₂ a little at a time. *E. g.*, 500 g. agar-agar cuttings can be worked up with 2000 g. H₂O in which 100–500 g. crystd. CaCl₂ have been dissolved according to the strength of CaCl₂ desired. In the animal body the CaCl₂ is taken from the prepn. and metabolized, while the agar-agar passes off unchanged.

Ger., 283,728, Dec. 3, 1911. R. VON WALTHER. Mfg. powders and salves with increased covering power. Cf. Fr., 451,446 (C. A. 7, 3532).

18. ACIDS, ALKALIES, SALTS AND SUNDRIES.

T. LYNTON BRIGGS.

The Italian chemical industry and the war. ANON. *Chem. Ztg.* 39, 489-91 (1915). J. H. MOORE.

The Austro-Hungarian chemical industry and the war. ED. DONATH AND G. ULRICH. Brunn. *Chem. Ztg.* 39, 505-7, 526-8 (1915). J. H. MOORE.

The fixation of atmospheric nitrogen on a commercial scale. H. C. PRINSEN-GEERLIGS. *Louisiana Planter* 54, 347-8 (1915).—P.-G. reviews various known methods for the fixation of N and refers to the work of the German Fermentation Industry Inst. in connection with the conversion of the N of NH_3 unto albuminoids. Under suitable conditions, yeast is rapidly grown in a soln. of sugar, $(\text{NH}_4)_2\text{SO}_4$, and some nourishing salts by forcing a current of air through the liquid. A considerable amt. of organic matter is formed and when dried contains about 40% albumin and is equal in wt. to the sugar used. When mixed with molasses, a complete cattle food is produced.

A. GROSS.

Deacon process. B. NEUMANN. *Z. angew. Chem.* 28, I, 233-6 (1915).—Results are given of investigations of the effect of catalytic agents on the equil. $4\text{HCl} + \text{O}_2 \rightleftharpoons 2\text{H}_2\text{O} + \text{Cl}_2$, made with a view to increasing the yield of Cl_2 . It was found that the double salts of CuCl_2 and KCl or NaCl gave better results than the CuCl_2 alone. Theoretically the process must be carried out at as low a temp. as possible, which, however, would result in reaction velocities too slow for practical use. The greatest degree of decompn. takes place when the entering mixt. of air and HCl contains a low % of HCl , but then the Cl conc. in the final mixt. is low for practice. When CuCl_2 is used as the catalyst the most efficient temp. is 430° , for the double salts about 40° higher; the latter do not volatilize as readily. The degree of decompn. is increased by the use of O_2 instead of air, but the increased yield does not warrant the higher cost of the O_2 . The double salt copper chloride-sodium chloride begins to volatilize at about 550° in a quiet atm. and at approx. 510° in a current of gas, while CuCl_2 begins to volatilize between 430 and 460° . The reaction velocity at 470° is so great that with mixts, rich in HCl the state of equil. is reached in a short time, when the double salt is used as the catalyst.

H. R. GUNDLACH.

Ammonia-soda: Striebeck system. K. W. JURISCH. *Chem. Ind.* 38, 9-22, 61-71 (1915); cf. *C. A.* 1, 228, 473-4; 4, 3123; 5, 2308.—Developed by Striebeck in the period 1879-1885 this unpatented process was kept secret till his death in 1900. The output of factories at Nürnberg, Inowrazlaw and Stassfurt exceeds that of all others operating according to systems other than the Solvay system. A detailed description with plan is given of one unit for the production of 30,000 kg. per day. Two active and one reserve CaO kilns, each burning 27,000 to 30,000 kg. per day, are required. These kilns have an oval or round cross-section, about 3 m. in external diam. at widest part, about 10 m. high and are so supported on 4 cast Fe columns that the lower discharge end is 80 cm. above ground level, its opening being closed by a "plug" of burnt CaO . The burning is effected exclusively with coke mixed with the CaO . Around the head of the CaO kiln is a circular canal 1 m. high and 30 cm. wide in which the gas collects and some dust settles. The gas is drawn through a vent in upper part of the canal through a cast Fe pipe 40 cm. in diam. into a dust trap and then into a scrubber. Each CaO kiln has its own scrubber which rests upon a base 50 cm. high and is 8.5 m. high with a diam. of 1.5 m. The gas enters below a perforated false bottom about 75 cm. above the true bottom. The gas main provided with large side openings is extended into the scrubber which is packed with coke, broken tile or similar material above the false bottom and constantly washed by a descending stream of H_2O distributed

by means of specially constructed floating rubber balls. The outflow is so regulated that a definite height of H_2O is maintained below the grid. The scrubber cools the gas and removes dust, SO_2 and tarry matter, etc. The gas is drawn from the upper space of the scrubber through a cast Fe pipe 25 cm. diam. into a separator or second scrubber without filling 3.6 m. high and 1.5 m. diam. to remove entrained water, $NaCl$, $CaCl_2$, $MgCl_2$, which form crusts with lubricating oil of the compressor. The gas enters below through a sieve about 45 cm. above the true bottom. The gas passes through a 225 mm. diam. cast Fe pipe to the 3 compressors, 2 of which are always in use. Each machine sucks under a negative pressure of 7 to 8 cm. of Hg about 24 cu. m. of gas per min. calcd. to atm. pressure. The gas is compressed to about 1.6 atm., cooling with a spray of H_2O . The compressed gas passes through a 200-mm. diam. cast Fe pipe into a H_2O separator 1.2 m. in diam. and 1.5 m. long with arched end plates, then into an air-chamber about 2.4 m. high and 1.2 m. diam. in which a further sepn. of H_2O occurs. From here the gas passes direct to the pear-shaped Fe or steel carbonators, 6 for one unit, 6.2 m. high and 5 m. in diam., supported by 6 cast Fe columns, apex resting on a base on ground. The walls are 10 mm. thick in lower part, 9 in. upper. A novel feature is a distributing system with 6 radial slotted arms. The slots soon become clogged, so to prevent stoppage of gas flow by the deposited $NaHCO_3$, these 6 distributing arms are Ω -shaped and so kept open below. The overflow pipe is horizontal, 150 mm. in diam. and serves both to remove bicarbonate slime, and charge the app. with fresh ammoniacal brine; the excess of free NH_3 readily dissolves any obstructing lumps of $NaHCO_3$. The 6 carbonators are divided into 2 groups of 3; each group receives a stream of CO_2 from the blowing engines; the gas then passes through a scrubber to be freed from entrained NH_3 . After a carbonator is emptied, it is recharged with 40 cu. m. of fresh ammoniacal brine and connected at the end of the series of 3. One carbonator is emptied and recharged every 8 hrs. since 40 cu. m. of the brine requires 24 hrs. for satn. with CO_2 , producing 5,000 kg. of soda. The temp. at the end of carbonation is $20-28^\circ$. The carbonators are not lined as a protective layer of $NaHCO_3$ forms on the inner walls. The exit gases, the gas from the vac. filters and the waste gases from the absorption vessel in the distn. are washed in a scrubber with brine, passing finally through H_2SO_4 to remove last of the NH_3 . To effect rapid and complete emptying of the carbonators the bicarbonate slime is forced into a closed, steel, stirring chamber of 5 m. diam. and 2.5 m. height, capacity 49 cu. m., having a stirrer of 2 to 3 h. p. The exit pipe for the slime is near the bottom of the stirrer and is 100 mm. in diam.; the slime flows by gravity onto 10 of the battery of 20 vac. filters, 1.6 m. sq. base and 1.35 m. high; the filtering layer is about 70 cm. from the bottom. While filling with bicarbonate slime the filters are covered and sealed by a H_2O layer; filling, filtration and washing are done without using suction. Each filter has a 500 l. elevated water tank for washing; 2 or 3 washings with cold H_2O ($1\frac{1}{2}$ vol. of H_2O to 1 of slime) suffice. The filters in series of 2 or 3 are sucked dry with a vacuum of not less than 25 cm. Hg. Each 40 cm. thick, filter cake yields in 6 hrs. about 1,024 cu. m. of bicarbonate. Gases from each filter are sent with the exit carbonator gas to the scrubber. The filtrate and washings are collected in an Fe holder; the bicarbonate settling out is removed from time to time and treated as the other bicarbonate. Calcination is done by Thelen pans of 5 parts, each 1.6 m. long, closed in order to recover CO_2 and NH_3 , provided with stirrers. Yield 6,000 kg. Na_2CO_3 per 24 hrs. from the moist $NaHCO_3$ from the vacuum filters; 6,500 kg. soda from centrifuged $NaHCO_3$. The gases are conducted through a horizontal cooled pipe to remove dust with the condensed H_2O . The gases from 3 pans then pass into cooling "boats," then mix with the ammoniacal waste gases from the clarification vessels for ammoniacal brine and finally pass into the absorption vessel of the distn. app. at a pressure of 0.7 atm. To produce a denser Na_2CO_3 (d. about 1.4), the product is calcined in an ordinary furnace till partially fused

and the mass powdered. The *mother liquor* and *washings* are pumped up into metal holders 14 m. above the brine supply, holding 5 to 10 cu. m. and operated in pairs. A pipe passes from these vessels to the upper part of a ten-compartment preheating column and is also connected with the mother liquor pump. The column is heated by the steam from the main column and the hot NH_3 vapors from the mixing vessels. The soln. free of volatile NH_4 compds. now flows into the mixing or decomposing vessel, where it is mixed with milk of lime. A thin milk of $12\text{--}13^\circ \text{Bé.}$ is prepd. in slaking vessels; the steam is piped off for use in the distn. The milk is passed through a settling box to remove coarse material and then into a stirrer, then into 2 vertical cylinders with conical bases where heavier matter settles and is drawn off at bottom. It then flows into thickeners whence thickened Ca(OH)_2 is drawn off just above the bottom and discharged into the cast iron decomposing vessel of the Honigmann type. The narrow, rectangular, main column, 11.55 m. high, contains 36 compartments so arranged that on the narrow sides, stages 25 cm. apart are present, while on the long sides landings are 50 cm. apart. Steam from the blowing engines under a pressure of 1.1–1.2 atm. passes into the main column at top, flows out and mixes with vapor from the mixing vessels, passes through the preheating column into the cooling "boats," and the NH_3 is conducted to the brine vessel. *Raw materials:* NaCl averages about 96.5–97.5% NaCl; limestone in Stassfurt 90% CaCO_3 ; Striebeck claimed 95–98% $\text{CaCO}_3 + \text{MgCO}_3$. NH_3 in the form of $(\text{NH}_4)_2\text{SO}_4$ made from gas liquor. The av. of the gas from the CaO kilns was 26% by vol. of CO_2 . Exit gas from carbonators averaged 13% by vol. of CO_2 . Gas from the calcination was 50–60% by vol. CO_2 —Striebeck obtained as high as 80–90% at Inowrazlaw. About 75% of the CO_2 is absorbed in the receivers. End gases contained about 10–12% by vol. of CO_2 and about 0.005 kg. of NH_3 per cu. m. About 2.9 kg. of H_2SO_4 of 66°Bé. are used for recovery of NH_3 in the final absorber per 100 kg. of Na_2CO_3 . Ammoniacal brine in the absorption vessel contains only 260–270 g. NaCl per l. and is considerably undersatd. with but 63–68 g. NH_3 per l.

F. W. SMITHER.

Manufacture of nitrite of soda. J. TURNER. *J. Soc. Chem. Ind.* 34, 585–6 (1915).—The method based on the reduction at 420° of NaNO_3 by means of Pb is first described. By careful regulation of the process 90% of the theoretical yield of NaNO_2 may be obtained. The Paul process described in detail, based on the cautious reduction of NaNO_3 by NaOH and S, is not so cheap as the Pb process, on account of the difficulty in sepg. the Na_2SO_4 from the NaNO_2 , and the max. yield is only 80% of theory.

F. W. SMITHER.

Valuable potassium compounds in Catalonia (Spain). C. B. HURST. *Commerce Reports* 1915, Supplement 15c, 10–12.—In view of the discontinuance of potash exports from Germany, the extensive potash deposits near Barcelona have been investigated. These are briefly described.

E. J. C.

Vapor-compression refrigeration. J. H. GRINDLEY. *Engineering* 100, 22–4 47–8 (1915).—A short account of vapor-compression refrigeration is presented in Part I and some variations of the manner in which present-day vapor-compression machines effect their object are discussed, using for this purpose the entropy-enthalpy diagram. It is concluded that the mechanical complication involved in carrying out some of the cycles, which theory suggests give increased performances, may not warrant their practical application but undoubtedly some of them would be possible and practicable, especially when dealing with high-temp. condensing H_2O , and when cooling has to be carried out at temps. above the critical point. In Part II graphs for showing the properties of CO_2 and NH_3 are given and explained. There are found three curves, one or more of which may be straight, on which to place scales of the 3 variables p , v , and T , and these 3 curves are so placed in relation to each other that the scaled values of any

3 points, one on each curve, which are collinear, give simultaneous values of p , v , and T , which satisfy the desired equation. Cf. *C. A.* 7, 1083; Goodenough and Mosher *C. A.* 7, 3202. F. W. SMITHER.

Air-lift pumping. P. H. BERGGREEN. *Sibley J. Engineering* 1915, May; *Met. Chem. Eng.* 13, 507(1915).—A résumé of this subject. E. J. C.

Apparatus for preparing hydrogen (KAUSCH) 1.

U. S., 1,145,024, July 6. E. N. LAINE. Purifying graphite. See *Brit.*, 5,798, 1914 (*C. A.* 9, 2297).

U. S., 1,145,162, July 6. M. MOEST and M. ECKARDT. Highly concentrated nitric acid is produced by distg. acid containing about 70% HNO_3 (e. g., as produced according to U. S. pat. 1,050,160 (*C. A.* 7, 871), in a rectifying column which is heated by the vapors of lowest vapor pressure from the boiling vessel or by a steam jacket if additional heat is necessary.

U. S., 1,145,920, July 13. J. W. POULTON. Polishing powder for use on gold, silver, etc., formed of Fe_2O_3 1, powdered chalk 4 and pptd. CaCO_3 28 parts.

U. S., 1,146,045, July 13. L. H. BAEKELAND. Hard, compact, infusible molded articles are made by removing H_2O from hydroxybenzyl alc. or other phenol-alcs.; the material is then further hardened by heating under pressure with CH_2O . Condensing agents and inert fillers may be advantageously employed.

U. S., 1,146,189, July 13. H. B. MACFARLAND and R. J. SHOEMAKER. Heat-insulation is formed of a felted mixt. of 70% of fibers of *Zostera marina* with 30% of hydrocellulose made from fibers of the same plant.

U. S., 1,146,190, July 13. H. B. MACFARLAND and R. J. SHOEMAKER. Heat-insulation is produced by cooking the fibrous portions of *Zostera marina* in 2% NaOH soln., sepg. the sol. substances and treating the fibrous residue with H_2SO_4 and using the gummy product thus formed as a binder with fibers of the *Zostera marina* or similar plants. Cf. *C. A.* 9, 1691.

U. S., 1,146,214, July 13. C. P. TOWNSEND. Combined coatings of thin metal and phenolic condensation products on iron, steel, etc., are produced by application of a soln. formed of MeOH , EtOH , Me_2CO , PhOH , a salt of the coating metal, e. g., CuCl_2 , and PhOH and CH_2O or a sol. phenolic condensation product.

U. S., 1,146,299, July 13. J. W. AYLSWORTH. A moldable phenolic condensation product.

U. S., 1,146,300, July 13. J. W. AYLSWORTH. A phenolic condensation product. See *Can.*, 160,736-40 (*C. A.* 9, 2132).

U. S., 1,146,336, July 13. C. S. LOUNDS. Coating composition for preventing tarnishing of silver, brass, plated-ware, etc., composed of celluloid 1 oz., amyl acetate 80 oz., oil of cedar 4 drams, and denatured alc. 1 oz.

U. S., 1,146,372, July 13. P. G. TOEPFER. Hydrated lime is produced by treating CaO with H_2O in an inclined revolving receptacle from which it is intermittently drawn off by gravity and led to a screen while exposed to the air to allow it to dry.

U. S., 1,146,384-91, July 13. J. W. AYLSWORTH. Methods of molding phonograph records of resinous phenolic condensation products.

U. S., 1,146,413, July 13. T. A. EDISON. Sound record tablets are made by placing a layer of powdered phenol resin and wood pulp in a mold, compressing to a compact mass of even thickness, then adding a layer of finely powdered phenol resin and further pressing while heated.

U. S., 1,146,414, July 13. T. A. EDISON. Sound record tablets are formed with a thin surface facing of celluloid and a thicker backing of rubber.

U. S., 1,146,491, July 13. H. A. GARDNER. Barium chloride is made by fusing BaSO_4 with CaCl_2 until the residue is rendered basic by the volatilization of acid products (a temp. of about 1200° being employed) and pouring the melt into H_2O to dissolve the BaCl_2 .

U. S., 1,146,787, July 20. C. S. DOLLEY. A plastic composition for use in making molded receptacles, etc., is formed by adding H_2O to a mixt. of powdered kaolin 200, wood pulp 100, casein 5, gelatin 5 and Na resinate 10 parts to form an emulsion and then spraying into the latter a soln. of gutta-percha or balata 5 parts dissolved in C_6H_6 . The product is resistant to both alkalies and acids.

U. S., 1,146,884, July 20. C. R. KING. Grinding-wheels, etc., are made of particles of emery, carborundum or other abrasive held together by a binder of clay or water glass and impregnated with a filler of rosin. The rosin prevents clogging of the grinding surface by particles of metal.

U. S., 1,147,183, July 20. S. PEACOCK. Phosphorus pentachloride. See Can., 154,406 (C. A. 8, 1859).

U. S., 1,147,184, July 20. S. PEACOCK. Calcium nitride, Ca_3N_2 , is made by heating a briquetted mixt. of CaO and C in an atm. of H and N to a temp. of about 900 – 1000° or higher at which the double nitride of H and Ca first formed breaks up into Ca_3N_2 and NH_3 .

U. S., 1,147,264, July 20. A. H. PETER. An amber-like plastic substance is made by heating a mixt. of 10 parts resorcinol with 7.5–10 parts of a 36–40% soln. of CH_2O .

Aust., 4,399, May 13, 1914. Addition to 63,556. P. RÖDER-BRUNO RAABE AKT.-GKS. Mfg. an artificial sponge. Instead of a concd. cellulose deriv. soln., a casein made plastic by previous treatment with alkali solns. and heating, or a similar albuminous material, is mixed with fiber and readily sol. material, and this mixt. is treated with a HCHO soln. or other substance which renders the albumin insol., and then the readily sol. substances are removed by extn. Cf. C. A. 8, 3354.

Aust., 7,762, Sept. 10, 1913. C. DOELTER. Decolorizing talc with dil. HCl or H_2SO_4 . After the acid treatment the resulting Fe salts are washed out with H_2O .

Brit., 6,155, Mar. 11, 1914. BERLIN-ANHALTISCHE-MASCHINENBAU AKT.-GES. Hydrogen. See Fr., 465,575 (C. A. 8, 3491).

Brit., 6,274, Mar. 12, 1914. H. POLLARD. Ammonia is obtained in the anhydrous liquid form, without employing a mechanical compressor, by first absorbing the gas by means of a dry salt, which produce a liquid combination, and then expelling the NH_3 by heat under sufficient pressure to effect its liquefaction.

Brit., 6,288, Mar. 12, 1914. F. RASCHIG. A packing for absorption or reaction towers consists of small cylinders irregularly arranged, as by dropping or pouring them into the tower.

Brit., 6,354, Mar. 12, 1914. SOC. ANON. DES COMBUSTIBLES INDUSTRIELS. Carbon is obtained from liquid hydrocarbons, such as coal tars, tar oils, petroleum tars or oils, by first removing any suspended mineral matter and then subjecting the hydrocarbon, while in a pulverized or atomized state or in the form of vapor, to the action of heat and a current of air or oxidizing gas in fine jets; this treatment is stopped before the mass becomes carbonized, which occurs at 400 – 500° . The product is then treated with a solvent, such as benzene, petroleum, or tar oils, to remove the sol. portion, and the insol. residue is carbonized. The dissolved portion is distd. to recover the solvent

and is further subjected to the process described above, either alone or mixed with other hydrocarbons.

Brit., 6,445, Mar. 13, 1914. H. MILLIGAN. An adhesive paste is made from a powder comprizing ground manioc root well mixed with a non-poisonous, or substantially non-poisonous metallic chloride, such as $MgCl_2$, or $NaCl$, or both, and with or without a small quantity of maize flour, farina, or the like. For use, sufficient boiling H_2O is poured over the powder to give a paste of the proper consistence; this is followed by thorough stirring. When cool, the paste is ready for use.

Brit., 6,476, Mar. 14, 1914. J. L. BUCHANAN and E. B. MAXTED. Hydrogen is prepd. by passing a mixt. of CO , or gases containing CO , and steam over a catalyst consisting of an alkali ferrite which has been lixiviated so that a portion of the alkali is removed; the alkali ferrite may be prepd. by roasting Fe_2O_3 , as burnt pyrites, with Na_2CO_3 .

Brit., 6,477, Mar. 14, 1914. J. L. BUCHANAN and E. B. MAXTED. Hydrogen is prepd. by the interaction of CO and steam in the presence of a catalyst consisting of or containing a metallic couple; $Fe-Cu$ or $Fe-Ag$ couples are suitable. The catalyst may be made from lixiviated alkali ferrite, as described in 6,476 (*supra*), by reducing the Fe_2O_3 therein to the metallic state by H , etc., moistening with a soln. of $Cu(NO_3)_2$, and finally heating, preferably in a current of reducing gas, or washing, to remove nitrates. Gases containing CO may be used instead of CO itself.

Brit., 6,555, Mar. 14, 1914. OESTERREICHISCHE FILZKORKWERKE GES. In a process of obtaining spinning fibers, insulating material, and a substitute for cork flour from the barks of osiers, one-year old bark which has been stored in a moist and well aerated room is steamed in a vessel at 1 to 3 atms. pressure for 1 to 3 hrs., and then pickled in an alk. soap bath for 12 hrs. To sep. the long fibers, the material is then passed between fluted rollers to a hollander. After treatment, long fibers are lifted out by a rake and heated under pressure with a steam satd. with glycerol, after which they are dried. Bark and short fibers pass to the mixer, from which they are discharged to a trough having a sieve. Finer constituents passing through the sieve are ground to powder and used for filling linoleum. Coarser material is lifted out by dipper frames and pressed by means of a press into briquets, which may be used for insulating purposes.

Brit., 6,601, Mar. 16, 1914. P. KRETMANN. In reducing hard substances by preliminary crushing and fine grinding, the material is subjected to the action of an air current as it passes from the preliminary mill into the fine grinding-mill, whereby it is divided into 2 parts, the finer particles being carried into the fine mill by the air current, while the coarser particles are returned to the coarse mill.

Brit., 6,617, Mar. 16, 1914. J. LUTJENS. The supply of HNO_3 or other reagent supplying nitrous gases in the chamber or tower processes of mfg. sulfuric acid is controlled automatically by a thermometer in the chamber or tower, so as to maintain the reaction constant and thereby enable smaller chambers, etc., to be employed.

Brit., 6,739, Mar. 17, 1914. BRITISH THOMSON HOUSTON CO. (GEN. ELEC. CO.). Effecting reactions between gases by leading a gas through a heated porous tube and causing another gas to enter the tube through the porous wall thereof; the process is particularly applicable to obtaining N by passing air through the heated tube while a reducing-gas, e. g., H , is caused to enter through the porous wall. The tube may be continuously heated throughout the process from the initial source, or the heat liberated by the reaction may suffice to keep up the temp. In a form of app., a tube of alundum or other suitable material is contained in an air-tight casing and is provided with an elec. heating-coil of Pt , W , etc.; the end portions of the tube are made non-porous

by glazing or a cement coating, and the connections between the tube and casing are also rendered air-tight. The casing is filled with a suitable granular nonconducting material such as sand. The tube is heated to the desired temp., air is admitted by a pipe, and H from another pipe diffuses through the tube and mixes with the air; the resulting mixt. of N and water-vapor passes out by an outlet; the water-vapor may then be removed by cooling and the N purified from traces of H or O by passage over heated CuO and Cu.

Brit., 6,893, Mar. 18, 1914. C. CLAESSEN. Artificial mother-of-pearl. See Ger., 278,933 (C. A. 9, 1377).

Brit., 7,324, Mar. 23, 1914. B. BRAMWELL. Mixing liquids proportionally. The addition of one or more liquids to another which is passing through a Venturi pipe, *e. g.*, the addition of a chem. soln. to H_2O , is controlled by the difference of actual flow or wts. of liquid passed through orifices connected, respectively, upstream and at the throat of the Venturi pipe.

Brit., 7,419, Mar. 24, 1914. F. HAUSSER. In a process of absorbing nitrogenous gases in H_2O for the manuf. of nitric acid, interposing between each absorption chamber and the next an oxidation chamber in which the N oxide, which may be produced by the decompn. of HNO_2 , is made to travel through a very long course and is oxidized by the use of O without employing a catalyst.

Ger., 282,253, Sept. 19, 1913. GEWERKSCHAFT AMÉLIE. Mfg. hydrochloric acid and neutral potassium sulfate from $KHSO_4$ and KCl. The $NaHSO_4$ is first roasted with an excess of KCl to obtain $K_2SO_4-Na_2SO_4$. In the further treatment of the resulting mixt., in the wet way, with KCl, to obtain K_2SO_4 at a higher or lower temp., the concn. of the lye is controlled, with a view to securing a high % product, so that from 70 to 75 g. Na_2SO_4 seps. per 1000 cc. In order to obtain a higher yield of neutral K_2SO_4 , and to reduce the SO_4 -content of the resulting lyes, an excess of KCl is added. The mixt. resulting from the roasting of Na_2SO_4 with KCl is pretreated with the dil. liquors already obtained, instead of with H_2O , in order to reduce the amt. of the lye and more easily conc. it. In general, a temp. of 25-30° is sufficient. By repeated use of the lyes, these can be almost satd. with NaCl.

Ger., 282,370, Mar. 14, 1914. P. MÜLLER. Drying material spread out upon an elastic support which is expanded and allowed to contract as desired.

Ger., 282,566, Aug. 30, 1913. Addition to 271,246 (C. A. 8, 2465). G. SAUERBRY, MASCHINENFABRIK AKT.-GES. In the operation of app. for crystallizing salt solutions, especially K-salt solns., with the aid of air according to the principal process, the exhaust from the shafts is used as a measure of economy.

Ger., 282,609, Nov. 5, 1911. PERKINS GLUE CO. In mfg. wood size from starch by the action of alkali lye, the factors influencing the process, *i. e.*, the character of the starch, concn., time, temp., and manner of stirring, are so controlled with respect to each other that the product, which may be drawn out into threads, is suitable for coating the wood. If the starch is to be pretreated by hydrolytic or oxidizing substances, the initial material may be a moderately disintegrated product which does not dissolve clear in hot H_2O . Cassava may be employed as the starchy material. *E. g.*, into a glue kettle, provided with stirring app., are charged 275 liters H_2O ; the stirring app. is set in operation and then 100 kg. crude cassava meal (starch) are added in such manner that the meal and H_2O are completely and intimately mixed. After the meal has been added, stirring is continued for 30 min. Then, with continued stirring, a soln. of 10 kg. NaOH in 30 liters of H_2O is added, as slowly as possible in order to avoid bringing large amts. of the concd. alkali soln. into contact with the starch at one time. During the first stage of this treatment, the starch undergoes a change

analogous somewhat to the so-called breaking down effected by the pretreatment with oxidizing or hydrolyzing agents. After all the alkali has been added, the mixt. is ready for use as wood size. The desired end point of the alkali treatment is recognized in that the stringy product is also suitable for spreading. To stabilize the mass, a small addition of NaOH, 0.5-2%, is made at the end of the operation. Potato starch and corn flour are also suitable for this process.

Ger., 282,701, Dec. 7, 1913. EHRICH & GRAETZ and E. PODSZUS. Mfg. pure or practically pure boron nitride. Heretofore the production of BN in a sufficiently pure state and in sufficiently large quantities has failed, principally because in the removal of foreign matter chemically, the BN suffered reversion to H_2BO_3 . In this process there are mixed with the reaction mass substances, such, *e. g.*, as C or BN, which neither sinter nor frit and which can be removed by a gas reaction; these are added to the B_2O_3 in such amts. that sintering does not occur to any great extent. The mixt. of anhydride and added materials is ground in a ball mill. The ground mass is subjected to the action of NH_3 while maintaining the temp. above 1000° , since at lower temps. the NH_3 acts very sluggishly. Preferably a temp. of about 1800° is employed because at that temp. the trioxide volatilizes and reacts more rapidly. In case the mixt. bakes together during the reaction, which indicates that not all the trioxide has been decomposed, the mixt. can be reground and again treated with NH_3 . This operation can be repeated as often as necessary, the BN already formed serving as an admixt. advantageous to the process. If coal be used as the added substance, it can be removed, during or after the reaction, by the reaction with NH_3 , in the form of CN compds. Some H_2O may be admitted with the NH_3 ; the resulting H_2BO_3 is volatilized at a sufficiently high temp., and is reconverted by means of NH_3 into BN. At the same time, the C hastens the reduction of the trioxide. If BN be added instead of C, the process can be made continuous, since definite amts. of B_2O_3 can be added from time to time, and the operation repeated. If the product still contains acid, it is subjected to a rectification in a current of NH_3 at a temp. sufficiently high to volatilize the trioxide and ppt. the B as BN. If C is not used, a tube of BN is used. The product is so pure that at the highest attainable temps. no trace of baking together is apparent, and no B_2O_3 or Ca compds. are given off.

Ger., 282,745, May 14, 1913. R. WUSSOW. Separating gases of different properties from gas mixts., by means of diffusion and absorption, simultaneously, with the employment of a pressure chamber in which tubes are fitted which are made of a material permeable to one gas constituent, while the space between the tubes is filled with an absorbent for another constituent. The gas is introduced preferably under pressure. *E. g.*, if a mixt. of water-gas containing 67% H_2 and 33% CO_2 is to be sepd., a porous partition (of clay) may be used, the space between the tubes being filled with beechwood charcoal. After the first diffusion the mixt. has been found to consist of 83% H_2 and 17% CO_2 .

Ger., 282,746, Nov. 12, 1913. CHEM. FABRIK GRIESHEIM-ELEKTRON. In the manuf. of solid high grade calcium hypochlorite, employing a mixt. which contains all the CaO required for the formation of the hypochlorite, with a relatively small amt. of H_2O , and introducing sufficient Cl for the production of the hypochlorite. The H_2O content of the hydrate is so calcd. that upon chlorinating only the hypochlorite seps. out; the chlorite formed at the same time remains in soln. The process is carried out continuously at such temps. that the intermediate product does not sep. The Cl can be conducted, under pressure, upon or over the reaction mixt., with stirring, shaking, or the like. If, *e. g.*, a lime slurry containing for 1 part CaO at the most 2 parts H_2O is used, the mere passage of the required amt. of Cl leads to the production, with a smooth progress of the reaction, of the desired hypochlorite, which crystallizes

spontaneously from the highly conc. soln. Practically the temp. is not reduced while sufficient lime is present to prevent the decompn. of the hypochlorite formed. As the pressure is increased, the temp. is raised, since with increased pressure the absorption of the Cl is increased and consequently the temp. of the reaction. By maintaining suitable reaction temps., the basic intermediate product does not cause decompn. If, however, the temp. falls, as by interruption of the process, the basic compd. seps. out in considerable amt. In such cases the decompn. of the pptd. basic compd., by further introduction of Cl, proceeds very difficultly and slowly. Good results are secured by operating at a chlorination temp. of 35-45° and under a pressure of about 500 mm. of H₂O. Towards the end of the chlorination the temp. is preferably reduced to 25° in order to prevent a decompn. of the formed hypochlorite, the pressure at the same time being increased to 2000 mm. H₂O. The chlorination is then completed within 1 to 2 hrs.

Ger., 282,747, Jan. 10, 1913. E. HARTMANN (v. E. HARTMANN & F. BENKER). In the manuf. of sulfuric acid by the chamber process, increasing the durability of the tower system by interposing between the towers which serve as the reaction chambers and those which serve as Gay-Lussac towers, a tower which is provided with a filling and sprayed with H₂SO₄ of ordinary strength. This interposed tower provides added opportunity for the condensation of the acid spray carried over with the current of gas, especially when operating with a rapid current of gas or when forcing the plant. The condensing action of the tower can be increased materially by spraying with ordinary H₂SO₄. HNO₃ is saved and the production of the plant is increased, whether the tower system is filled wholly or partly with coke or prism-stones, Glover rings, or the like. In certain circumstances the tower may be sprayed with nitrososulfuric acid in order to oxidize the last traces of SO₂.

Ger., 282,748, Oct. 23, 1913. E. PODSZUS. In the manuf. of strong articles from nitrides, especially from the nitrides of B and Ti, the easily sintered compds. of the initial materials, such as the oxides, especially B₂O₃, TiO₂, are formed into solid bodies, then sintered, and converted into the nitrides by strong heating in an atm. of NH₃ or the like. Only a portion of the initial materials need be of sintering material, while the rest may be nitride. The oxide can be formed during the operation by a partial conversion of the nitride. The nitrides of B and Ti are formed preferably with organic binders, and the binder is burned out in contact with the air, with partial oxidation. BN products can be satd. with molten B₂O₃ or a soln. of H₃BO₃ and ignited in a current of NH₃, and if necessary this process may be repeated. Before application in the process, TiO₂ is ignited or melted. The products serve for all purposes in which high temps. are required and a reducing atm. prevails. The BN treated in the manner specified dissociates only at 2000° or over, and sublimates above this temp. in a current of H₂, while in a current of NH₃ and N it resists temps. up to 3000°. It is especially suitable for use as melting crucibles for metals, since even boiling alkali metals have no action upon it. Articles of Ti nitride are made in an analogous manner by grinding a burned or molten oxide as finely as possible, shaping the mass with an organic binder, and burning in an oxidizing fire or directly in NH₃. At first, the oxide sinters and then is converted into the nitride. If a metal, such as W, is to be incorporated, this is mixed with the oxide and the whole mass is burned in a current of NH₃.

Ger., 282,750, Feb. 26, 1914. Addition to 238,255 (C. A. 6, 1556). GEHR. BURGDORF. Constructional details of an app. for dissolving potassium salts.

Ger., 282,776, Sept. 25, 1913. E. MÜLLER. Fire kindler.

Ger., 282,849, Dec. 4, 1913. BADISCHE. Obtaining hydrogen by the catalytic double decompn. of CO or gases containing CO with steam, with the employment of

Ni as contact metal. When CO and steam, in the presence of Ni, are converted into CO_2 and H_2 , an undesired by-product (CH_4) is formed. To prevent the formation of CH_4 , there may be employed mixed contact masses, consisting of an excess of Fe or its oxides with the Ni or its oxides. Other elements or their compds., which have active properties, are added advantageously. The specified contact masses, even at low temps., effect a rapid and extensive decompn., and are to be preferred to Ni because of their stability and slight sensitiveness to accidental increases in temp. and to impurities in the gas mixt. The contact mass is applied preferably in the form of porous pieces. *E. g.*, a suitable mass is obtained by pptg. a mixt. of 40 parts $\text{Fe}(\text{NO}_3)_3$, 5 parts $\text{Ni}(\text{NO}_3)_2$, and 5 parts $\text{Cr}(\text{NO}_3)_3$ (all free from Cl), in soln., with K_2CO_3 , and thoroughly washing. The mass is then formed, dried, and a water-gas-steam mixt. is conducted over it at 400–500°. The amt. of Ni can be increased or diminished. In a modification, the principal portion of the CO can be removed with a suitable catalyzer at 500–600° and the gas, while still hot, is freed from H_2S by passage over Cu, or the like, and then, with the addition of steam, it is conducted over the new contact mass at 350–400°.

Ger., 282,891, Feb. 14, 1914. DIEDRICH P. SCHRÖDER. In mfg. soot from bituminous coals of all kinds, such as brown coal, the coal is first extd. with H_2O in drums, mortars, stamping mills, or the like. The constituents dissolving out are removed by means of H_2O in filter presses or extg. app. After the addition of very dil. NaOH or KOH soln. the coal is ground further, until it is reduced to the moisture content of bone black. The coal is then stirred up with an equal or greater amt. of 10–30% alkali soln., and worked further in disintegrators, or the like. Rotary friction app. are preferred. By this treatment the bituminous portions are dissolved, and an extremely fine, mol. C of exceptional covering power, is obtained. The mixt. is then freed from liquid constituents in filter presses, and the residual alkali is washed out, whereupon the mass is dried. The expressed or dissolved bituminous constituents are used as a caustic agent. Any residual impurities, such as bitumen, oxides, or the like, remaining in the black product, can be removed by repeated grinding with H_2SO_4 , HF or the like. The acid is then washed out and the H_2O is removed by heating. In removing the last trace of H_2O some alc. is added, or the mass is extd. with alc., whereby an exceptionally fine black product is obtained. Instead of treating the crude coal with NaOH, or the like, Na_2CO_3 , NaCl, or Na_2SO_4 may be used, in such manner that the mass is subjected to electrolysis, when the Na seps. on the cathode and at once forms NaOH with H_2O . The mixt. must be maintained in constant motion by a stirring app.

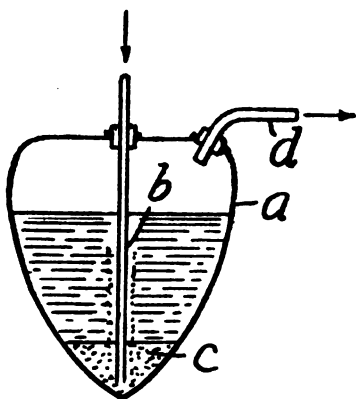
Ger., 282,913, Aug. 5, 1913. C. FRHR. VON GIRSEWALD. Mfg. hydrofluoric acid by prepg. a mixt. of fluorspar and H_2SO_4 in the usual manner and heating the mixt while at the same time introducing superheated steam. The amt. of steam added is detd. first by the concn. of the acid employed, and second according to the strength of HF desired. Inasmuch as the added H_2O is for the greater part distd. over, correspondingly less H_2O is placed in the receiver than heretofore. For highly concd. acid, practically no H_2O is placed in the receiver. This process effects a saving in fuel. By the addition of steam, the mixt. of acid and fluorspar is more intimately mixed and the heat applied is more uniformly distributed. By dilg. the concd. acid with H_2O , a considerable amt. of heat is liberated; this is completely utilized. The steam passing over with the acid aids in the expulsion of the latter.

Ger., 282,952, Mar. 15, 1913. BAYER & CO. Purifying rock salt by repeatedly treating it with a soln. satd. as to NaCl and free from H_2SO_4 or its salts, until the NaCl sepd. from the ext. in the known manner has attained the desired purity. The temp. may be varied between wide limits, up to the b. p. The salt liquor from the extn. is freed from the lime and Mg salts taken up, and is then returned for further extn.

of crude salt. *E. g.*, 1000 kg. crude ground rock salt are digested at 50–80° in a suitable app. with a soln. satd. with pure NaCl and acidified with HCl, until the suspended salt has acquired the desired degree of purity. The purified salt is then sepd. from the extn. soln. in the usual manner by suction, centrifugation, or the like, or it is covered with a salt soln. and used either in a moist state or after drying. *E. g.*, by this process, from a crude rock salt which according to analysis contains 1.21% insol. matter and 0.497% impurities precipitable by means of Na_2CO_3 , may be obtained a purified NaCl which contains only 0.104% insol. and 0.0046% precipitable impurities.

Ger., 282,953, Aug. 19, 1913. R. HOMBURG. Making transfers on stone or metal plates. H. uses a transfer paper coated with a mixt. of albumin and adhesive, CaCl_2 and glycerol, a transfer color consisting, to about one-half, of soap, wax and fatty substances, and the rest of Peru balsam, and a cleaning mixt. consisting in the main of turpentine oil, asphalt, wax, and Peru balsam.

Ger., 283,026, Apr. 17, 1913. W. JANENSCH. Solution or extraction of substances, especially those of a granular, fibrous, or like character, by means of a current of liquid or air under pressure directed into the lowest portion of a container cone-shaped at the bottom. The current of liquid or air, under pressure, is directed back and forth, and the efficiency of the app. is increased according to the force with which the solid matter, which is drawn up into the tube, is thrown out when the current is reversed. This projected material also acts as a piston, aiding soln. Furthermore, the suction produced when the material is drawn up into the tube, causes an active circulation, which greatly assists soln. Also, the impact of the projected matter aids in the crushing of such material as beet root cuttings. As illustrated, the current under pressure is delivered through the tube *b* into the deepest portion of the vessel *a*, where the material *c* under treatment collects, and forces this material upwards, while the material lying along the sides of the vessel *a* slips down and is subjected to the action of the current. According as pressure or suction is used, the vessel may be open or closed. *d* is an exit tube.



Ger., 283,065, June 10, 1914. N. KRANTZ. In a sulfuric acid chamber, the floor of the chamber is constructed so that a special cooling of the reaction gases is effected. It is preferably of a step-like construction, and the several steps are provided for drains for the acid. Various modifications are specified.

Ger., 283,096, Nov. 18, 1913. CHEM. FABRIK BUCKAU. Utilizing magnesium chloride waste liquors of the potash industry by adding H_2SO_4 and heating to the boiling temp. All the Cl is expelled as HCl and is taken up in the usual manner. *E. g.*, the waste liquors are treated in a Pb, cast Fe, clay, or like vessel, provided with a distn. mounting, with the required amt. of H_2SO_4 of 60° Bé., or even with more dil. acid, and the mixt. is maintained at the boiling temp. by direct firing or by means of steam. The HCl passing over is condensed. The boiling may be continued until MgSO_4 remains as a cryst. powder, which may be utilized in the usual manner.

Ger., 283,104, July 17, 1913. Addition to 281,831 (*C. A.* 9, 1981). C. BREITHAUP and W. ZIERVOGEL. Detailed procedure in the separation of salts from solutions by the action of a current of air, according to the principal patent.

Ger., 283,160, Oct. 31, 1913. J. PINTSCH, AKT.-Ges. In a hydrogen generator operating according to the so-called Fe-contact process, water-gas and air are conducted into a shaft filled with Fe_2O_3 to preheat and reduce the oxide, and then steam is introduced, whereupon the O combines with the Fe, while the H is liberated. The water-gas so used is preheated in a preheating system wherein the heat from the heating period of the generator is utilized. Cf. C. A. 9, 1376.

Ger., 283,161, Feb. 6, 1913. E. COLLETT. Oxidation of sulfite, especially of $(\text{NH}_4)_2\text{SO}_3$, to sulfate, in soln. by means of gases containing O.

Ger., 283,182, Apr. 28, 1914. W. HUBMANN. Obtaining potassium chloride. Many crude salt solns. of potash works contain large amts. of fine slimes which upon clarification settle with difficulty, requiring a long time. During the cooling incident to this clarification, a large amt. of the KCl seps. and is difficult to recover. By the present process the crude soln. is conducted through a sedimenting box in which kieserite and entrained particles are sepd. The soln., after some diln., is transferred to the crystg. box. After several days the slime has settled out completely, and the first product is crystd. out. The mixt. of crystd. salt and slime, after pouring off the mother liquor, is heaped up in the box to free the mixt. as completely as possible from adherent mother liquor. The slimy salt is treated then, in suitable app., in counter-current with end lyes with the aid of air blast, and by vigorous agitation of the salt and the end lye the slime is sepd. from the KCl. The fine slimes are taken up by the strongly agitated end lyes, and sepd. in this manner from the salt. Since the end lyes are not in condition to dissolve the KCl, there is no loss of the latter.

Ger., 283,302, Apr. 2, 1914. V. KLOPPER. Solution or softening of vegetable albumin, e. g., flour paste, by means of a treatment with Turkey red oil. E. g., 1 kg. fresh material, after gentle warming, is worked up with 500 g. Turkey red oil, whereupon it dissolves to a transparent, gelatinous mass.

Ger., 283,338, Jan. 24, 1914. Addition to 261,151 (C. A. 7, 3211). H. SCHROER. In mfg. a cleaning liquid for glass surfaces, such as glass sky-lights, windows, arc lamp globes, and the like, instead of the H_2SO_4 in the liquid of the principal patent, which only loosens the dirt after a long time, in this process hydrofluosilicic acid is used. A cleaning liquid which consists of the aq. exts. of quillai, or the like, H_2SiF_6 and Cu salts, has the effect of permitting the removal of all dirt after application to the surface. E. g., 1.5 kg. quillai bark is extd. with H_2O , and the cooled ext. is made up with H_2O and the prepared acid (20 liters HF of 70-75% and 2 kg. SiO_2), together with a soln. of 20 g. CuSO_4 to 100 liters.

Ger., 283,347, Aug. 31, 1912. E. R. BESEMVELDER. In a process of evaporating or drying liquids, the liquids are subjected to the action of flowing vapors of other liquids, excepting steam, whereby a vapor mixt. is obtained with b. p. lower than the temp. of the liquid under treatment. In this manner liquids sensitive to heat and readily decomposed can be dried without excessive heat. The process is especially applicable in milk pasteurization. Suitable liquid vapors are benzine, benzene, alc., ether, toluene, turpentine oil, CCl_4 , MeOH, $\text{C}_2\text{H}_5\text{Cl}$, C_2HCl_3 , nitrobenzene, EtBr, Et benzoate, naphthalene, CS_2 , etc.. The vapor chosen for a particular liquid should be that of a liquid which upon condensation does not mix with the condensate of the liquid under treatment. The vapor mixt. is, therefore, condensed, and the condensate is sepd. according to sp. gr., the drying liquid being returned to the process. The liquid under treatment is atomized into the current of drying vapor. According to the nature of the liquid under treatment, the operation may be started with a vapor from a liquid of a lower b. p., and concluded with the vapor of a higher b. liquid, or *vice versa*. A mixt. of different liquid vapors may be used in conjunction, e. g., ether and benzene

or ether and C_2HCl_4 . The progressive drying process may be used for drying albumin, at first employing vapors of benzine b. at about 85° , and finally ether vapor of 35° . The completely dried albumin loses the odor of ether readily when exposed to the air.

Ger., 283,445, Feb. 24, 1914. J. BREHNS. Employing C suspended in a liquid in the separation of gas-, vapor-, or gas-vapor-mixtures by absorption. Expts. have shown that wood charcoal or blood charcoal slimes, *i. e.*, a suspension in H_2O of finely divided C of the kinds specified absorb, under like conditions of pressure, 8 times as much H_2S and CO_2 as does H_2O alone. The gas absorbed in the slime is approx. proportional to the content of suspended C, and is dependent otherwise to a great extent upon the pressure of the gas absorbed in the H_2O . The slime yields the absorbed gas under vacuum, to a great extent. By protracted heating of the slime in the H_2O bath, the gas is almost completely eliminated. A slime of 40% linden charcoal or blood carbon and 60% H_2O (by wt.) may be prepared readily by adding the C to hot H_2O , and heating the mixt. for 1-2 hrs. at 97° . The product has a drop-wise fluidity, permits the C to settle very slowly, and has a sp. gr. of 1.17. If, *e. g.*, crude coal gas is to be freed from H_2S by means of such a slime, the circulating slime is allowed to flow down, in an Fe cylinder, over a wood grating, while the gas current is directed against the slime from below upwards. The regeneration of the slime is effected by heating, and upon return to the process it is cooled on the countercurrent principle, by means of the cold slimes flowing to the regenerator. Pure S can be obtained readily from the H_2S thus obtained, by the C. F. Clauss process. The H_2S -slime may also be conducted, for regeneration, to a second tower or cylinder, wherein a current of fresh air rises and carries the H_2S with it. The H_2S -laden air may be conducted into any burning mass. If the mixt. of air and H_2S is to be employed for the catalytic manuf. of SO_2 , the H_2S -content is increased by passing the air through the second tower and drawing it off at the top by means of a vacuum pump. The rising air has then a tension less than 760 mm. Hg, but takes out the same amt. of H_2S from the slime. Also for sepg. the CO_2 from the flue gases from steam boilers or from the exhaust from gas engines, the slime is especially suited. In the same manner coal gas can be freed from small admixt. of aldehyde vapor, and pure aldehyde can thereafter be distilled off.

Ger., 283,501, May 15, 1912. BADISCHE. Mfg. hydrogen. See Fr., 453,077 (C. A. 7, 4050).

Ger., 283,536, July 29, 1913. A. REICH. Manuf. of alkali hydroxide. Expts. have demonstrated the fact that upon igniting a mixt. of an alk.-earth carbonate with alkali silicofluoride or alkali fluoroborate, the dissociation tension of the CO_2 increases to such a degree that even at a dark red heat (a temp. below the temp. of decompn. of the silicofluorides) all the CO_2 is driven off and a reaction is effected in the sense of the equation— $K_2SiF_6 + 4BaCO_3 = 4CO_2 + 3BaF_2 \cdot BaSiO_3 + K_2O$. If sufficient alk.-earth carbonate be employed, all of the alkali in the silicofluoride is obtained as hydroxide, upon soln. of the melt in H_2O , while the alk.-earth metal remains undissolved as fluosilicate. Apart from the economy, due to the employment of the carbonate instead of the oxide, there is advantage in the employment of the most effective of the carbonates, $BaCO_3$. This is especially desirable in the subsequent regeneration of the hydrofluosilicic acid from the resulting Ba fluosilicate by means of H_2SO_4 , inasmuch as the almost insol. $BaSO_4$ seps. out completely and may be readily sepd. from the silicic acid; this can be accomplished only incompletely with $CaSO_4$.

Ger., 283,601, July 26, 1914. J. PINTSCH, H. STRACHE and H. HILLER. Converting H_2S from distn. gases into sulfuric acid or its salts. Heretofore, H_2S could be oxidized by ferric salts only to S. Expts. have shown that upon conducting gases containing H_2S into a hot $Fe_2(SO_4)_3$ soln. strongly acid with H_2SO_4 , with alternate or simultaneous regeneration of the resulting $FeSO_4$ with air or O, an oxidation of the

H₂S to H₂SO₄ is effected without sepn. of S. By air or O blast, the ferric salt is regenerated and the S sepd. at first is dissolved, in the heat, in the H₂SO₄, with its partial reduction to SO₂ according to the equation $2\text{H}_2\text{SO}_4 + \text{S} + \text{H}_2\text{O} = 3\text{H}_2\text{SO}_3$. The SO₂ reduces the ferric ion and is itself oxidized to H₂SO₄. These 2 reactions proceed simultaneously. The H₂SO₄ obtained in this manner contains Fe and can be used as such or for combination with NH₃, whereby, after neutralization, any remaining FeS can be sepd. from the (NH₄)₂SO₄. The regeneration of the FeS results upon return to the oxidation soln.

Ger., 283,618, July 15, 1913. FARBW. v. M. L. & B. Mfg. sulfates from the corresponding sulfites by oxidation by means of O or air, operating in very dil. solns., in the absence of negative catalyzer. Concd. solns., under the same conditions, are converted only slowly into sulfate. The reaction is hastened, under such conditions, by operating in the presence of Se and Te (in the form of their elements or their compds.) as catalyzers. E. g., a concd. aq. soln. of (NH₄)₂CO₃ is converted into sulfate by means of O of the air, if necessary ozone, in the presence of a small amt. of Se in the elementary or combined form, in a much shorter time than when operating without the addition of Se. The O or the air is employed preferably in the finest state of subdivision, and in excess. Heat and increased pressure favor the reaction.

Ger., 283,746, Oct. 25, 1913. GUBINOL-GES. M. B. H. Sheet metal foil for imprinting, provided with a readily sol. surface film of thin mirror-like material, such as stanniol, Al, cellite, cellophane, and the like. This material is provided with the adhesive and upon this the foil is laid. As adhesive may be employed any waxy substance, such as paraffin or fat, which m. readily in the heat without becoming glutinous.

19. GLASS AND CERAMICS.

G. E. BARTON, A. V. BLEININGER.

American clay for American potteries. A. V. BLEININGER. *Commerce Repts.* No. 165, 258-60 (1915).—Until importation was disturbed by the war, European clays were used exclusively for certain ceramic products. As yet no single American clay has been found to be an entirely satisfactory substitute, but mixts. of American with European clays give good results and it is predicted that soon there will be found an American clay or combinations of American clays that will replace foreign clays altogether. Some important sources of clay are mentioned. E. H.

Preliminary report on the clay and shale deposits of the Province of Quebec. J. KEELER. Canada Dept. of Mines, *Mem.* 64, 196 pp. (1915).—The clays are described according to the geological age in which they were laid down. The Pleistocene clay is remarkably uniform in its chem. comp. over all the regions investigated. The effect of varying quantities of sand on the strength of the burned clay was observed. It was found that the addition of 25% sand reduces the strength of the body nearly one-half while with 50% sand there is only about one-quarter the strength of the all-clay cube. The addition of sand has the effect of reducing the quantity of water required for tempering and reducing the shrinkages. It makes the clay easier to work, easier to burn, easier to dry. Most of the Pleistocene clays of the St. Lawrence valley have a tendency to crack while drying and produce a sticky and pasty type of plasticity, causing them to adhere to metals and making them hard to work or mold. They have an excessive drying shrinkage also. These defects are caused by extreme fineness of grain and by large percentage of colloidal material in the deposits. Such clays can be made workable by preheating. The new ante-fired process of making brick was tried. In this the clay is burned in heaps by wood or coal as it comes from the bank and is ground fine enough to pass through a 12-mesh sieve. The ground clay is then

moistened, mixed with 5-6% of hydrated lime, pressed into brick shapes and then hardened in cylinders under a steam pressure of 100-140 lbs. per sq. in. for 8 hrs. Brick made by this method appeared to be as strong and to withstand the freezing test as well as a medium grade of soft mud brick but they do not have the quality of toughness, as the corners and ends were rather crumbly. Sand-lime brick are made from lime and sand-stone. The reaction upon which this industry is based depends upon the fact that under the action of high pressure steam, the lime attacks the particles of sand and a chem. comp. of water, lime and sand is produced which forms a strong bond between the larger particles of sand. The addition of 2% quicklime to the clay in the manufacture of clay wares destroyed the stickiness of the clay and made it much easier to work. Chapters on drain tile manufacture, clay-working industry, sand-lime brick, the origin and general properties and kinds of clay and the field examination and testing of clays are included. Several samples collected were submitted to tests for working qualities, shrinkage and burning.

R. L. SIBLEY.

U. S., 1,147,114, July 20. J. L. MUSSEY. Purifying clay by pulping and decanting to remove heavy impurities, heating to free lighter impurities, decanting them, subjecting the remaining heated clay pulp to suction of a fan and drying it.

Aust., 6,644, Aug. 2, 1913. L. HELLER. Compn. for securing metal coatings to ceramic surfaces. See U. S., 1,126,211 (C. A. 9, 701).

Brit., 6,699, Mar. 17, 1914. A. G. EVANS. In vacuum-jacketed vessels of earthenware, China, etc., the vacuum is produced by providing an opening in the outer wall through which the air from the jacket escapes during the process of firing in the oven, the opening being sealed automatically by means of a pellet of glaze, or of glaze mixed with the "body" or clay, which fluxes and runs into the opening and subsequently solidifies.

Ger., 281,808, Apr. 2, 1913. J. DIENER. Drying and burning hand- and machine-bricks.

Ger., 281,809, Sept. 10, 1913. Addition to 281,207 (C. A. 9, 2301). W. HAPPE. Mfg. a basic lining for rotary tube furnaces.

Ger., 281,857, June 7, 1913. A. E. H. BEYER. Process of smoking and preheating in ring furnaces.

Ger., 281,863, Feb. 11, 1913. G. POLYSIUS, EISENGIESSEREI UND MASCHINEN-FABRIK. Rotary tube furnaces are fired by surface combustion, the mixt. of gas and air being supplied through the porous walls of the furnace.

Ger., 281,994, Aug. 7, 1913. A. BAARMANN. Machine for glazing tiles, and the like.

Ger., 282,524, Sept. 20, 1913. L. KERN. Process of mfg. a refractory coarsely porous filtering mass by burning off ceramic material admixts. The mass consists of kieselguhr, cellulose back-water, clay, and the like, and O is introduced into the material while it is being burned.

Ger., 282,538, Aug. 15, 1914. H. PHILIPP. A composition for plates is made of Neuburger white (instead of BaSO₄), and the usual additions.

Ger., 282,715, Feb. 11, 1914. H. F. PADEL. Combined gas muffle and rapid burner for glass painting.

Ger., 282,840, Aug. 21, 1913. F. SKAUPY. Articles of porcelain and fused-on glass parts, with the glass parts of borosilicate with a coeff. of expansion about that of the porcelain. Porcelain and metal parts are united by means of borosilicate glass fused in between them.

Ger., 283,081, Jan. 17, 1914. H. WELTE. Support for the galvanic production of patterns in the ceramic and enamel industries.

Ger., 283,203, Oct. 13, 1910. G. W. UNGER. Protecting ring for use in completely drawing molten glass from the pot in the mechanical blowing of bottles.

Ger., 283,204, Dec. 5, 1911. R. RICKMANN. Mfg. a white pigment for enamel, glass, and glazing, with the use of substances containing Sb. Cf. C. A. 8, 1861.

20. CEMENT AND OTHER BUILDING MATERIALS.

C. N. WILEY.

Plan to manufacture cement in Brazil. ROBERT FRASER, JR. *Commerce Repts.* No. 167, 295(1915).—It is proposed to manuf. cement from sea shells. E. H.

An air analyzer for determining the fineness of portland cement. J. C. PEARSON AND W. H. SLIGH. *J. Frank. Inst.* 179, 712-4(1915).—Description of a device for permitting the introduction of an unretarded air stream into a conical bulb, a sep. chamber of considerable height which permits no lodgment of either fine or coarse particles, a tapping device to minimize adherence of fine dust and a collector operating in conjunction with the sepg. chamber. The error in estg. the quantity of any desired fraction from the mechanical analysis curve will not exceed 1.5%. A. J. PHILLIPS.

The significance of reactions in the solid state for the burning of limestone. K. ENDELL. *Tonind. Ztg.* 39, 73, 85-6, 107-8(1915).—E. holds that the slow slaking of dead-burned CaO is due to the growth of the CaO grains during burning. He reviews the work of Cobb (*C. A.* 4, 1092 and succeeding articles) to show that crystal growth and reactions are possible in the solid state. W. L. BADGER.

The decomposition of cement mortars by water. CHEM. LAB. FÜR TONINDUSTRIE. *Tonind. Ztg.* 39, 215-6(1915).—Compression test pieces were made of 1:9, 1:4 and 1:2 mortars. These were kept 7 days in a moist closet, then stored by different methods, and tested at 1, 3, 6, and 9 mos. Those stored under still water were used as standards. A set on which water was allowed to trickle developed stalactites of CaO on the leaner mortars with consequent loss in strength. A set immersed in flowing water also decreased in strength in the leaner mortars; while a set half immersed in running water was almost equal to the control. A set which had been made by half filling the forms, waiting 24 hrs., and then finishing, showed considerable loss in CaO at the joint. W. L. BADGER.

Fire test on reinforced concrete. ANON. *Cement Eng. News* 26, 73(1914).—A 5-ft. cubical tank 3 in. thick with ribbed reinforcing was made from 5 pts. cement, 12 sand and 1 lime paste; it was aged 29 days and 160 gals. kerosene fired in it. The fire burned 2.75 hrs., a max. deflection of $\frac{3}{8}$ in. being noted. While warm, the tank was filled to within 18 in. of the top and the walls retained their strength against the H₂O pressure. A. J. PHILLIPS.

Investigation of the durability of cement drain tile in alkali soils. R. J. WIG, G. M. WILLIAMS, et al. Bureau of Standards, *Technologic Paper* No. 44, 56 pp. (1915); *J. Frank. Inst.* 179, 354-6(1915).—Conclusions drawn from 1 yr. field tests of 16 types of drain tile made in one plant, together with soil and H₂O analyses are: that mixtures not leaner than 1-3 are unaffected structurally within 1 yr. in operating drains in very concd. alkali soils. Not leaner than 1-3 mix should be used in localities where alkali is found in concns. similar to that in experimental drains at Grand Junc., Col., Montrose, Col. and Garland, Wyo. 1-4 mixts were unaffected within 1 yr., in soils similar to those of Fort Shaw Mont., Sunnyside, Wash., Yuma, Ariz. and Roswell, N. M. A. J. PHILLIPS.

Experimental concrete roads. J. T. VOSHELL. *Cement Eng. News* 27, 91-2 (1915).—Exam. of experimental roads laid in Montgomery Co., Maryland, in 1912, of bituminous concrete, cement concrete and brick shows apparently no difference in the plain and oil concrete sections. Where bituminous materials were used as coatings, the refined water gas tars are best and the coal tars next; the asphalt coatings did not adhere well to the concrete surface and many bare spots remain.

A. J. PHILLIPS.

Cracking in concrete roads. A. N. JOHNSON. *Cement Eng. News* 26, 247-8 (1914).—Wet concrete for roads shrinks for 24 hrs. from drainage and then expands during the next 3-4 months due to chem. action. Expts. made by Spackman indicate that the addition of 10-15% hydrated lime reduced cracks and eliminated the formation of holes and soft spots. $\text{Ca}(\text{OH})_2$ causes the mortar to hold H_2O and prevents segregation of the cement from the sand.

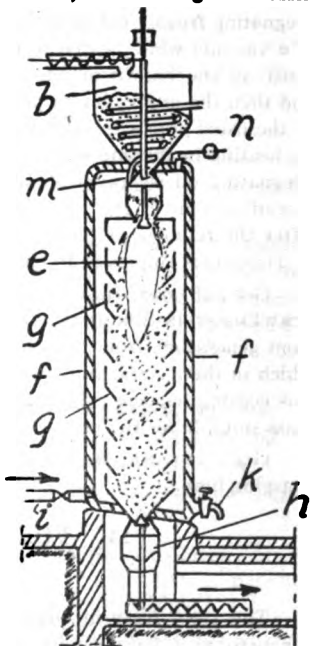
A. J. PHILLIPS.

U. S., 1,146,532, July 13. A. C. SPENCER. Natural cement rocks containing potash are disintegrated and heated to a temp. just below their fusing point until at least a portion of the potash is volatilized and recovered and the residue is then pressed into building blocks.

U. S., 1,147,635, July 20. H. S. LOUD. Treating wood with preservative liquids by drenching the surface of the wood with the liquid and subjecting to air under pressure which is progressively increased during the process.

Brit., 6,573, Mar. 16, 1914. TURNER BROS. and H. R. TURNER. A fire-resisting block especially applicable for the bulkheads of ships consists, in one form, of a series of layers of corrugated sheets of asbestos attached to flat sheets faced with a protecting slab of asbestos cement. The corrugated sheets may be of the form described in 23,621, 1910, and may be formed of any suitable insulating material, such as MgO or fossil-meal. The protecting slab may be corrugated or may be reinforced with metal as described in 14,266, 1913 (C. A. 9, 136).

Brit., 7,061, Mar. 20, 1914. A. ANKER. In a process of slaking lime or other mortar material, the material is fed from a hopper, *b*, through a valved sluice chamber and falls vertically downwards through a chamber, *e*, surrounded by an outer chamber, *f*. The inner chamber is connected with the outer one by an open top, or by perforations in its sides, or both. When perforations are provided, surfaces *g* may be arranged so as to prevent lime passing into the outer chamber. Similar inclined surfaces may be provided on a member arranged centrally in the inner chamber, which may also be provided with distributing steam-pipes or with sieve-like members allowing the entrance of steam but preventing the escape of the lime. Steam is admitted by a pipe, *i*, and condensed water is withdrawn at *k*. The slaked material is discharged through a valved sluice chamber, *h*. The material may be moistened before feeding to the slaking-chamber, and if enough water is present, moist or dry hot air may be admitted to the slaking-chamber instead of steam. Steam evolved in the sluice chamber



at the top may be led off by a pipe, *m*, through a coil, *n*, for heating the lime in the hopper.

Aust., 1,892, Mar. 2, 1911. MAXIMILIAN MAYERL, JR. In a process of impregnating and preserving wood, the wood articles are lightly coated with tar oil, or the like, which is mixed with a readily combustible substance, such as alc., benzine, or the like, in such proportion that upon burning this admixt., neither the other constituent of the mixt. nor the wood is ignited or destroyed. The burning off of this readily combustible constituent burns in the other constituent.

Aust., 9,210, Oct. 28, 1913. F. HELLER. In the manuf. of wood impregnating agents, with the use of colloids, the soln. of a fungus poison is mixed hot with a colloid in the sol. condition, so that upon complete drying the colloid seps. in the wood as a gel and retains upon its entire surface the fungus poison while at the same time preventing extn. by stopping up the pores.

Ger., 281,842, Mar. 14, 1914. GRÜBENHOLZIMPRÄGNIERUNG, G. M. B. H. In the application of mercuric chloride as a disinfecting agent and preservative for wood, soaking of grain, and the like, the chloride is decomposed readily by metals, which detracts from its efficiency and at the same time corrodes the metals. To overcome these objections, alkali nitrite is added, an addition of 2% alkali nitrite to a 0.1-0.2% HgCl_2 soln. being sufficient to prevent the action of the metal parts of instruments used for disinfecting purposes. Sol. salts which enhance the preservative action may be added, provided these have no decomposing action on alkali nitrite. *E. g.*, MgSO_4 may be added to increase the fireproof qualities of impregnated wood. The action of alkali nitrite appears to be physical, without chem. altering the HgCl_2 .

Ger., 282,696, Jan. 8, 1914. A. ANKER. Process of slaking lime. See Fr., 456,330 (*C. A.* 8, 2793).

Ger., 282,777, Mar. 13, 1912. RÜTGERSWERKE AKT.-GES. In a process of impregnating freshly cut or incompletely dried wood, the wood is subjected to the action of a vacuum while heated in the impregnating liquid, a low vacuum being maintained const. in the known manner and while the impregnating liquid is being drawn off, and then the impregnation proper is carried out with limited amts. of tar oil according to the usual practice. After a sufficient amt. of H_2O has been driven out of the wood by heating in the impregnating oil, as detd. by measuring the H_2O vaporized, the impregnating oil is drawn off without suspending the vacuum, which is not allowed to exceed 40 cm. of Hg. In this manner the oil is prevented from entering the wood. After the removal of the oil an economical process, such as those specified in 138,933 or 212,911, is employed to effect the impregnation with tar oil.

Ger., 282,907, June 10, 1913. Addition to 261,680 (*C. A.* 7, 3654). HOCHOFEN-SCHWEMMSTEIN-SYNDIKAT, G. M. B. H. In the manuf. of light weight stone, slags from generators, from the cupola furnace, from Cu smelting, also from rock materials which in the natural state are not suitable, are covered with thin mortar and left until this coating hardens; then the product, by admixt. with a binder, is converted into a mass suitable for the manuf. of the stone.

Ger., 283,383, Sept. 9, 1913. W. SCHONDELING. App. for slaking and discharging lime.

21. FUELS, GAS, TAR AND COKE.

J. D. PENNOCK.

The solid fuels in 1914. W. BERTELSMANN. Waidmannslust. *Chem. Ztg.* 39, 497-9(1915).—A review, with bibliography.

J. H. MOORE.

Coal fields of Manitoba, Saskatchewan, Alberta and Eastern British Columbia.

D. B. DOWLING. Canada Dept. of Mines, *Mem.* 53, 122 pp.(1915).—The report is a concise statement of the area and probable contents of the various coal fields of the middle portion of Canada. References to various reports giving details of thickness of seams and character of enclosing rocks are given. The character of the coal is treated in some detail. Forty pages are devoted to tables of analyses of coals, and for purpose of comparison, other analyses of North American and foreign coals are included.

R. L. SIBLEY.

The significance of chemical control in operating the purifiers. C. J. H. MADSEN. Copenhagen. *J. Gasbel.* 58, 234-7(1915).—By making detns. of H_2S daily at the inlet and outlet of each purifier a definite indication is given as to just what each is doing, and as to when renewals are necessary. Several sets of analyses are given and interpreted. In 1908-9, using a "counter-current" system, and changing the order of the boxes every 2 days, there were 74 renewals in 8 months (April-Nov.), with a production of 580 million cu. ft. In 1912-3 a system was employed whereby each day the last box of the day before was made the first: *e. g.*, 1-2-3-4, 4-1-2-3, 3-4-1-2, etc. By simultaneously introducing air, the last box was regenerated. With this method there were 44 changes in the same time, with a production of about the same quantity of gas. In 1914 with chem. control and a production of 630 million cu. ft., only 16 renewals were made. A buret for titrating a sample of gas with I is described.

W. L. BADGER.

Coke-oven accidents in the United States during the calendar years 1913 and 1914.

ALBERT H. FAY. Bur. of Mines, *Tech. Paper*, 118, 16 pp.(1915).—Statistics. During this period 91 men were killed at coke ovens in the U. S., 644 were seriously injured and 4,059 slightly injured.

E. J. C.

Centrifugals (BARNICK) I.

U. S., 1,145,095, July 6. N. TESTRUP, M. A. ADAM, T. RIGBY and G. W. ANDREW. **Treating peat.** After being "wet carbonized" the peat is pressed and the expressed liquid is distilled to recover NH_3 and volatile acids. The remaining liquid is concd. to a sirupy consistency and then is gasified, with recovery of by-products.

U. S., 1,145,327, July 6. W. C. LOUDON. **Retort-furnace for generating coal gas.**

U. S., 1,145,356, July 6. H. L. DOHERTY. **Method of mixing powdered fuel with air and burning it in the fire-box of a furnace.**

U. S., 1,145,357, July 6. H. L. DOHERTY. **Burning gas with air to secure a prolonged flame, *e. g.*, in coke oven furnaces.** The burning gas is caused to follow a zigzag course over horizontal baffle plates and after an initial combustion of a portion of the gas with an excess of air more gas and air are added successively, each in amt. to establish an excess at the time of addition, as the burning mixt. passes through the combustion chamber over the plates.

U. S., 1,145,358, July 6. H. L. DOHERTY. **Method of burning gas with air similar to that of the preceding pat., with special regulation of the draft through the furnace to secure proper mixt. of the streams of air, gas and combustion products.**

U. S., 1,145,892, July 13. F. C. HAMILTON. **Furnace for making and burning producer gas, *e. g.*, under boilers.**

U. S., 1,146,627, July 13. H. KOPPERS. **In operating gas-producers, the slag is discharged in molten condition, the required temp. being maintained by passing a portion of the hot gas generated through the discharge port with the slag.**

U. S., 1,146,724, July 13. C. E. LUCKE. **Burning explosive gaseous mixtures**

by forcing the gas downwardly from the outlet of the supply pipe upon a mass of granular chrome ore, MgO or other refractory material and burning it in the material while its velocity is at least equal to the rate of propagation of flame through the gas. The products of combustion are led off through the bed of refractory material.

U. S., 1,146,725, July 13. C. E. LUCKE. Burning explosive gas mixtures as in the method of the preceding pat. except that the combustion takes place at the surface of the refractory bed. Cf. C. A. 8, 3852.

U. S., 1,146,726, July 13. C. E. LUCKE. Burning explosive vaporized liquid fuels by downward projection against a bed of refractory material in which the flame is maintained as in the method of the 2 preceding pats.

U. S., 1,146,732, July 13. P. O. PERKINS. Fuel or use in boiler furnaces, etc., is formed by mixing oil-bearing shale with bituminous coal which gives a practically smokeless combustion leaving an ash free from clinkers.

U. S., 1,146,764, July 13. W. C. MINNIEAR. Apparatus for generating gas from incandescent coke, crude oil and H_2O .

U. S., 1,146,776, July 13. H. F. WALLMANN. Fuel or illuminating gas is made by burning one portion of residue from the distn. of coal, wood or other carbonaceous matter to form CO and H and a second portion of residue to form CO and while burning the second residue passing the combustion products into fuel to supply heat for distg. the latter, sepg. condensable materials from the gasified mixt. and mixing the permanent gases with those obtained by the combustion of the first portion of the residue.

U. S., 1,147,103, July 20. W. G. LAIRD and G. R. SHIELDS. Gas retort furnace.

Brit., 29,624, Dec. 23, 1913. L. WIGNON. Mfg. a gas comprizing mainly a mixt. of H and CH_4 by passing a quantity of steam or H_2O over a mixt. of carbonized material (such as coke) and lime heated to a temp. above 300° . CO_2 and CO formed in the reaction are removed by absorbing the CO_2 with CaO or by other means, and then passing the gas containing CO over CaO heated to 400° .

Brit., 6,036, Mar. 10, 1914. C. STILL and C. WILKE. In a coke oven in which the air for the regenerators is drawn from the foundation arches or passages, horizontal partitions are provided to form upper and lower chambers, the former acting as heating channels for the air on its way to the regenerators, while the latter, which allow access of the workmen to the gas valves, etc., are kept relatively cool.

Brit., 6,112, Mar. 10, 1914. A. WADDELL. In a vertical gas-retort having a plane or convex floor set at such an angle that discharge by gravity is just prevented, the coke is removed by a reciprocating pusher moving as a whole in a path parallel to the plane or curve of the floor. Cf. C. A. 8, 3112.

Brit., 6,113, Mar. 10, 1914. A. WADDELL. In a travelling hopper for charging vertical retorts, the passage of fuel from the hopper is controlled by a vertically movable sleeve which is connected temporarily with the bell closure of the retort so that the two move together when the bell is lowered.

Brit., 7,116, Mar. 20, 1914. C. W. TOZER. Vertical, oblique, or horizontal retorts are divided by walls and ribs into 2 or more rings of spaces arranged concentrically or eccentrically, the spaces being all of the same cross-sectional area. Passages are provided at the top and bottom, leading to an internal heating-flue. The distn. may be effected at atm. or other pressure, or in a vacuum or partial vacuum, and at a temp. between 300 and 1200° , the duration of the process being much less than usual.

Brit., 7,117, Mar. 20, 1914. C. W. TOZER. Destructive distillation of coal or other carbonaceous substance in closed retorts at 300 – 700° , under a continuously-

maintained abs. pressure of 4.9-12.25 lbs. per sq. in., for the production of a smokeless fuel and the recovery of tar, oils and NH_3 .

Brit., 7,338, Mar. 23, 1914. **DESSAUER VERTIKAL-OFFEN-GES.** In a gas-retort furnace which can be heated either by producer gas or by illuminating gas, a small quantity of producer gas is supplied during the heating by illuminating gas so that the producer and connecting-conduits may be kept hot.

Ger., 281,559, May 10, 1914. **E. BREMER.** Process and app. for quenching, sifting, and transporting coke. The hot coke from the oven is delivered directly into running H_2O . The coke is not only quenched, but also, in a certain period of time after entering the H_2O , is sepd. into floating large fragments and small coke which sinks, the larger pieces being carried on by the H_2O . Under the floating stream of large coke is disposed a screen or sieve for sepg. the entrained fine coke, according to size, and to retain incompletely coked material or especially heavy coke.

Ger., 281,569, Aug. 23, 1913. **BERLIN-ANHALTISCHE MASCHINENBAU AKT.-GES.** Regulable gas valve for gas firing.

Ger., 281,684, Jan. 24, 1913. **W. KÖPPER.** Construction and operation of a charging device for gas generators.

Ger., 281,864, Feb. 11, 1913. **G. POLYSIUS, EISENGIESSEREI UND MASCHINEN-FABRIK.** Surface-combustion furnace, with the employment of a tube composed of elements, some of which are permeable to gas, and some of which are impermeable to gas.

Ger., 282,357, Dec. 20, 1913. **BERLIN-ANHALTISCHE MASCHINENBAU-AKT.-GES.** Construction of a closure for the casing of tar separating bells.

Ger., 282,454, June 18, 1913. Addition to 277,843 (*C. A.* 9, 963). **H. MEYER.** Mfg. fire kindling material from combustible materials such as oakum, wood, fragments of peat, or the like. According to the principal patent combustible matter, such an oakum, or the like, is boiled for a long time in a strong saltpeter soln., then rapidly dried, and partially coated with molten S. According to this process, strong solns. of other oxidizing salts, such as NaClO_4 or KClO_4 , are used instead of saltpeter. Cf. *C. A.* 9, 963.

Ger., 282,488, June 6, 1914. Addition to 279,308 (*C. A.* 9, 1109). **H. GOSSLER.** Gas feed for coke oven.

Ger., 282,579, Aug. 18, 1911. **H. KLINNER.** Mfg. heating power and lighting gas from low grade fuels, especially peat, by an enriching process.

Ger., 282,651, Dec. 19, 1912. **MASCHINENFABRIK BAUM, AKT.-GES.** Machine for drying fine coal.

Ger., 282,673, Mar. 1, 1914. **K. BRUNNER and C. H. WECK.** Movable grate adapted to move from the fire-bridge towards the stoker who shovels the fuel onto the portion of the grate next to the fire-bridge.

Ger., 282,781, Dec. 12, 1913. **A. JABS.** Construction of app. for expressing water from peat.

Ger., 282,882, July 24, 1913. **J. MÜLLER and A. BERTHOLD.** In the construction of coke ovens, the passage of gases between the oven proper and the heating channels is prevented by compacted refractory material which is used in the construction of the sepg. walls.

Ger., 282,912, Oct. 24, 1913. **T. VERHOEVEN.** Constructional details of an app. for grinding peat or the like.

Ger., 283,062, July 7, 1914. **H. VOSS and A. PRUST.** Utilization of fine coal by

coking and degasifying. Heretofore fine coal has not been worked successfully in gas manuf. because of the difficulties interposed to the escape of the gases generated, and further because explosions are likely to occur. Also, a high-grade coke cannot be obtained from fine coal alone. To overcome these difficulties, suitably granulated moist brown coal (5 to 15 mm. in size) is added to about 10-15% of the wt. of the fine coal.

Ger., 283,132, Nov. 27, 1913. H. KOPPERS. **Preparing coal for coking.** Dry coal dust is moistened with fat solvent, such as soap soln. (to overcome the surface tension which prevents the absorption of the H_2O by the coal), and to increase the NH_3 yield correspondingly. E. g., the thin layer of coal dust is treated, from both sides, with a finely atomized soap soln. in order to moisten the coal uniformly with a definite small % of liquid. The addition of H_2O to the charge is necessary to prevent the decompn. of the NH_3 normally formed during the distn.

Ger., 283,201, Dec. 29, 1912. PHARMAKON G. M. B. H. In the manuf. of **kindling mass to be saturated with liquid fuel**, wood felt is impregnated with H_3PO_4 and $(NH_4)_2HPO_4$. The fiber is so affected that it permits the complete combustion of the combustible liquid with which it may be satd. The felt, prepared from wood, straw, or the like, after impregnation and shaping, is satd. with a combustible liquid. The impregnating salts prevent too rapid combustion and disintegration of the fiber, and loss of liquid fuel.

Ger., 283,303, Dec. 25, 1913. P. HOSS. **Mfg. a plastic lining for coke oven doors** by mixing 75 parts refractory broken stone from old used coke-oven linings, with 20 parts fire-brick clay, and then adding 5 parts water-glass. Also, up to 10% of graphite as obtained from the oven walls and the vertical tubes are used.

Ger., 283,332, Mar. 10, 1914. BAROPER MASCHINENBAU-AKT.-GES. **Operation of horizontal coke ovens.**

Ger., 283,362, Mar. 5, 1915. J. RÖSCH. **Construction of a coke oven.**

Ger., 283,446, May 21, 1914. H. MÜLLER. **Intermediate pressure regulating tank for use in conjunction with intermittent gas generators.**

22. PETROLEUM, ASPHALT, AND WOOD PRODUCTS.

F. M. ROGERS.

Studies on the pressure distillation of petroleum hydrocarbons. A. P. BJERRE-GAARD. *J. Ind. Eng. Chem.* 7, 573-7(1915).—A detailed report with tables, diagrams, etc., of a series of expts. on the "cracking" of oils. It is shown that the yield is at least roughly proportional to the time the oil is subjected to the influence of heat and pressure. $Mg(OH)_2$ + $Ca(OH)_2$ and ZnO added as "catalyzers" appeared to decrease the yield of gasoline and gas loss, the ZnO more so than the Ca . The lighter or transformation distillates, obtained in the first sepn. of the oils into 2 portions, contained no aromatic hydrocarbons. The high heat and great pressure not only broke down whatever viscous hydrocarbons were originally present in the tars studied, but prevented the formation of others.

F. W. SMITHER.

Asphalt and petroleum in the Philippines. J. F. BOOMER. *Commerce Repts.* No. 170, 358-61(1915).—The division of mines of the Philippine Bureau of Science has examd. the asphalt deposits of Leyte and found large quantities of rock asphalt and some petroleum. The petroleum is a light oil with a high % of gasoline, but it is not yet

detd. whether this can be obtained by drilling wells in the ordinary manner because the rocks are so fine-grained that the petroleum does not flow very readily. E. H.

The present status of the wood turpentine industry. E. H. FRENCH AND JAMES R. WITHROW. *Met. Chem. Eng.* 12, 95-9(1914); *J. Ind. Eng. Chem.* 6, 148-52(1914); *Chem. Eng.* 19, 58-63(1914). E. H.

The hardwood distillation industry in America. E. H. FRENCH AND J. R. WITHROW. *J. Ind. Eng. Chem.* 7, 47-55(1915); *Met. Chem. Eng.* 13, 30-9(1915); *Chem. Trade J.* 56, 119-20, 141-2(1915); cf. preceding abstr.—This paper includes a historical review, a general discussion of the subject and a report on recent exptl. developments and failures. Discussion. H. O. SHUTE. *Ibid* 55-6. I. MILLER.

Apparatus for the recovery of turpentine oil from pine waste-wood, paving blocks and lumber. G. BARNICK. *Leipzig. Chem. App.* 2, 137-8(1915).—A cut shows an app. for extg. with superheated steam; general directions for operating are given.

J. H. MOORE.

Turpentine legislation in Georgia 26.

U. S., 1,145,877, July 13. A. BARBERIS. **Lubricating packing for journal boxes, etc.,** is prepared by soaking cotton waste, asbestos or other fiber in a 10% soln. of alum or other fireproofing compd. to impregnate the fibers and render any combustible fiber used fireproof, then soaking the material in a mixt. of H_2O 1000, H_3BO_3 20, gelatin 30, glycerol 40, 36% CH_2O soln. 4 and graphite 100 parts, pressing to remove any excess of this mixt., and then adding lubricating oil.

U. S., 1,147,608, July 20. C. E. CLARK. **Apparatus for generating gas from crude oil.**

Brit., 6,345, Mar. 12, 1914. ALLGEMEINE GES. FÜR CHEM. IND. **Separating solid paraffin hydrocarbons** from fractions obtained from coal-tar, shale oil, or petroleum by the addition of liquid SO_2 , which is mixed with hydrocarbons of the aromatic series if the fractions do not already contain such hydrocarbons. The sepd. paraffin may be purified by treating with liquid SO_2 , which may contain aromatic hydrocarbons, at a temp. above the m. p. of the paraffin, such as 40° , in a closed vessel. The method of purification may be applied to solid paraffin obtained by other methods. Cf. C. A. 9, 860.

Brit., 6,536, Mar. 14, 1914. J. M. DESCHAMPS. **Constructional details of charcoal kilns.**

Brit., 6,547, Mar. 14, 1914. H. E. FENCHELLE and F. M. PERKIN. **Cracking hydrocarbons** by heating them in the liquid state under very high pressure and afterwards cooling the liquid still under pressure and allowing it to escape at a lower pressure into a chamber in which the lighter hydrocarbons vaporize spontaneously. The oil is heated to $500-600^\circ$ under a pressure of 50-60 atms. in cracking-tubes and is cooled by passage through a boiler containing H_2O . If the oil is thus cooled to 150° , steam of about 60 lbs. pressure is generated. The oil then passes through throttle valves into a vaporizing chamber fitted with baffle-plates. The gases and vapors generated in the vaporizing chamber pass to a dephlegmator, in which they are sepd. into fractions issuing by suitable pipes. The residual liquid in the vaporizing chamber is run into a still heated by steam-coils, using steam from the boiler. The vapors from the still pass to a dephlegmator, the resulting fractions being collected by suitable pipes. The uncondensable gases are led to a scrubber and are eventually used for heating the cracking-

tubes. The residue from the still is subjected to further cracking. The invention is applicable to liquefied hydrocarbons such as naphthalene or paraffin wax.

Brit., 6,593, Mar. 16, 1914. STANDARD OIL CO. In mfg. gasolene, etc., from fuel oil and other petroleum residues by distg. at $650-850^{\circ}\text{F}$. under a pressure of about 4-5 atms., as in the process of 29,862, 1912 (C. A. 8, 2058), the residue from this operation is distd. to dryness under atm. pressure, and this distillate is submitted to the cracking operation, preferably in admixt. with the fresh charges of fuel oil. The crude gasolene thus obtained is refined with acid and redistd., the residue in the still being again cracked. The pressure in the cracking-still is obtained by means of a valve situated either at the outlet of the condenser or between the still and the condenser.

Brit., 7,112, Mar. 20, 1914. CONTINENTAL-CAOUTCHOUC & GUTTA-PERCHA-COMPAGNIE. Cracking heavy mineral oils by the catalytic action of a hydrocarbon-halogen-aluminium compd., particularly the oily compd. having the formula $\text{Al}_2\text{Cl}_6\text{C}_6\text{H}_6$, which is formed as an intermediate product in the Friedel and Crafts reaction when AlCl_3 , EtCl , and benzene are used as the starting materials. The operation may be effected by boiling the heavy oil with the catalyst under a reflux condenser at ordinary or reduced pressure, or by allowing hot petroleum to flow continuously on to the catalyst heated to 170° . The catalyst may be absorbed in porous materials, such as kieselguhr, in which case the vapor of the oil may be passed over the catalyst. The products are satd. hydrocarbons resembling benzene.

Brit., 7,282, Mar. 23, 1914. W. A. HALL. In cracking oils for the manuf. of motor spirit by a process, such as that described in 24,491, 1913 (C. A. 9, 1245), in which the fraction nonvolatile at $180-200^{\circ}$ is sepd. from the product and the remaining gases and vapors are compressed and condensed together, these gases and vapors are first purified by passage through dehydrated fullers earth, bauxite, kieselguhr, or other mineral substances used in the sepn. of finely divided matter from liquid hydrocarbons. Cf. C. A. 9, 375.

Dan., 18,827, July 11, 1913. N. FALK-HULTGREN and E. H. VIDSTRAND. Mfg. a combustible liquid, similar to benzene, by heating a mixt. of CO or CO_2 and H_2 to at least 2000° . In the reaction are formed, besides H_2O , hydrocarbons, which condense upon cooling to a readily volatile benzene-like liquid. Cf. C. A. 9, 148.

Ger., 281,657, July 2, 1913. C. HASSLER. Spray burner for liquid fuel.

Ger., 281,968, Dec. 21, 1911. E. CONSTAM. Process of increasing the temp. and ease of ignition of high-boiling oils for internal-combustion engines.

Ger., 282,036, July 19, 1912. VULKAN-WERKE AKT.-GES. Oil-firing for steam boilers. A smokeless combustion free from vibration is secured by the automatic feeding of the oil by means of air pressure.

Ger., 282,712, June 30, 1914. MITTEL-RHEINISCHE TREERPRODUKTEN- UND DACH-PAPPEN-FABRIK A. W. ANDERNACH. A dressing and coating for containers which come in contact with petroleum and other mineral oils consists of wood tar pitch, alone or in combination with wood tar. Minerals, dyes, fibrous material, desiccating agents, quartz sand, asbestos fibers, or kieselguhr, may be added. The materials may be taken up in solvents, or mixed therewith, so that hard or tough materials may be applied in the cold. Beech wood tar and pitch are preferred. PbO or Mn oleate serve as driers.

Norw., 24,576, Jan. 18, 1913. N. FALK-HULTGREN and E. H. VIDSTRAND. In the manuf. of a combustible liquid, compds. of the methane, ethylene, or acetylene series, such as the dry distn. products from peat, coal, etc., are heated with H_2O to 2000° . The resulting liquid consists of a mixt. of several heavy hydrocarbons and their isomers, and in compn. is intermediate between the methane and the ethylene series. Cf. C. A. 9, 148.

24. EXPLOSIVES AND EXPLOSIONS.

C. E. MUNROE.

Production of explosives in the United States during the calendar year 1914 with notes on coal mine accidents due to explosives. ALBERT H. FAY. Bur. Mines, *Tech. Paper* 107, 16 pp.(1915).—Tabulated statistics. E. J. C.

Explosives. EDWARD P. O'HERN. *Smithsonian Rept.* 1914, 249-75.—A popular résumé but containing information on smokeless powder and military devices of such character as an officer of ordnance is best enabled to give. The illustrations are numerous and excellent. CHARLES E. MUNROE.

Methods of preventing and limiting explosions in coal mines. GEORGE S. RICE AND L. M. JONES. Bur. Mines, *Tech. Paper* 84.—Describes six types of rock dust barriers invented by Rice to be patented for free use in the U. S. and gives photographs of effects of explosions in the "Experimental Mine" where these devices have been tested. CHARLES E. MUNROE.

U. S., 1,145,421, July 6. A. JEDL. Steel chips for use in pyrotechnic compositions are agitated with about 1% of boiled linseed oil at a temp. of 65° to coat them and preserve them from oxidation. "Sparklers" are made from a pasty mixt. of the coated steel chips 31.25 lbs., powdered Al 6.5 lbs., dextrin or starch 12.5 lbs., Ba(NO₃)₂ 50 lbs., 40% CH₃O soln. 2 oz. and NaHCO₃ 5 oz. with H₂O.

U. S., 1,147,159, July 20. C. L. GABRIEL. Impregnating match splints to render them "non-glowing" after use by subjection to a soln. formed of PCl₅ 1, C₆H₆ 2 and kerosene 100 parts.

Brit., 6,447, Mar. 13, 1914. T. E. MATTHEWS. Manuf. of nitroisobutylglyceryl trinitrate by nitrating nitroisobutylglycerol by means of usual mixts. of H₂SO₄ and HNO₃, and application of the products as an explosive or as an ingredient in explosives, e. g., mixed with kieselguhr or nitro-cotton.

Brit., 6,608, Mar. 16, 1914. A. E. CHARBONNEAUX. Mfg. explosives. See U. S., 1,093,767 (C. A. 8, 2062).

Brit., 6,755, Mar. 17, 1914. W. J. HOYNES. In mfg. explosives, e. g., a mixt. of KClO₄ and sugar, spherical pellets are made by tumbling small dry nuclei of the explosive in a revolving drum in the presence of powdered explosive and a spray of moistening liquid.

Ger., 282,780, Feb. 12, 1913. C. A. BALDUS and A. KOWASTCH. Exploding charges with the aid of liquid air introduced into the cap filled with kieselguhr and a C-carrier, and a spark or incandescent wire. Cf. C. A. 9, 863.

Ger., 282,941, Aug. 6, 1913. J. MÜNNING. Electric detonators for group or time firing.

Ger., 283,330, Oct. 10, 1912. DYNAMIT-AKT.-GES. v. A. NOBEL & Co. In a process of hastening the separation of nitroglycerin from the spent acids, the evolution of SiF₄ is effected towards or at the end of the nitration process, by the addition of fluorides and SiO₂ or salts which are readily decomposed by acid. The evolution of SiF₄ can also be caused by the addition of silicofluorides, alone or in admixt. with SiO₂ or its readily decomposed salts, to the nitrating mixt. The escaping gas bubbles of SiF₄ break up the reaction mass and bring the nitroglycerin to the surface. The gas is formed according to the equation $4\text{NaF} + \text{SiO}_2 + 2\text{H}_2\text{SO}_4 = \text{SiF}_4 + 2\text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$. The NaF is mixed preferably with about 8-10% of its wt. of finely slimed light kieselguhr, and about 20 g. of this mixt. are added to 100 kg. glycerol about 5-6 min. before the end of the operation. The period required for the sepn. of the nitroglycerin from the spent acid is in this manner reduced to about 1/3, the normal period. The same

effect is produced by 10–15 g. Na_2SiF_6 to 100 kg. glycerol. If some kieselguhr is added, a still smaller amt. of Na_2SiF_6 is required.

Swed., 36,674, Jan. 10, 1913. J. ANDERSON. A moisture-proof friction surface for matches is made with a binder consisting of a H_2O -sol. silicate (K- or Na-water-glass) to which may be added a glue or gum soln.

25. DYES AND TEXTILE CHEMISTRY.

L. A. OLNEY.

The dyestuff situation. ANON. *Commerce Repts.* No. 162, 196(1915).—A brief review of the situation in America brought about by the war. E. H.

Swiss dyestuffs for American use. THOMAS H. NORTON. *Commerce Repts.* No. 166, 278–83(1915).—As a result of the war the Swiss dye works find it difficult to get crude coal-tar products and American manufactures are experiencing a dye famine. The Swiss firms are seeking to obtain coal tar crudes from America, paying for them in finished dyes. E. H.

The dyeing and bleaching of commercial fibers. S. G. BAILEY. *J. Soc. Dyers, Colorists* 31, 46–50(1915).—A discussion of some com. fibers used chiefly in brush, broom and mat making. The action towards dyes, the bleaching properties, and the uses of Bassine or Palmeiro fiber, Mexican fiber, coconut fiber, Kitool, esparto grass and horse hair are described. L. A. OLNEY.

β -Hydroxy-1-naphthoic acid. J. HEILMANN & CO. AND MARTIN BATTEGAY. *Bull. soc. ind. Mulhouse* 1914, 267; *Rev. gén. mat. color.* 18, 281–6(1914).—This acid has had no practical application. Under the influence of various reagents it loses its $-\text{COOH}$ and then furnishes the same derivs. as β -naphthol. There are, however, certain cases where the indirect production of these β -naphthol compds. is a distinct advantage in drying and printing and makes possible results which the use of naphthol would prevent. This acid forms stable alk. salts which are non-volatile with steam, it is equally sol. in alkali carbonates and NH_4OH , and it ppts. Ba and Pb salts and couples just as easily as does β -naphthol. The prepn. of a para red on wool, the production of colored discharges on azo bottoms, the printing of tannin colors and subsequent developing in a diazo bath, and the prepn. of cloth with β -hydroxynaphthoate followed by a surimpression with aniline black are described. Complete printing formulas are given. MILES R. MOFFATT.

U. S., 1,145,072, July 6. A. L. LASKA and A. ZITSCHER. Azo dyes are made by combining a diazo compd. such as diazotized nitroanisidine, nitro or chloro derivs. of aniline, toluidine, naphthylamines or diaminodiphenylurea with an acidyl-2-amino-3-naphthol, e. g., benzoyl-2-amino-3-naphthol, its halogen or nitro substitution derivs., 2-acetylamino-3-naphthol or 3,3'-dihydroxy-2,2'-dinaphthylurea. Red and reddish blue dyes, which yield lakes fast to oil, are formed. Cf. C. A. 8, 1875.

U. S., 1,145,846, July 6. G. R. PESTER. **Forming jasse-melange textile materials.** Undyed cotton and undyed wool yarns are twisted together, a number of the threads thus formed are twisted together and the composite threads are successively dyed in cotton and wool dyes.

U. S., 1,145,858, July 6. J., T. and E. BRANDWOOD. **Apparatus for dyeing.**

U. S., 1,145,934, July 13. A. STEINDORFF and R. WELDE. **Vat dyes of the indanthrene series** are transformed from an amorphous condition to a coarsely cryst. form by heating with about 5–15 times their weight of H_2SO_4 of 1.6–1.67 sp. gr. for several hrs., then dilg. with H_2O , but still leaving the sp. gr. of the acid at 1.5 or more so that

the impurities present will go into soln., filtering off the latter and treating the residue with ice H_2O to dissociate the product containing indanthrene sulfate.

U. S., 1,146,324, July 13. J. H. GILES and D. M. GILES. **Apparatus for dyeing yarn.** Cf. C. A. 8, 3864.

U. S., 1,146,461, July 13. C. TAYLOR. **Bleaching textile fabrics** by satg. with a soln. of Cl and H_2O , pressing the soln. into the pores of the material, treating with NaOH soln. to remove fatty and resinous compds., pressing and steaming under low pressure for 3-4 hrs. while acted on with NaOH soln., again pressing and treating with Cl and H_2O , first with a weak and then with a stronger soln.

U. S., 1,146,987, July 20. H. J. YOUNG. **Hemp fiber** is obtained by crushing the stalks between rollers, immersing for a short time in a 2% soln. of NaOH at a temp. of about 95°, rinsing with acidulated H_2O , pressing out the soln., drying and mechanically sepg. the fibers.

U. S., 1,147,011, July 20. A. E. GARRETT. **Treating woolen goods to prevent shrinking** by first subjecting to a Cl bath, then to a weak soln. of soap and NH_4OH , rinsing, drying and finishing in the usual manner. The goods have less tendency to absorb moisture than is usual after treatment with Cl. Cf. C. A. 9, 1695.

Brit., 1,443, Jan. 19, 1914. CASSELLA & Co. **Mfg. fast dyes** by heating 1-amino-2-methylanthraquinone with S in the presence of an aromatic amine such as *p*-phenylenediamine, benzidine, etc. Cf. C. A. 8, 2488.

Brit., 6,900, Mar. 18, 1914. CASSELLA & Co. A **trisazo dye** is obtained by tetraazotizing *m*-aminophenylazo-2,5,7-aminonaphtholsulfonic acid and coupling with 2 mols. of resorcinol. The product dyes claret-red shades, which may be fixed by after-treatment with $HCHO$. It is suitable for dyeing union goods. Cf. C. A. 9, 383.

Brit., 7,317, Mar. 23, 1914. L. LILIENFELD. In a modification of the process of 25,245, 1911 (C. A. 7, 1616), for **finishing, fillings, loading, or dressing textile fabrics and spun goods with viscose**, the viscose soln. used has a content of caustic alkali which is less than its content of cellulose or hydrocellulose, but which is equiv. to not less than 0.6 of this content.

Brit., 8,577, Apr. 4, 1914. FARBW. v. M. L. & B. **Halogen-containing dyes of the quinoline yellow series**, fast to light, are obtained by the condensation of phthalic acid anhydride, either with a *m*-haloquinaldine or a haloquinaldine or one of its homologs which contain halogen or a Me-group in the *o*-position to the N, and then sulfonating the substituted quinophthalone.

Fr., 468,526, Apr. 25, 1913. R. VIDAL. In mfg. **sulfur dyes**, *p*-aminophenol, *p*-phenylenediamine, *o,p*-diaminophenol, oxyazobenzene, benzeneazocresols, poly-amino- or hydroxyaminodiphenylamine are heated with S in the presence of a phenol, cresol, or mixt. of the 3 isomeric cresols (com.), α - or β -naphthol. New black or blue S dyes are obtained.

Ger., 275,537, May 10, 1913. BADISCHE. **Benzanthrone vat dyes.** See C. A. 8, 3722.

Ger., 277,059, June 12, 1913. Addition to 263,382 (C. A. 8, 257). Brit., 3,682, Feb. 12, 1914. FARBW. v. M. L. & B. In the **manuf. of vat dyes**, the processes specified in Brit., 19,599, 1912 (C. A. 8, 429), and 22,528, 1913 (C. A. 9, 865), for the prepn. of vat dyes, by the introduction of S into the mol. of the condensation product of a haloquinone and arylamine, are extended in that instead of the metal sulfides specified therein other S compds., such, e. g., as thiosulfuric acid or its salts, are employed.

Ger., 281,353, Sept. 19, 1913. Addition to 251,569 (C. A. 7, 422). FARBW. v.

M. L. & B. In the manuf. of concentrated vat preparations, the addition of soaps, such as Turkey red oil, monopol soap, etc., has been found to exert an exceptional solubilizing action on the concd. leuco alkali salts of quinone vat dyes, so that with the aid of these soaps, vat solns. of the quinone vat dyes can be very readily prepared.

Ger., 281,448, Dec. 5, 1913. CHEM. FABRIK GRIESHEIM-ELEKTRO. Mfg. water-insoluble azo dyes by combining diazo-compds., which contain no sulfo- or carboxyl-group, with acidyl-2-amino-3-naphthol.

Ger., 281,837, May 28, 1913. P. HAHN. Constructional modifications in mercerizing machines. Cf. C. A. 8, 2813.

Ger., 281,998, Aug. 30, 1913. T. POSNER. Condensation products of indigo, applicable as dyes or as initial material in the manuf. of dyes, are obtained by protracted heating of indigo and its derivs. (halogenated indigo) with reactive methylene compds., such as Et malonate or Et phenylacetate (in excess or in an indifferent high-boiling solvent or with the aid of Cu powder or other agent facilitating condensation).

Ger., 282,001, Mar. 7, 1913. P. HAHN. Process of mercerizing yarn. Cf. C. A. 9, 1998.

Ger., 282,163, Oct. 24, 1913. Addition to 267,089 (C. A. 8, 828). AKTIEN-GES. FÜR ANILIN-FABRIKATION. In mfg. sulfur dyes, instead of mixing with aromatic amines, nucleus alkyl derivs. of 4-hydroxydiphenylamine are heated together with compds. which upon reduction yield aromatic amines, and with S or polysulfides, to high temps.

Ger., 282,198, Jan. 26, 1913. CASSELLA & Co. Mfg. wool dyes of the pyrazolone series, fast to light and milling, by coupling the tetraazo compds. derived from the sulfonic acids of diaminotriarylmethane, with 2 like or unlike mols. of sulfoarylmethylpyrazolone, its substitution products or arylmethylpyrazolones.

Ger., 282,214, Aug. 3, 1913. ANILINFARBEN- UND EXTRAKT-FABRIKEN VORM. J. R. GEIGY. Mfg. 2,5-diaminodiphenylmonosulfones or 2-amino-5-mono- or -dialkylaminodiphenylsulfones by oxidizing 1 mol. of an aromatic *p*-diamine or its unsymmetrical N-mono- or dialkyl-deriv., in the presence of 1 mol. of an aromatic sulfinic acid. E. g., a soln. of 22 kg. *p*-phenylenediamine in 100 liters HCl of 20° Bé. and 750 liters H₂O is mixed with a soln. of 35.6 kg. Na *p*-toluenesulfinate in 750 liters H₂O, and then 300 kg. of a 20% FeCl₃ soln. is allowed to flow in slowly, with stirring. The resulting 2,5-diamino-4'-methylphenylsulfone (and analogously the 2-amino-5-dimethylamino- or 2-amino-5-diethylamino-4'-methylphenylsulfone) may be readily diazotized and employed for the production of azo dyes.

Ger., 282,223, May 17, 1913. Addition to 246,115 (C. A. 6, 2540). NIEDERLAHNSTEINER MASCHINENFABRIK, G. M. B. H. Dyeing machine.

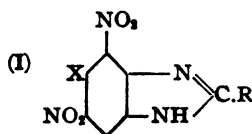
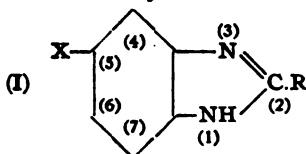
Ger., 282,251, Oct. 2, 1912. DEUTSCHE GASGLÜHLICHT AKT.-GES. (AUERGES). Weighting silk with the organic or mixed organo-inorganic salts of Sn, Zr, Ti, or other suitable metals, and effecting the hydrolysis in an atm. satd. with steam. E. g., the basic acetates of Zr and Sn, which hydrolyze rapidly, are used, whereby, instead of the undesirable HCl, a weak organic acid results.

Ger., 282,317, Nov. 15, 1913. Addition to 263,655 (C. A. 7, 4080). FARBW. V. M. L. & B. Instead of using the aminodiphenylaminesulfonic acids specified in the principal patent in the manuf. of yellow to brown wool dyes, the *p*-aminocarbazolemonosulfonic acids or their derivs. alkylized or arylized on the carbazole N, are coupled with dinitrochlorobenzene.

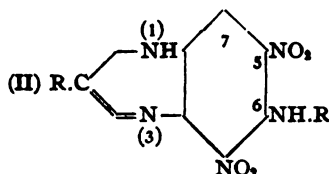
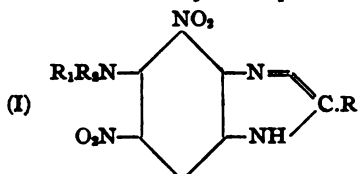
Ger., 282,346, Mar. 12, 1914. FARBW. V. L. DURAND, H. & Co. In the manuf. of basic safranin dyes, nitrosomethyl- or nitrosoethyl-*o*-toluidine yields, upon con-

densation with *m*-aminomethyl- or *m*-aminoethyl-*p*-toluidine, dyes of the compn. specified in 80,758.

Ger., 282,374, Feb. 25, 1913. D. MARON. Mfg. amino derivatives of substituted benzimidazoles. Benzimidazoles of the general formula I, in which X = alkyl, halogen or alkyloxy and R = H, alkyl, OH, or NH₂ are treated with concd. H₂SO₄ and nitrates, obtaining thereby 4,6-dinitro derivs. of substituted benzimidazoles of the general formula II. From them, by reduction, are obtained nitroamines and diamines applicable in the manuf. of dyes.



Ger., 282,375, Aug. 14, 1913. D. MARON. Mfg. basic condensation products of the benzimidazole series. The 4,6-dinitro-5-halobenzimidazoles obtained according to 282,374 (*supra*) readily exchange the HI at. for the mono- or dialkyl-amino groups or monoarylamino groups, which can thereby be substituted in the aryl residue with the formation of condensation products of constitution (I) or (II). The new compds. serve in the manuf. of dyes and pharmaceutical prepn.s.



R = H, alkyl, OH or NH₂; R₁ = alkyl, Ph, C₆H₄OH, C₆H₄COOH, C₆H₄NH₂, (C₆H₄S)₂, C₆H₄SO₃H; R₂ = H or, if R₁ = alkyl, then R₂ = alkyl.

Ger., 282,451, July 6, 1913. J. J. FEARON. App. for dyeing textile material.

Ger., 282,452, Dec. 13, 1912. H. ZWINGAUER. Centrifugal app. for cleaning oily textile materials with means for elec. heating the air as it is drawn in, up to 200°.

Ger., 282,501, Sept. 2, 1913, 282,502, Oct. 7, 1913, and 282,503, Oct. 14, 1913. Addition to 263,382 (C. A. 8, 257). FARBW. v. M. L. & B. Mfg. vat dyes. According to 282,501 (addition to 263,382) (*cf. supra*), alkali polysulfides, metal sulfides, metal hydrosulfides, or salts of thiocarboxylic acid, are allowed to act upon the condensation products obtained from haloquinones and arylamines. According to the addition patent 282,502, salts of hydrosulfurous acid can be employed for introducing S into the mol. of the haloquinonearylide, preferably in basic organic diluent. The identical or similar vat dyes are obtained, according to addition 282,503, when thiocarboxylic acid anhydride is allowed to act on haloquinonearylides.

Ger., 282,675, Jan. 17, 1913. F. KOCH. Cleaning wool. At first only the fatty constituents of the crude material are removed by means of chlorinated hydrocarbons; then the impurities not sol. in this solvent, such as wool scale and the like, are removed by rubbing, or other dry treatment. The dust particles removed in this manner are treated with a solvent or series of solvents. A fat solvent is employed which has but little solvent power for salts and soaps. By a suitable defatting and removal of the solvent a condition of the wool can be brought about in which the small lumps cling to the fiber as at first and may be removed by combing, beating, or otherwise, and carried

off with or without a current of air. Also by the addition of kieselguhr the same effect can be produced at any stage of working.

Ger., 282,744, Jan. 1, 1914. Addition to 265,659. W. BORKS. **Waterproofing** and otherwise preserving ship- and net-lines, and the like, by impregnating with a mixt. of Venetian turpentine and wax or waxy substances, instead of with a mixt. of Venetian turpentine, wax, paraffin or the like, and gum soln. E. g., a mixt. of 500 g. Venetian turpentine, 400 g. vegetable wax, 250 g. spermaceti and 300 g. ceresin may be used.

Ger., 282,789, Nov. 27, 1913. VEREINIGTE GLANZSTOFF-FABRIKEN AKT.-GES. Fresh impure viscose may be formed directly into **highly lustrous fibers** by means of H_2SO_4 or other mineral acid in equiv. amt., if on the one hand the acid is kept rather weak (only 10%), and on the other hand the period of passage of the squirted stream of viscose through the acid is made as brief as possible, operating at room temp. In a short time after winding, the threads are thoroughly coagulated and can be washed in the usual manner, dried, and desulfurized.

Ger., 282,947, May 15, 1913. L. SCHREINER. **Dyeing with alizarin** and like dyes, in the presence of mordants or salts which act as mordants, using the vat and subsequently fixing. As dye bath are used (to 100 kg. cotton) 10 kg. alizarin, 2000 liters H_2O , 25 kg. soda, and 8-10 kg. hydrosulfite; the alizarin is reduced in a short time, whereupon the cotton is introduced. It is finally boiled in a 5-10% Turkey-red oil bath. To the bath as also to the mordant can be added Mg-, Ca-, Zn- and other salts. Mg salts form sol. compds. with the reduced alizarin.

Ger., 283,443, July 30, 1914. H. W. KNOLL. In a process of **impregnating cotton** on the spool, the material is treated first on a dressing machine with a dil. soln. of dextrin and gelatin, and dried with hot air. The dried hank is then satd., on a waxing machine, with a soln. of paraffin, Japan wax, turpentine oil and varnish, squeezed by rolling, stretched, and cooled quickly by exposure to the action of a fan.

Ger., 283,717, Jan. 12, 1912. BADISCHE. Mfg. **chrome-containing color lakes** from oxyanthraquinonesulfonic acids, by pptg. the colors of 280,505 (C. A. 9, 1998), at the ordinary or elevated temp., upon substrata, or by means of alkalies or alk. reacting agents. Cf. C. A. 8, 1017.

26. PAINTS, VARNISHES AND RESINS.

A. H. SABIN.

Proposed standard definitions of terms used in paint specifications. Report of sub-committee of American Society for Testing Materials. *Drugs, Oils and Paints* 31, 54-5 (1915).—Definitions of the following terms: standard, equal to, pure, commercially pure, adulteration, adulterant, bulk, voids, opacity, covering power, hiding power, spreading rate, fineness, crystalline, amorphous, paint, pigment, vehicle, volatile thinner, non-volatile vehicle, tinting strength, color, tint, shade, hue, tone, drying, drier, specific gravity, density, gallon, dry. E. W. BOUGHTON.

Imitation chrome yellow. ANON. *Farben-Ztg.* 20, 1032-4 (1915).—General discussion of the properties necessary in such products. Substitutes are lakes made with a base of $BaSO_4$, $CaCO_3$, etc. A list of suitable dyes is given. Resistance to water, alkali, and light is considered. E. W. BOUGHTON.

Progress in the paint and varnish industries in 1914. W. FAHRION. *Farben-Ztg.* 20, 985-7, 1009-10 (1915).—(1) Linseed oil and substitutes, (2) blown oil, linoxyn and linoleum, (3) boiled oil, driers, (4) colors in oil, (5) stand oil, thickened oil, (6) varnishes and (7) the drying processes are reviewed. E. W. BOUGHTON.

Turpentine and paint legislation in Georgia. ANON. *Oil, Paint and Drug Rep.* 88, No. 3, 11(1915).—Copies of two bills introduced in the Georgia legislature, one providing for the sale of turpentine by net wt. and the other for the formula-labeling of paints.

E. W. BOUGHTON.

The constitution of Chinese wood oil varnishes. E. E. WARE AND C. L. SCHUMANN. *J. Ind. Eng. Chem.* 7, 571-3(1915).—A review of the polymerization of the oil is given. W. and S. believe with Wolff (cf. *C. A.* 7, 2125) that the solidification is due to the formation of a colloidal gel. The effect of rosin in preventing solidification is due to the solvent action of the rosin on the gel. The method of W. and S. for the sepn. of Chinese wood oil from other oils (cf. *C. A.* 8, 3244) was found to be satisfactory for the analysis of heated mixts. of Chinese wood oil and rosin. The Na soaps of both raw and heated Chinese wood oils are insol. in abs. EtOH. The fatty acids from these soaps may be dissolved in 80% EtOH and the oleomargaric acid crystd. by cooling. Expts. showed that rosin has no inhibiting effect on the polymerization of Chinese wood oil.

E. W. BOUGHTON.

Colorless lacquer for metal parts. MAR. *Elektrochem. Z.* 22, 68(1915).—The lacquer is made from 10 parts sandarac, 20 of abs. alc., 2 of camphor and 4 of Venetian turpentine. This should be applied thinly with a soft brush to the slightly warmed articles. A lasting coating very resistant to wear is said to be obtained. W. E. R.

Examination of floor waxes. A. A. BESSON. *Basel. Chem. Ztg.* 39, 455-6 (1915); see *C. A.* 8, 1019; 9, 971.

J. H. MOORE.

Production of rosin in Germany. W. STORANDT. *Farben-Ztg.* 20, 1011(1915).—A brief article giving statistics and methods.

E. W. BOUGHTON.

U. S., 1,145,186, July 6. R. EBERHARD. A composition for coating steel or iron to prevent rust. See *Brit.*, 27,894, 1912 (*C. A.* 8, 1857).

U. S., 1,145,365, July 6. H. A. HARRIS. Paint- and varnish-remover formed of crude PhOH 10%, candelilla wax 2%, paraffin 1% and alc. or acetone 87%.

U. S., 1,145,782, July 6. J. H. MATTHES. Paint for use on leather, textiles, etc., composed of asphaltic bitumen, finely pulverized, suspended in linseed oil, without being dissolved. The film of linseed oil after drying is rendered more durable by the bitumen.

U. S., 1,145,980, July 13. C. ELLIS. Paint- and varnish-remover formed of $C_2H_2Cl_4$ 40, light camphor oil 25, denatured alc. 35 and ceresin wax 2 parts.

U. S., 1,146,173, July 13. G. H. KEITH. Composition for cleaning and polishing painted and varnished surfaces, composed of beeswax and gasoline in the proportions of 5 drams to a qt.

U. S., 1,146,182, July 13. S. LIPSUS. Raised printing is produced by printing with slow-drying ink containing glycerol, applying powdered shellac to the printed characters and fusing it on them.

U. S., 1,146,690, July 13. J. L. CARPENTER. A pigment composed of calcium sulfate and zinc sulfide is made by reacting on a soln. of $CaCl_2$ with Na_2S until the soln. is slightly alk. and then simultaneously adding $ZnSO_4$ and additional Na_2S in such proportions as to maintain the alkalinity of the soln. during the pptn.

U. S., 1,146,854, July 20. C. ELLIS. Composition for removing paint and varnish, formed of chlorinated glycerol 35, cumene 25, light kerosene 40, wood flour or starch 20 and ceresin wax 10 parts.

U. S., 1,146,928, July 20. J. F. COOK. Printers' overlays are made by dusting a wet ink impression in cameo paper with powdered carborundum and rye flour, remov-

ing a surplus to secure the shade lines desired, passing the sheets through a quickly drying soln., *e. g.*, an alc.-ether soln. of shellac to expand the grains of flour on the sheet, drying, treating with quick drying varnish and turpentine and baking.

U. S., 1,147,066, July 20. J. ADLER. Finishing and coating wooden articles. The surface is treated with "methyl acetone," then with a filler and with several coats of celluloid solns., each successive coat of which contains a quantity of opaque pigment (*e. g.*, lithopone) larger than in the preceding coat. A mixt. of shellac varnish and Fe_2O_3 may be used as filler.

Brit., 7,087, Mar. 20, 1914. BRITISH PATENT SURBRITE CO. and E. G. MEADWAY. A metallic paint is made by dissolving gum mastic in rubber soln. and adding metallic powder, celluloid soln., and celluloid solvent. In the example, the rubber solvent is naphtha and the celluloid solvent amyl acetate.

Brit., 7,126, Mar. 20, 1914. F. C. DONOVAN. A composition for cleaning and polishing painted or varnished surfaces consists of boiled linseed oil, spirits of turpentine, tripoli, and shellac. It may be applied with the cleaning-water, and a final polish obtained by application without rubbing of a mixt. of boiled linseed oil, spirits of turpentine, and shellac.

Ger., 282,959, July 8, 1913. REICHHOLD, FLÜGGER & BOECKING. In mfg. oil varnishes, linoleum masses, or the like, with the aid of copal resins, fats, and especially drying oils, the practice in the past has been to heat the copal resin to a high temp. before the addition of the oil, since otherwise the addition of the oil resulted in the sepn. of solid masses, so-called caking, rendering the product insol. in the usual solvents and, therefore, worthless. This condition is circumvented by adding S, Se, their compds., or substances containing them, to the mass. The S or Se may be added as such, or may be taken up in any solvent which is sol. in the resin-oil mixt. and enters into combination therewith. *E. g.*, the so-called fact has proved satisfactory. When employing such an addition, the copal resin may be mixed with the oils at the ordinary temp. and heated to the necessary temp. without the formation or reversion to insol. substances. *E. g.*, 20 kg. Manila copal are heated to 100–150° with 20 kg. of linseed, and about 200 g. S are added. This mass is again heated, up to 300–320°. A thoroughly uniform mass is obtained which, after cooling, may be dild. with the necessary amt. of turpentine oil.

27. FATS, FATTY OILS AND SOAPS,

E. SCHERUBEL.

The constants of the fatty acids from sulfonated cod oil. L. G. RADCLIFFE AND C. W. PALMER. *J. Soc. Chem. Ind.* 34, 643(1915).—R. and P. used a brown cod oil having sp. gr. 0.931 at 15.5°, sapon. no. 163.3, acid value 17.6, corresponding to 8.9% of free fatty acid calcd. as oleic acid, and iodine value 173.7%. The fatty acids were prepd. by sapon. with strong potash and alc., boiling the soap with water to remove the alc. and pptg. the fatty acids by HCl. The clear oil was washed with water, sepd. and heated until free from moisture. The fatty acids had a solidifying point (titer test) 22.8°, neutralization value 194, mean mol. wt. 289.4, I value 178%, and yield of hexabromides 42%. To 100 g. of oil in a suitable vessel were added, drop by drop, 35 g. concd. H_2SO_4 . The temp. was at no time above 25°. No SO_2 was noticed. After two hrs. stirring the darkened and thickened product was washed with cold satd. soln. of Na_2SO_4 until nearly all of the free H_2SO_4 was removed. The product dissolved in dil. NH_4OH to a clear soln. A clear oil was obtained on heating in the water oven. The fatty acids were prepd. in the same way as from the original oil. They contained no S. They were of much harder consistency than the acids from the unsulfonated

oil. The solidifying point (titer test) was 25.7° , neutralization value 183, mean mol. wt. 308.6, I value 114.4, and yield of hexabromides 11.0%. J. S. ROGERS.

"Kontakt" and "Pfeilring" saponifiers. G. KÖNIG. *Seifensieder Ztg.* 42, 93-4 (1915).—A comparison of these reagents with the following results: The "Kontakt" reagent requires more H_2SO_4 for its activity than the "Pfeilring," a disadvantage when the glycerol water is made neutral with $BaCO_3$. The "Kontakt" reagent is more active at the start. The color of the fatty acids is said to be the same. The ash content of the glycerol from the "Pfeilring" reagent is 0.09%, while that from the "Kontakt" is about 1%. E. SCHERUBEL.

Fat from precipitated muck (BECHHOLD) 14.

U. S., 1,145,480, July 6. C. H. HAUSAMANN. Saturated compounds from unsaturated fatty materials. See Can., 157,396 (C. A. 9, 531).

U. S., 1,147,392, July 20. O. C. HAGEMANN. Refining oils and fats by treatment with caustic alkali followed by addition, after the purifying action of the alkali is completed, of CO_2 , dil. $NaHCO_3$ or H_3BO_3 soln. or other acid which does not materially reverse saponification.

Ger., 282,782, Dec. 12, 1913. BADISCHE. In catalytic hydrogenation and dehydrogenation, the taking on and splitting off of H_2 with the aid of known metallic catalyzers (especially Ni, Co, Fe, Cu) are facilitated and hastened by the addition to the catalytic metal of F, Te, Sb or their compds. Complex compds. are preferred. E. g., 40 parts $NiCO_3$ are satd. with 1 part NH_4 tellurite soln., dried, and reduced. With the aid of such a contact mass, cottonseed oil is hardened at about 100° .

Ger., 282,936, June 21, 1912. LUX-APPARATEBAU- UND VERTRIEBS-GES. M. B. H. Construction of an app. for treating cadavers and other flesh scraps.

Ger., 283,216, Feb. 22, 1914. C. STIEPEL. In a process of deodorizing train oil fatty acids, the vapors of these acids are mixed with SO_2 . The odor does not reappear after such treatment, either in the acids or in the soaps made therefrom. A moderately strong current of SO_2 is passed over the surface of the fatty acid in the still when the temp. of the acid has reached 200° , and continued until the distn. is concluded.

28. SUGAR, STARCH AND GUMS.

A. HUGH BRYAN.

Purity of the juice of individual sugar beets. JOSEF URBAN. Prague. *Z. Zuckerind. Böhmen* 39, 151-63 (1915).—The seed of 2 strains (A and B) of mother beets was sown in the same plot under as nearly as possible identical vegetative conditions; the detns. and observations indicated below were made on 100 beets from each strain. The purity of the juice, as well as the sugar content and other characteristics, of beets of the same strain grown on the same plot of ground was found to vary considerably. The generally recognized relation between sugar content and purity of the juice was observed in the case of various beets of the same strain; beets with higher sugar content showed a greater av. purity of the juice and the reverse relation was likewise true. This relation is not absolutely true, however, inasmuch as instances of correlated high sugar content and low purity of juice were observed in the case of individual beets and also in the comparison of different strains. This "gap" in the correlative nature of sugar content and purity of juice doubtless has a bearing on the fact that mother beets of the same wt. and sugar content sometimes produce descendants which show considerable variations in quality. The generally credited inverse relation between

purity of the juice and wt. of the beet (*i. e.*, the purity of the juice decreases as the wt. of the root increases and *vice versa*) was not observed in the case of beets grown under the same vegetative conditions; roots of varying wt. of both the *A* and *B* strains often showed approx. the same degree of purity of the juice. The av. exptl. data of both strains also contradicted the above supposed relation, since the individuals of strain *B* had both a higher av. root wt. and a higher av. purity of juice than the individuals of strain *A*. Diminished purity of juice was only observed in the case of certain exceptionally large roots grown under conditions of considerable excess of nutrient material. Certain relations between purity of juice and shape, as well as other superficial characteristics, of the root were also observed. A high pointed root top (instead of a lower, rounded shape) was found to be associated with diminished purity of juice; sketches of these 2 typical shapes are given. Diminished purity of the juice is also associated with a greenish coloration of the constricted portion of the root and, in the majority of beets, with a pronounced wrinkled appearance of the surface. H. S. P.

Further experiments on the influence of the rate of saturation on the purity and filterability of beet juice. VL. STANĚK. *Z. Zuckerind. Böhmen* 39, 1-7(1914).—Certain previous observations in factory experience were more carefully tested on a laboratory scale. A cylindrical Cu vessel (with outcurving bottom) mounted on a tripod was used as a satn. kettle. This vessel was equipped with a stirrer and CO_2 , after passing through a rotameter, was introduced through a tube with perforated tip which passed to the bottom of the vessel. A 1 chamber filter press was employed; the filtering material (fine linen cloth on 3 layers of filter paper) was placed on a metal sieve which rested in turn on the lower plate (the latter was fluted and the channels connected with the outlet) of the filter press. Fifteen hundred g. diffusion juice (passed through a fine sieve) were placed in the satn. kettle and heated to 85° with const. stirring; 2.1% CaO (calcd. on the basis of the amt. of juice) was then added in the form of milk of lime of known concn. and the mixt. was stirred 10 min. at 85° . Satn. with CO_2 was then commenced and continued to a content of approx. 0.1% CaO , the degree of alkalinity being approx. measured by means of Karlik phenolph. reagent paper; 600 l. and 100 l. CO_2 per hr. were employed for rapid and slow satn., resp. Foaming was prevented by addition of xylene (which was removed by heating) in amts. of 1-2 g. at a time. After the 1st satn. was complete the filter press was attached to the bottom of the kettle by means of a screw nozzle provided with a cock; the satn. kettle was then hermetically closed by means of a top plate equipped with a manometer and inlet for compressed air. The contents of the kettle were brought to a definite vol. of 1500 cc. with H_2O and a const. pressure of 1.5 atn. was maintained during filtration. The ppt. remaining in the filter press was washed with hot H_2O until the filtrate amounted to 150 cc. (which was added to the juice). The juice, satd. and filtered as above, was then heated to 90° and subjected to a 2nd satn. so that the CaO content was reduced to 0.01%, after which it was boiled 10 min. on a sand bath, filtered, cooled and analyzed (detn. of ash, N, sugar, color, CaO , content of dry substance). The CaO content of the juice after the 1st and 2nd satn. was 0.08-0.13 and 0.005-0.011%, resp. The period required for satn. was found to decrease with increasing purity of the diffusion juice as well as with increasing rate of inflow of CO_2 . The rate of filtration of rapidly satd. juice was in all cases greater than that of slowly satd. juice. The rate of filtration increased as a rule with increase in the coeff. of purity in the case of both the rapidly and slowly satd. juice; no definite relation could be ascertained so it is probable that the interdependence is of a complicated nature. The coeff. of purity of rapidly satd. juice was greater than that of slowly satd. juice; the content of N, ash and pigment was less in the former than in the latter. S. is now constructing an app. by which to measure the velocity with which CO_2 is absorbed by milk

of lime under varying conditions (influence of varying amts. of sugar and non-sugars, as well as the effect of different temps., manner of slaking the CaO, etc., on the course of satn.). The C content of the organic non-sugar substances of CaO ppt. (from diffusion juice) which had been dried at 50° and kept for 1/2 yr. was found to have increased during this time; this indicates that some sugar had been transformed by the action of CaO and air into other organic compds. and recalls a similar observation of Urban in the case of Sr saccharate. The action of microorganisms is not excluded, but is, however, not probable.

H. S. PAINE.

The determination of reducing sugars by the Bertrand method and the influence of sucrose upon the results. H. PELLET. *Intern. Sugar J.* 17, 273-4(1915).—P. criticizes Bertrand's method which does not point out errors due to the presence of sucrose, and the duration and intensity of boiling. P. avoids the action of sucrose by heating the mixt. of cupro-potassic liquor and sugar soln. only to 60-62° during 10 min., commencing at the moment when the liquid reaches this temp. Parker's method is recommended for the volumetric detn. of the Cu₂O when the amts. are too small to be weighed. If 0.5 g. of salicylic acid is added to a standard soln. of invert sugar at the time of inversion, the soln. will keep indefinitely.

A. GROSS.

By-products of sugar manufacture. C. W. HINES. *Sugar* 17, No. 6, 44-6(1915).—The various sugar-house by-products of the Philippine Islands are described and a plea is made for their utilization.

A. GROSS.

The by-products of the cane sugar factory. W. E. CROSS. *Intern. Sugar J.* 17, 267-71(1915).—The article deals mainly with the fertilizer value of filter press cake. Analyses of the press cake from seven factories in Tucuman on air-dried samples showed the comp. to be P₂O₅ 3.04-7.81, N 1.87-2.75, NH₃ 2.27-3.33, the variation being due to the method of clarification used. There was some loss of organic substances due to the weathering process of drying the cakes but the loss of N was not of important dimensions. The phosphoric acid is present to a large extent in citrate-sol. form, but mostly so when H₂PO₄ is used in clarification. The lime is present in good proportion and the organic matter (about 50-70%) is a humus-producing material of considerable value. C. suggests that this is a product of value and should be returned to the soil if the fertility of the land is to be maintained.

A. GROSS.

Dehydrated cossets. F. G. WIECHMANN. *Sugar* 17, No. 6, 29-31(1915).—To prolong the sugar beet campaign, W. suggests the working of dehydrated cossets during the usual dull period. The cossets are prepd. during the working season by a special method of hydration (details of procedure not given) and stored for future use. After 100 days storage the sucrose differed by only ±0.2%. The saving in transportation and storage is considerable as the dehydrated cossets weighed only 25% of the original. A practical test was made with the dehydrated cossets and the results obtained were in all respects equal and in some respects superior to the results obtained from fresh beets worked in the same factory.

A. GROSS.

U. S., 1,145,484, July 6. F. W. HUBER and R. W. POINDEXTER, JR. **Obtaining ammonia, hydrocyanic acid and other by-products from beet-molasses waste water.** "Steffen's water" is concd. and subjected to destructive distn. The gases produced are heated to above a red heat, producing HCN, first cooled to effect sepn. of tar, then washed with acid to recover NH₃ and further cooled to condense H₂O, which carries with it at least part of the HCN.

U. S., 1,146,456, July 13. W. SEARBY. **Sugar cane** is crushed to break and flatten it, then shredded by beating and re-pressed to recover the saccharin juice.

Brit., 2,813, Feb. 3, 1914. AKT.-GES. FÜR ANILIN-FABRIKATION. **Betaine and**

its salts are prepd. by evapg. *in vacuo* the molasses, etc., obtained from beet-sugar manuf., and then adding HCl soln. so that the temp. does not rise high enough for the formation of humus substances. On cooling, betaine-HCl crystallizes out and may be purified and converted into betaine or other salts thereof in the known manner.

Brit., 2,923, Feb. 4, 1914. AKT.-GES. FÜR ANILIN-FABRIKATION. Betaine salts are obtained from molasses and other beet sugar residues by rendering the material feebly acid in reaction with HCl or other acid, and then evapg. the mixt. *in vacuo* at a temp. not exceeding 60°. The betaine salt crystallizes out on cooling, and its sepn. may be hastened by strongly acidifying the soln. with HCl.

Ger., 281,830, Oct. 19, 1912. M. S. HANSEN. In mfg. potato starch by bacterial fermentation with exclusion of air, the coarsely comminuted potatoes are subjected, for several days, in a closed vessel under H₂O, maintained at a temp. of 25-40°, to spontaneous fermentation.

Ger., 281,925, Dec. 2, 1913. M. LINDNER. In a process of purifying sugar juices obtained according to 268,530 (C. A. 8, 1885), the thick sap obtained from the sugar beet cuttings treated with Al(OH)₃ in neutral or alk. soln., is treated with colloidal Al(OH)₃ at 70-80°, for the purpose of removing the non-saccharin residues contained therein. This is not preceded by a treatment with lime. The Al(OH)₃ residue is sepd. by means of dil. lime water; the mass is boiled and filtered.

Ger., 282,445, Jan. 7, 1913. L. VENDITI. App. for treating the residues of sugar manufacture.

Ger., 282,810, Nov. 9, 1913. O. GIESS. Mfg. a high-% clear sugar sirup, non-cryst., with over 50% sugar content, by keeping the amt. of the saccharose, with reference to the invert sugar, in the proportion of 5:2. Such a product is of value in those processes in which the sugar must not be fermented too readily.

29. LEATHER AND GLUE.

LLOYD BALDERSTON.

Vegetable tanning materials in 1914. J. JEDLIČKA. *Gerber* 41, June 1 and July 1 (1915); *J. Am. Leather Chem. Assoc.* 10, 441 (1915).—A general discussion and review.

E. J. C.

Wattle bark supplies of British colonies. ANON. *J. Roy. Soc. Arts* 63, 753 (1915).—Production statistics.

E. J. C.

Neradol D. A. ROGERS, *et al.* Tanners Inst., Brooklyn. *Repts. of 3rd yr.* 25-30, 38-42; *J. Soc. Chem. Ind.* 34, 368 (1915).—Preliminary treatment with Neradol D renders vegetable tannage more rapid at first but does not influence the final yield of leather. Calf skin, pickled as for chrome tannage, gave a similar yield with a combination of Neradol D and quebracho as with quebracho alone; Neradol D alone did not give so good a yield of leather.

E. H.

Peptization phenomena in tanning solutions. W. MOELLER. Hamburg. *Kolloid-Z.* 16, 69-76 (1915); *Collegium* 1915, 49-59.—Tanning solns. contain 2 essential components, a peptizing material which is sol., and an insol. material which in contact with the former is peptized to a colloidal soln. The tanning effect is due to the adsorption of the peptizing material by the hide, which causes coagulation of the peptized material in the leather. Tannin is the peptizing material in most vegetable tanning materials, while the insol. materials are related either to pyrogallol or to pyrocatechol. These are usually found in different parts of the same plant, and the tannin present may be in excess, or insufficient to peptize all of the insol. material available. Tanning

with inorg. materials is due to the presence of a sol. or an insol. hydroxide which is peptized by the normal or acid salt.

H. I. MATTILL.

Note on the analysis of tanning materials. THOMAS CALLAN. *J. Soc. Chem. Ind.* 34, 647(1915).—Analyses were made of guara using (1) the present official method of the Assoc. of Leather Trades Chemists with American hide powder of standard quality, (2) Bennett's method (*C. A.* 9, 978) using American standard hide powder and (3) Bennett's method using finely ground hide powder obtained from the Deutsche Versuchsanstalt für Lederindustrie, Freiberg. The non-tannins obtained, using the same soln., were 23.1%, 28.1%, and 25.4%, resp. The gelatin test on the detannized solns. showed no turbidity nor opalescence, thus indicating apparently complete detannization. (2) showed the least absorption of non-tannins. By Stiasny's test (to 3 cc. of the soln. to be tested add 1 cc. of a satd. salt soln., then 2 drops of 1% HPO_3 soln., and finally 2 drops of 5% gelatin, 5% salt soln.) on the non-tannin filtrates, (1) and (3) showed no tannin, and (2) a distinct trace. After redissolving the dried non-tannin residue, (1) gave no reaction, (2) a heavy ppt., and (3) distinct opalescence. Expts. were made to det. the approx. degree of accuracy of the present official tannin test. It was found that with some tannin materials 6.5 mg. in 50 cc. could not be detected by the official method, although Stiasny's readily showed 3 mg. in 50 cc. A stringent test would be to concentrate 6 cc. of the presumably detannized soln. (12 cc. if Bennett's method is used) to 3 cc. and apply Stiasny's test. It would seem by a number of analyses that the Bennett alteration designed to reduce the absorption of non-tannins had been carried too far. Stiasny's test will not show 150 mg. of gallic acid in 50 cc.

J. S. ROGERS.

Notes on the analysis of guara and guara extract. THOMAS CALLAN. *J. Soc. Chem. Ind.* 34, 645(1915).—Nearly all the reactions of guara tannin agree closely with pyrogallol tannin. A dil. aq. infusion gives a violet-blue coloration with iron alum, no ppt. with Br water, no phloroglucinol reaction with a deal shaving, a yellow ppt. turning green with lime water, a slight ppt. with HCHO and HCl , a yellow coloration with Na_2SO_3 , and intense red or brownish red coloration with an ammoniacal soln. of $\text{K}_3\text{Fe}(\text{CN})_6$ in a very dil. soln., a pink to purple coloration with Bennett's I test, and a deep orange-brown color with nitrous acid. However, with concd. H_2SO_4 a crimson-pink coloration changing to pink is obtained, a reaction given by most catechol tannins. A table of analyses shows that the past two years' supply of guara has been of a remarkably constant quality. One set of results is 44.8% tans.; 23.1% non-tans.; 21.7% insol. and 10.4% H_2O . Skins tanned entirely with guara give a soft well-filled leather resembling gambier tannage. This may be due to the nature of the non-tannins. Guara is not liable to give excessive fermentation. It is not readily leached on account of its fine state of subdivision, although the tanning matters are readily sol. For developing acidity in tan liquors guara is excellent, and used with untreated quebracho it gives a good color. Used in the paddle with quebracho, guara does not draw the grain, but gives a soft mellow tannage. Guara extract is inferior in all respects to the natural product and is no longer imported.

J. S. ROGERS.

Disposal of tannery waste (SELTZER) 14.

U. S., 1,146,963, July 20. W. S. SHAW. Tanbark is shredded to prepare it for extrn. and then compressed into a substantially waterproof bale for shipment.

U. S., 1,147,178, July 20. M. B. LARSON. Composition for tanning hides and skins, formed by separately dissolving gambier 5 and NaCl 1 part in hot H_2O , combining the solns. and adding 1 part of MgSO_4 .

U. S., 1,147,245, July 20. H. H. HURT. Preparing a tanning composition from

waste sulfite liquor. Highly concd. neutral or nearly neutral waste sulfite liquor is treated with H_2SO_4 to ppt. part of the Ca and liberate lignosulfonic acids, then NaHSO_4 is added to ppt. the remainder of the Ca and after sepn. of the ppt. there remains a concd. soln. of about $28-31^\circ \text{Bé}$.

Ger., 281,822, Mar. 24, 1914. **BAYERISCHE MASCHINENFABRIK REGENSBURG F. J. SCHLAGETER.** Mounting for a **tanning and fulling trough**, revoluble around its middle axis. The trough, tightly closed on all sides, is allowed to float freely within a liquid container.

Ger., 281,868, Oct. 30, 1913. **C. MÜLLER.** Machine for **defatting animal scrap, skins**, and the like, whereby the material is conducted, by means of endless bands, between electrodes in alk. bath.

Swed., 36,696, Feb. 10, 1912. **K. BENDIXEN.** **Tanning fish skins** by softening them, allowing them to lie for 3 days in a soln. of As_2O_3 or Na_2S or both, rinsing them, and leaving them for 3 days in a soln. of slaked lime and H_2O . During this period the skins are taken out frequently and spread out. They are then treated for 5 min. with a weak HCl soln. and finally with H_2O , poultry dung and salt liquor, or in a soln. of sumac ext.

30. RUBBER AND ALLIED SUBSTANCES.

R. T. STOKES.

Spots on rubber. ANON. *India Rubber World* 52, 569(1915).—Spotting and discoloration are generally due to common saprophytic fungi which contain proteolytic enzymes, infection taking place while latex is being collected. Diln. of the latex increases the danger of infection. Infection is best prevented by treating the latex with formalin, by the quick drying of rubber, and by the addition of NaHSO_3 .

H. B. SLUSSER.

Rubber latex prepared with uranium borate. ANON. *India Rubber World* 52, 569(1915).—It is stated that 8 oz. of U borate to every 100 lbs. of latex, when thoroughly mixed with the latex before coagulating, influences considerably the appearance of the rubber, prevents oxidation, and increases tensile strength.

H. B. SLUSSER.

The estimation of sulfide and sulfate sulfur, and the action of solvents on vulcanized rubber. HENRY P. STEVENS. *Analyst* 40, 275-81(1915); cf. C. A. 8, 2267. —*Detn. of sulfide S:* The app. consists of a Kipp CO_2 generator and a Voigt flask. This is a 250 cc. flask with an outlet tube connected to the ground-in stopper, and an inlet tube fused in the side and reaching nearly to the bottom. 10-20 cc. pure concd. HCl are poured into the flask and covered with a layer of ether (20-30 cc.). The air is then swept out of the app. with CO_2 and the stopper removed for a few seconds to admit the entry of the rubber (0.1-1.0 g.). If the rubber tends to sink in the acid soln., it is advisable to swell it with ether alone before placing in the flask, or to wrap it in filter paper to keep it afloat. Two 100 cc. absorption bottles containing Pb acetate soln. are connected to the app. and a little more CO_2 passed through to drive out traces of air. The whole is allowed to stand with occasional shaking for 15-30 min. for soft rubbers, or longer for hard or fully cured specimens. The rubber swells and is gradually decompd. by the acid with the evolution of H_2S . The ether and H_2S are now driven over by gentle boiling, and the decompn. completed by boiling a few min. Traces of H_2S are washed out with CO_2 , and the whole is allowed to cool. The absorbing liquids are acidified with AcOH to decompose any carbonate formed, and the PbS filtered off cold and washed on the filter until free from sol. Pb salts. It is transferred wet to a stoppered flask, and allowed to stand with occasional shaking in contact with a known vol. of standard I soln. The excess of I is then titrated with $\text{Na}_2\text{S}_2\text{O}_4$. *Estn. of sulfate S:*

The soln. remaining in the Voigt flask should contain the PbSO_4 resulting from the reaction $4\text{PbO} + 2\text{S}_2 = 3\text{PbS} + \text{PbSO}_4$. Repeated extns. of the residual rubber with HCl were made, but the theoretical amt. of PbSO_4 was not obtained. This indicates that, although the above equation expresses the reaction of PbO and S in an inert medium the reaction is modified in the presence of caoutchouc. Repeated extns. with HCl and ether showed that when swollen rubber is extd. a small part of the vulcanized rubber passes into the soln. with the S. The whole of the S in a vulcanized compd. containing PbS and ZnS may be accounted for as follows: (1) Free S by oxidation of the acetone ext.; (2) sulfide S by decompn. with ether and HCl, and estn. of the H_2S ; (3) sulfate S in the HCl soln.; (4) S combined with rubber by oxidation of the residue. Although it is generally held that fully vulcanized rubber is not sol. in common solvents, the expts. made show that in the presence of HCl vulcanized rubber is dissolved even in the cold. Mixtures of benzene and HCl and of chlorohydrocarbons and HCl have a solvent action similar to that of mixts. of ether and HCl.

P. B. DUNBAR.

U. S., 1,145,351, July 6. S. C. DAVIDSON. Obtaining rubber from latex by treatment with an alkali metal polysulfide or thiosulfate and then with acid of 1-2% strength which forms free S in the rubber during the coagulation. The S thus deposited acts more uniformly during vulcanization because of its fineness and even distribution. Disinfecting agents such as CH_3O or an alk. soln. of creosote or PhOH may be added during the process.

U. S., 1,145,352, July 6. S. C. DAVIDSON. Coagulating rubber latex after successively adding a dil. alk. soln. of creosote and CH_3O and an acid, *e. g.*, HOAc, HCl or H_2SO_4 .

U. S., 1,146,253, July 13. A. HEINEMANN. Caoutchouc from isoprene is made by passing O_2 or O_3 through the isoprene and then heating at 105° to effect polymerization. On heating for 8 days a 50% yield is obtained. The O_2 may be generated in the isoprene if desired by mixing BaO_2 and H_2SO_4 with it or from H_2O_2 or by electrolysis of H_2O .

U. S., 1,146,699, July 13. T. GARE. Method of mechanically uniting softer vulcanized rubber with powdered ebonite and forming the product into continuous lengths.

U. S., 1,146,851, July 20. S. C. DAVIDSON. Coagulating India rubber latex. An aq. soln. of caustic alkali, cresol, CH_3O and alkali metal polysulfide is added to the latex to serve as preservative and vulcanizing agent and then the latex is coagulated by the addition of HCl, H_2SO_4 , HOAc or $\text{CCl}_3\text{CO}_2\text{H}$ in 0.25-0.5% aq. soln.

Brit., 6,215, Mar. 11, 1914. R. S. AGAR. In coagulating rubber latex, a horizontal drum, grooved, corrugated, perforated, or plain, is rotated in a trough containing latex, the drum and trough being arranged within a smoke chamber to which smoke is fed by a pipe the end of which opens into the trough at a point near the surface of the latex.

Brit., 6,763, Mar. 17, 1914. APSLEY RUBBER CO. Vulcanizing India rubber boots and other articles of irregular shape by placing them upon a last enclosed, with the boot, etc., thereon, in an impervious bag-like flexible envelope, which excludes all air or steam, and by then submitting the article in a vulcanizing-chamber to the action of heat and pressure derived from a fluid. Any excess of air in the bag may be removed before closing it.

Brit., 6,897, Mar. 18, 1914. F. E. MATTHEWS and E. H. STRANGE. Purifying unsaturated hydrocarbons containing the conjugated double bond by first treating them with SO_2 in the presence of HCl or other halogen acid, I, or acid chlorides such as

acetyl chloride, sulfonyl chloride, or thionyl chloride, whereby is obtained a mixt. of sulfo-oxides consisting chiefly of a cryst. substance sol. in H_2O , etc., with a small proportion of an insol. amorphous substance, then sepg. the cryst. sulfo-oxide from the mixt., and decomposing it by heat into the original hydrocarbon and SO_2 . *E. g.*, isoprene is treated with SO_2 and alc. HCl .

Brit., 7,370, Mar. 24, 1914. S. J. PEACHEY. The vulcanization of natural or artificial caoutchouc or caoutchouc-like substances is accelerated by means of a compd. resulting from the interaction of an aromatic amine with an aliphatic or aromatic aldehyde or of an aromatic aldehyde, such as $HCHO$ -aniline, benzylidene-aniline, or hydrobenzamide, with NH_3 . As an example, 100 parts of rubber are mixed with 10 parts of S and 1 of $HCHO$ -aniline, and heated to 140° for about 40 min.

Fr., 468,755, Feb. 20, 1914. M. FRÄNKEL and RUNGE. In mfg. fabric impregnated with rubber, regenerated rubber, alone or in admixt. with crude rubber, may be employed if, instead of the final product of the process of regeneration, are used the emulsions composed of rubber, solvent, and H_2O , and obtained as an intermediate product. Materials impregnated with these emulsions need no further vulcanization.

CHEMICAL ABSTRACTS

Vol. 9.

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No. 18.

I. APPARATUS.

L. C. JONES.

Modified buret calibrating pipet and certain points in the use of such instruments. C. W. FOULK. *J. Ind. Eng. Chem.* 7, 689-93(1915).—The two-way cock is used as the zero mark instead of a mark on the pipet. A discussion of the principles underlying the calibration and use of such pipets is given, as well as extensive directions for manipulation.

ISADOR MILLER.

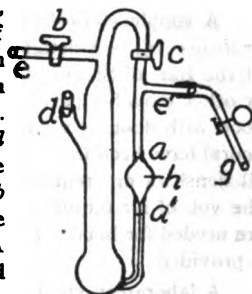
A simple buret reader. L. S. PRATT. *J. Am. Chem. Soc.* 37, 1730-1(1915).—P. has investigated the different forms of buret readers available and has found that "the various devices possess rather marked disadvantages." The simple reader described (with drawings) has proved to be entirely satisfactory. It consists of a disk of ordinary mirror glass, about 15 mm. in diam., in the center of which is a rectangular section, about 4×10 mm., from which the silvering has been scraped. A fine diamond line extends across the face, perpendicular to the long axis of the triangle. The procedure in using this reader is outlined.

E. J. C.

Adjustable burner support for condensation apparatus. H. E. BISHOP. *J. Ind. Eng. Chem.* 7, 693(1915).—Modification of app. of Barnard and B. (*J. Am. Chem. Soc.* 28, 999(1906)) so as to make it applicable for flasks of any size. All parts can be adjusted separately. The modification was effected by changing the position of the gas supply from under the flask support to the top of the supports for the condensing tube and making the position of the burner adjustable.

ISADOR MILLER.

A simple viscosimeter for determining the inner friction of volatile liquids and of liquid mixtures of volatile substances. O. FAUST. *Z. Elektrochem.* 21, 324(1915); cf. *C. A.* 6, 3043.—To obviate the loss due to evapn., especially at temps. near the b. p., in the detn. of viscosity of volatile liquids by the Ostwald viscosimeter, the app. shown in the cut was devised. This is a modification of a form previously reported (*Z. physik. Chem.* 79, 98(1912); cf. *C. A.* 6, 3043). Liquid is introduced through the side arm *d* which is closed by means of a cork stopper. To bring the liquid above *a*, close and apply suction at *g*, the cock *b* being open. Now open *c* to equalize the pressure and close *b* to prevent any evapn. After filling, *d* is also closed. A rubber tube provided with a pinchcock can be substituted for the cock *b*. To force liquids near the b. p. up into the capillary, close *c* and apply blast at *e*.



F. W. SMITHER.

Note on a new analytical suction filter. JOKICHI TAKAMINE, JR. *J. Am. Chem. Soc.* 37, 1519-20(1915).—This app. has been designed to facilitate the use of suction in making filtrations in quant. detns., in which it is desirable to catch the filtrate in the vessel in which it is to be further treated. The main body of the app. consists of a cylindrical glass jar, near the upper rim of which is a suction outlet with a ground-glass stopcock. The top has a pouring lip in the side opposite the suction outlet and the entire upper surface is ground. Half way up from the bottom on the inside surface are,

at equal distances apart, 3 glass protrusions for supporting a perforated shelf. The cover has a ground-glass rim and has an extra large stopper opening in the center for inserting the filter. The use of the shelf depends on the size of the vessel used for collecting the filtrate. The jar itself may be used as container for further treatment of the filtrate.

E. J. C.

A simple laboratory apparatus for the determination of carbon dioxide by loss. STUART P. MILLER. *J. Am. Chem. Soc.* 37, 1730(1915).—The app. is of the Schrötter type, but is much simpler and less expensive. Tests using C. P. BaCO_3 have shown that an accuracy of 0.1% is attainable with this app.

E. J. C.

New and improved form of Kjeldahl distillation apparatus. A. D. HOLMES. *J. Ind. Eng. Chem.* 7, 693-4(1915).—Modification of app. described in *C. A.* 9, 1.

ISADOR MILLER.

A new assay balance. ANON. *Mel. Chem. Eng.* 13, 512(1915).—The wts. are circular, perforated, metal disks, and are normally supported on upright posts that pass through circular openings in a horizontal frame which is a part of the wt.-pan hanger. On depressing keys outside the case, these posts are lowered so that the wts. rest on the horizontal frame.

W. L. BADGER.

An alternating current thermoregulator. HAROLD S. DAVIS. *J. Am. Chem. Soc.* 37, 1520-1(1915).—D. has constructed an arrangement which adapts the electromagnetic thermostat regulator to the use of a. c. from city mains. The app. has proved satisfactory.

E. J. C.

Some new forms of apparatus. I. A substitute for the twin-bulb trap in toluene-mercury thermoregulators. P. B. DAVIS. *J. Am. Chem. Soc.* 37, 1198-9(1915).—The toluene-Hg regulator described and pictured has been designed to overcome the disadvantages (enumerated) of the twin-bulb device. It has a range of about 50°. II. A new form of pycnometer for liquids. P. B. DAVIS AND L. S. PRATT. *Ibid* 1199-1200.—The authors tried a modified form of the Sprengel pycnometer, as described by Jones and Bingham (*Am. Chem. J.* 34, 48 (1905)) and Jones and Veazey (*Z. physik. Chem.* 61, 641(1908); cf. *C. A.* 2, 1653) and found it to have certain disadvantages. To remove these the form described (with a drawing) was designed. The new instrument is convenient to use and gives accurate results.

E. J. C.

A simple stone-frame chemical hood. E. R. WEAVER. *J. Am. Chem. Soc.* 37, 1726-9(1915).—A detailed description, with drawings, of a novel type of hood installed at the Bur. of Standards. A number of advantages are claimed. There are no doors or other movable parts. A specially designed front is shown for use in labs. where a hood with doors is required. Two-compartment hoods of the type described (without doors) have been in use for nearly 2 yrs. and have given perfect satisfaction. Fumes of all densities are removed with equal facility. Anemometer tests were made to det. the vol. of air required to give good ventilation. Experience has shown that no doors are needed for hoods of this type to insure adequate ventilation, if efficient fan capacity is provided.

E. J. C.

A laboratory stool. HORACE G. DEMING. *J. Am. Chem. Soc.* 37, 1518-9(1915).—The stool described and pictured is an ordinary camp stool of strong construction made to serve as a device for locking the drawers and doors of the student's compartment.

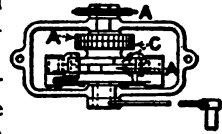
E. J. C.

Device for taking continuous samples of waste water. A. D. GRASWINCKEL. *Arch. Suikerind.* 22, 703-4(1915).—A small pipe is tapped into the condenser fall-pipe near the floor level. The sample bottle has a loose cork with a T-tube, the straight piece of the T being horizontal. The branch of the T inside the cork has attached to it a glass tip with an orifice to correspond to the size of the sample desired. The water

diverted through the small side pipe is passed through the T and on into the hot-well. Thus an av. sample may be taken over any length of time. The same device may obviously be used for any liquid flowing in a pipe.

W. L. BADGER.

Mechanical ore sampler. J. H. TAYLOR. *Eng. Mining J.* 100, 229(1915).—The sprocket wheel *A* (see cut), gear *A* and disk *A* are keyed to the shaft and driven by a sprocket wheel on the shaft of the driving pulley of the belt conveyor. The gear *A* drives an idle gear, which in turn drives gear *C*. Gear *C* and disk *C* are of one piece. As gear *A* has 31 teeth and gear *C* 30 teeth, disk *A* will revolve 30 times, while disk *C* revolves 31 times. At the beginning of one revolution of each 30, the recesses in disks *A* and *C* will coincide and a roller will engage disk *A* for half a revolution, when it will be released. Hence a sample will be taken once in 30 revolutions. The length of the cranks are such that a crank passes through the middle 60° of the 180° while the sample is being taken, so that the increment of the swing of the sample chute is nearly constant, while the stream of flow is actually being cut. With disks $4\frac{1}{2}$ in. in diam. and a crank 12 in. long, this device will successfully sample ore crushed to 4 in. from the end of a belt conveyor 2 ft. wide. The finer the ore the more accurate the daily sample. The device will cut about 0.5% of the ore passing over the end of the belt conveyor, without selection. The sample so taken will not be so accurate for a given day as if taken by cutting 20% each time, but at the end of a week the errors will be largely compensated.



F. W. SMITHER.

New sampling plant at Hamburg, Germany. ANON. *Eng. Mining J.* 100, 140-1 (1915).—The plant was erected primarily for the sampling of FeS_2 cargoes. The ore is reduced to 2 in. lumps and is then passed through a Brunton sampler, where $\frac{1}{4}$ of the stream is rejected. The remaining $\frac{1}{4}$ goes through the gyratory crusher and is reduced to $\frac{3}{8}$ in. lumps; thence to the top of a special automatic sampling machine, consisting of a large steel frame about 14 ft. high, in which are arranged 3 pairs of rolls. The largest, at the top, are 20 in. in diam. and the other 2 pairs are 16 in. and 12 in., resp. Above the top pair of rolls and intermediate between the different sets there are 3 flat reciprocating vanes, flaps or dividers, connected together and arranged to flap from side to side, so that during a portion of the time the ore striking them is diverted in one direction and during the remainder of the time in another. On entering the top of the machine the first flap rejects $\frac{1}{4}$ of the ore. All three of these flaps are driven by cams connecting rods in such a way that during $\frac{1}{4}$ of the time they are deflecting the stream of ore into the rolls and during the remaining time they are diverting it out of the left-hand side of the machine. The first pair of rolls crushes the ore to about $\frac{3}{16}$ in. lumps; this passes over the second flap, the sample going through the second pair of rolls. After another reduction it is finally crushed to the desired degree of fineness by the last pair of rolls; then it goes through a shaking screen and thence to the bottle filler. If there are any particles of ore which have not been sufficiently reduced in size by the last pair of rolls, they slide off the side of the shaking screen upon a little rubber belt elevator, which carries them up and again passes them through the final pair of rolls. In this way the whole of the final sample is crushed to any requisite fineness for the sample bottles. The bottle filler consists of a revolving table on which the bottles are placed and over them an annular hopper divided into compartments so arranged that a certain portion of the final sample is diverted and fed into the bottle in such a way that a definite quantity goes into the bottles and each bottle gets its correct proportion. Another feature of the machine is the provision of automatic adjustable feeders between the sets of rolls for keeping the stream of ore practically uniform. When each set of bottles is filled it is immediately removed, stoppered and sealed

by the representatives of both parties. Careful tests show the results obtained to be very accurate, with only a minute difference in the analyses from different bottles filled at the same time and representing the same parcel of ore. A 5000 ton cargo can be sampled in 3 days by 3 men.

F. W. SMITHER.

The distillation of water. G. W. McKEE. *Am. Gas Light J.* 102, 404-7(1915).—A general discussion including illustrated descriptions of 17 different types of direct-fired stills of American manuf.

E. J. C.

Centrifugal pump for thick liquors. ANON. *Met. Chem. Eng.* 13, 512(1915).—A pump with wide passages and an overhung, open impeller. Advantages claimed are efficiency, slight overload on the motor at heads below the rating, accessibility, and no chance of clogging.

W. L. BADGER.

Pneumatic conveyors in modern factories. J. E. BRAUER-TUCHORZE. Hanover. *Chem. App.* 2, 164-6(1915).—Five cuts and general remarks on air conveyors and separators.

J. H. MOORE.

Cell for preparing amalgams (MÜLLER) 4. Thermostat (JOHNSEN) 2.

U. S., 1,147,843, July 27. R. D. BRADEN. Acetylene generator.

U. S., 1,148,237, July 27. G. M. KNEUPER. Filter for filtering H_2O or other liquids under high pressure.

U. S., 1,148,496-7, Aug. 3. R. D. BRADEN. Acetylene generators.

U. S., 1,148,725, Aug. 3. J. A. STUTSMAN. Ammonia-condensing apparatus for use in refrigerating plants.

U. S., 1,149,005, Aug. 3. C. W. VOGT. Ammonia-absorption apparatus.

Brit., 7,633, Mar. 26, 1914. L. F. TOOTH, COMMERCIAL GAS CO. Modifications in gas-fired furnaces for the cupellation of Ag, glass-bending, enameling, etc.

Brit., 7,635, Mar. 26, 1914. L. F. TOOTH, COMMERCIAL GAS CO. Constructional details of a tilting crucible furnace.

Brit., 7,738, Mar. 27, 1914. J. SMITH. A combined pump and filter for benzene and similar liquids.

Brit., 8,439, Apr. 3, 1914. DRAKES, LTD., and A. WALKER. Screens for sifting granulated substances such as coke and coal.

Ger., 282,649, Apr. 29, 1913. GASMOTORENFABRIK DEUTZ. Conducting hot gases with the aid of an injector operated by a portion of the gas under pressure.

Ger., 283,077, July 28, 1914. Addition to 266,836. W. C. HERAEUS, G. M. B. H. Temperature regulator.

Ger., 283,123, Mar. 19, 1914. E. MÜLLENBACH. App. for separating stones from clay, loam, or the like.

Ger., 283,467, Feb. 3, 1914. J. VON KOWALSKI-WIERUBS. App. designed to be used in subjecting liquids to the action of ultraviolet rays while in a state of agitation.

Ger., 283,469, May 1, 1914. F. REDTEL. Operation of a clarifying tank.

Ger., 283,483, Apr. 10, 1914. A. BLOHM. App. for equalizing pressure differences in tube systems through which gaseous, vapor, or liquid substances flow.

Ger., 283,732, Feb. 17, 1914. L. GÜMBEL. Process and app. for measuring the viscosity of liquids.

Ger., 283,823, June 18, 1914. W. MEYER. App. for the continuous dehydration of peat, sea slimes, and the like.

Ger., 283,921, May 6, 1914. F. JÜNGST. App. for dressing finely powdered ores, fine coal, or the like, by delivering the pulverulent material onto the surface of a moving liquid.

2. GENERAL AND PHYSICAL CHEMISTRY.

WILLIAM D. HARKINS.

Assistants: E. B. MILLARD and A. B. CARTER.

Joseph A. Holmes. V. H. MANNING. *J. Ind. Eng. Chem.* 7, 712-5(1915).—An obituary. ISADOR MILLER.

Constitution of matter and the evolution of the elements. E. RUTHERFORD. *Pop. Sci. Monthly* 87, 105-42(1915).—An exceedingly interesting popular lecture in which the following topics are treated: Crystal structure (Bragg's work), spectra of gases, electron theory, unit charge of electricity, detn. of Avogadro's number, C. T. R. Wilson's work on the paths of atoms and electrons, radioactive evolution of the elements, the "nucleus-atom" theory of at. structure ("Rutherford atom"), nuclear charges, Mosley's X-ray spectra, radioactive elements and the periodic system, and the distribution of electrons in the atom. While no new work is recorded, the paper is an excellent review of the whole subject of atomic constitution. E. B. MILLARD.

Preparation of anhydrous solids. W. R. G. ATKINS AND E. G. WILSON. *J. Chem. Soc.* 107, 916-8(1915); see *C. A.* 9, 1569. E. B. MILLARD.

Topic parameters and morphotropic relationships. WM. BARLOW AND W. J. POPE. Cambridge. *Phil. Mag.* 29, 745-9(1915).—Topic parameters have no significance in the description of morphotropy. The usual illustration of the function of the parameters in the variation from cubic NH_4I to tetragonal NMe_4I , in which one dimension remains unchanged, is erroneous, because the indices chosen for the description, (100) and (111), are not the simplest. When (110) and (101) are used the latter salt is pseudo-cubic and the three topic parameters undergo equal change. A table is given to show that alkyl substitution in NH_4 salts gives pseudo-cubic forms.

G. L. WENDT.

Construction of cubic crystals with theoretical atoms. A. C. CREHORE. Columbia Univ. *Phil. Mag.* 29, 750-75(1915).—Mathematical. G. L. WENDT.

Enantiomorphism of molecular and crystal structure. W. BARLOW AND W. J. POPE. *J. Chem. Soc.* 107, 700-2(1915); cf. *C. A.* 8, 3523.—Barker and Marsh (*C. A.* 8, 3897) have made the statements: "Any assemblage of points possessing no other screw axes save diagonal can only be endowed with optical activity providing the points themselves (that is, the mols.) are enantiomorphous," and that in the case of enantiomorphous grouping of non-enantiomorphous mols., "the arrangement of mols. must possess screw axes of symmetry." The first statement is untrue, for the system may be a complex one in which a number of different point spirals having a common axis are found interpenetrating. Sohncke, many years ago, stated that a number of interpenetrating point systems must be taken to represent the crystal structure in some cases, and the justice of the same assumption by B. and P. has been demonstrated by X-ray methods. If the second statement of B. and M. (above) implies that the existence of these axes is a geometrical necessity in all such cases, it is incorrect, for an enantiomorphous arrangement of non-enantiomorphous mols. is geometrically possible in any one of the 65 types of homogeneous arrangement discriminated by Sohncke. If the enantiomorphism of a crystal structure and the consequent optical activity are entirely traceable to an arrangement of points (centers of force) located by coincident movements

about screw axes, the configuration of a single component mol. is not enantiomorphous. This is in direct contradiction to Barker and Marsh. E. B. MILLARD.

Regular intergrowths of barium bromate crystals. G. AMINOFF. Stockholm. *Centr. Min. Geol.* 1915, 163-70.—Extensive crystallographic measurements were made on apparently twinned crystals of $\text{Ba}(\text{BrO}_3)_2 \cdot \text{H}_2\text{O}$. True twinning could not be established, the crystals being regular intergrowths with a parallelism of certain faces and approximate parallelism of important zones. E. T. WHERRY.

Optical rotatory power in lithium sulfate monohydrate. A. JOHNSON. Kiel. *Centr. Min. Geol.* 1915, 233-43.—A method of prepg. large homogeneous crystals is first described; it consists of immersion of nuclei in a satd. soln. in a specially constructed thermostat (figure given). The optical properties of crystals of $\text{Li}_2\text{SO}_4 \cdot \text{H}_2\text{O}$ thus prepd. were studied in detail and the mean rotatory power per mm. detd. was $\alpha_D = 1^\circ 48' = 39'$. The crystals are monoclinic-hemimorphic; those which have the analogous pole of their pyroelectricity to the right are dextrorotatory, the others levorotatory. E. T. WHERRY.

Valence volume theory. T. V. BARKER. *J. Chem. Soc.* 107, 744-73(1915).—The paper is a critical exam. of the Barlow and Pope theory. LeBas' interpretation of Kraft's work (*C. A.* 1, 1118) has been shown (*C. A.* 8, 3523) to have no conclusive bearing on the subject of valence volumes. The alleged evidence which has been collected to support the theory is examd. from the crystallographic point of view, and B. concludes that "the data derived from angular measurements of crystals afford no ground for supposing that the theory is in accordance with the facts, and that the apparently satisfactory results obtained by the authors of the theory and their followers have been due to the subsequent application to the observed data of arithmetical operations, which are arbitrary and inadmissible, and might have been equally used to produce similar results from quite other assumptions." In Part I the laws of valency vol. are discussed; in Part II the methods are criticized in the light of crystallographic facts; Part III is devoted to detailed analysis for individual substances. E. B. MILLARD.

New researches on metallic clouds. V. A slag containing a manganese cloud. RICHARD LORENZ. *Z. anorg. allgem. Chem.* 92, 34-6(1915).—Describes a slag containing Mn in a highly dispersed condition forming a Mn cloud. Cf. *C. A.* 9, 2490.

GEORGE W. MORRY.

The general theory of corresponding states and the thermodynamic state-equation. G. VON KAUFMANN. Cambridge. *Phil. Mag.* 30, 146-62(1915).—A general equation is developed, $(\pi + 1/\Phi^2)(\Phi - 1) = \theta$, as an algebraic reduced form of van der Waals' equation. This is applied to several cases which involve no easily recognizable critical points and an attempt is made to calculate from the state-equation the relations connecting t , p and v in a 2-phase system. G. L. WENDT.

Experimental determination of the critical constants of oxygen, nitrogen, carbon monoxide, and methane. ETORRE CARDOSO. Geneva. *Arch. sci. phys. nat.* 39, 400-2(1915); cf. *C. A.* 8, 1045, 1147, 1896.—Temps. have been measured with a pentane thermometer, which was shown to be accurate when certain precautions were taken. The purity of the gases was controlled by isotherms of compression at different temps. while the respective vols. of the 2 phases were varied within wide limits. The following values were obtained as the means of several concordant expts.: N, crit. pressure 33.65 atms., crit. temp. -144.7° ; CO 34.60 atms., -137.7° ; O 49.30 atms., -118.0° ; CH_4 45.60 atms., -82.85° . Details will be given in a future paper. E. B. MILLARD.

Densities of the coëxisting phases of methane and of carbon monoxide. ETORRE CARDOSO. Geneva. *Arch. sci. phys. nat.* 39, 403-4(1915); cf. *C. A.* 8, 1896.—The method formerly used has been perfected. Using a Kuenen stirrer in the liquid phase,

and all precautions, the crit. d. for CH_4 was found to be 0.1623 and for CO 0.3110. The values were obtained by plotting and using rectilinear diameters. Exptl. details are not given.

E. B. MILLARD.

Criticism of Gurvich's hypothesis of a physico-chemical attractive force. N. A. KOLOSOVSKII. *J. Russ. Phys. Chem. Soc.* 47, 717-23(1915).—Gurvich's hypothesis of the existence of a new physico-chem. attractive force, different from purely phys. and purely chem. forces (cf. *C. A.* 8, 2090), is of no value for a better understanding of the phenomenon of soln. Phys. attraction operates between mols., and chem. between atoms. But between what entities does the new force act? G.'s special equations for calcg. the distribution of a substance between 2 adsorbents (or solvents) are perfectly arbitrary and entirely unnecessary. His only reason for inventing a new force is the disagreement he claims to have found between his exptl. data and the values calcd. from the formulas of Nernst and Freundlich. A careful recalcn. of these data by K. shows them to agree as well with these as with G.'s equations. In carrying out these calcns. K. observed that the distribution of either BzOH or valerician acid between benzine and floridin is given by the same formula: $y = 5.38p^{0.086}$, in which p is the conc. of the adsorbed in the adsorbing substances, and y is the variable in the equations of N. and F.

H. M. GORDIN.

Negative colloidal ferric hydroxide. FRANK POWIS. *J. Chem. Soc.* 107, 818-24 (1915).—By adding colloidal Fe(OH)_3 to a dil. soln. of NaOH of suitable conc. it may be changed from positive to negative, coagulation being prevented by mixing in this order. It may also be prepd. directly as a neg. colloid by allowing the Fe(OH)_3 particles to form in the presence of a dil. soln. of NaOH . The p. d. at the surface of a colloidal particle is due to the adsorption of ions from the soln., and its sign depends on whether the cations or anions are in excess in the layers nearest the particle.

E. B. M.

Ionization of bromine solutions of iodine trichloride. V. A. PLOTNIKOV AND V. E. ROKOTYAN. *J. Russ. Phys. Chem. Soc.* 47, 723-30(1915).—In support of their former statements (*C. A.* 7, 2148), P. and R. detd. the elec. cond. of ICl_3 in Br and in $\text{CH}_2\text{ClCO}_2\text{H}$ and found that the value of the dielec. const. of a solvent has nothing to do with cond. The explanation of the cond. in the present case is similar to that given in the article referred to. Solns. of ICl_3 in CCl_4 , SiCl_4 or CHCl_3 are almost devoid of cond.

H. M. GORDIN.

Displacement of metals by zinc in solutions of their salts. M. TZENTNERSHVER AND YUL. DRUKKER. *J. Russ. Phys. Chem. Soc.* 47, 528-36(1915).—A study was made of the velocity of displacement of Cu from solns. of CuSO_4 by Zn , using the equation: $k = 2.303p(\log C - \log c)/Ft$, in which k is the velocity const., v the vol. of the soln., C the initial conc. of CuSO_4 , c its conc. at the time t , and F the total area of the Zn . The detns. were made by rotating a Zn plate of definite dimensions in solns. of CuSO_4 of different concs. and detg. from time to time the amts. of CuSO_4 left unchanged. An exam. was also made of the time interval between the moment of immersion of the Zn plate into solns. of Ni , Co and Cu salts and the first appearance of these metals on the plate. The salts used were: CuSO_4 , NiCl_2 , NiSO_4 , $\text{Ni(NO}_3)_2$, CoCl_2 , CoSO_4 , and $\text{Co(NO}_3)_2$. The results given in tables may be summarized as follows: With Cu salts Zn reacts much more readily than with those of Ni or Co . With chlorides the reaction starts much earlier than with sulfates, while with $\text{Ni(NO}_3)_2$ or $\text{Co(NO}_3)_2$ Zn does not react at all, unless the conc. is very high; even then the ppt. is not the free metal but what seems to be its hydroxide (greenish in the case of $\text{Ni(NO}_3)_2$). The passivity of Zn towards $\text{Ni(NO}_3)_2$ and $\text{Co(NO}_3)_2$ cannot be due to NO_3 ions, since in solns. of both $\text{Ni(NO}_3)_2 + \text{K}_2\text{SO}_4$ and $\text{NiSO}_4 + \text{KNO}_3$ the Ni is pptd. by Zn , though in these cases the ppt. is greenish white. The action of Zn on solns. of Ni or Co salts is accompanied by an evolution

of gas (probably H produced by the Zn-Ni or Zn-Co couple). In the case of Ni salts the liberation of gas begins much earlier than in the case of Co salts, while in solns. of Cu salts Zn causes no evolution of gas at all. Comparing the lengths of time required to start the liberation of H from acids by Zn on the one hand, and of Ni, Co or Cu on the other, it is shown that in both cases there is a period of induction which is, however, much shorter in the liberation of the metals than in that of H. This is ascribed to the resistance of the layer of dielectric on the surface of the Zn which the H must pass in changing from the ionic to the mol. condition (cf. C. A. 8, 2834). In the case of the displacement of metals by Zn there are formed on the surface of the latter "local elements" (cf. Auren and Palmaer, *Z. physik. Chem.* 45, 182) which, having a very low resistance, facilitate the electrochem. interchange of metals. H. M. GORDIN.

Freezing point diagrams of formamide with water and the aliphatic acids and their bearing on the interpretation of viscosity measurements. S. ENGLISH AND W. E. S. TURNER. *J. Chem. Soc.* 107, 774-83(1915); cf. C. A. 8, 3258.—The curve formamide-H₂O proceeded to a V-shaped eutectic at -45° and about 43 mol. % formamide. A slight disturbance in the regularity of the curve on the H₂O side indicated the existence of a compd. HCONH₂·H₂O, the stability of which was limited. The HCONH₂·HCOOH curve had the usual form corresponding to a compd., 2 side branches and a convex center portion indicating HCONH₂·HCO₂H with a m. p. of 1.1°. This compd. was analyzed, and shown to consist of 1 mol. of each substance. In the system formamide-HOAc, the existence of a compd. HCO₂NH₂·2CH₃CO₂H was indicated; in propionic acid-HCONH₂ 2 maxima were found, one at 33% propionic acid, the other at 50% propionic acid; and in *n*-butyric acid-formamide a 4-branch curve indicating 2 compds. as with propionic acid. The expts. were made with a pentane thermometer and cooling baths of ether-CO₂ or ether-liquid air. Although maxima in viscosity curves may be due to compds., their formation is not always accompanied by viscosity maxima. These curves do not appear to differentiate between 3 compds. in a mixt., or to indicate the existence of more than 1 compd. The max. deviation from the law of mixtures does not show the true compn. of a compd. in all cases; in HCONH₂·HOAc the max. deviation lies at 50 mol. %, while the compd. contains only 33 mol. % HCONH₂. E. B. M.

New method of finding the second dissociation constants of dibasic acids. ASWINI KUMAR DATTA AND NILRATAN DHAR. Calcutta. *J. Chem. Soc.* 107, 824-7 (1915).—The method is based on the fact that a soln. of a normal salt of a strong base with a dibasic acid dissolves more CO₂ than the same vol. of H₂O at that temp. In the salt soln. hydrolysis occurs; the CO₂ forms HCO₃⁻ and H₂O. If *a* is the concn. of CO₂ dissolved in a given amt. of H₂O and *s* the concn. of CO₂ in a salt soln. of concn. *c*, the concn. of excess CO₂ = concn. HCO₃⁻ = concn. HX⁻, the concn. of the neg. radical of the salt = *c* - 2(*s* - *a*), and the second dissociation const. of the acid is, therefore, (assuming the H₂CO₃ to be a monobasic acid, and that the salt is 100% dissociated) $[H^+][X^-]/[HX] = \{a \times 3 \times 10^{-7}[c - 2(s - a)]\}/(s - a)^2 = K$. From expts. on several acids, the values for the second H⁺ were obtained as follows: tartaric acid 69.0, succinic 2.9, malonic 1.36, oxalic 31.0, fumaric 26.9, malic 9.03, phthalic acid 1.82. The values are for $K \times 10^8$ at about 25°, after correction for the degree of dissociation. E. B. MILLARD.

Electromotive forces in alcohol. VI. Absolute potentials by the capillary electrometer. EDGAR NEWBERRY. *J. Chem. Soc.* 107, 852-7(1915); cf. C. A. 9, 1000.—The unsatisfactory dropping electrode was replaced by a capillary electrometer in this series of expts. From 200 sets of data, 21 were selected as the most uniform, of which the mean was 0.483 volts for the potential for max. surface tension of Hg in a satd. alc. soln. of NaCl at 20°. The absolute potential of Hg in a satd. aq. soln. of NaCl at 20° was 0.481 v., a mean of 6 series selected from 50. In *N* aq. NaCl the value was 0.531 v.

and in 0.1 *N* 0.580 v. The temp. coeff. was +0.0008 v. per degree in 0.1 *N*, +0.0006 v. in *N*, and +0.0004 v. per degree in satd. aq. NaCl at 20°. These expts., and a similar series with NH₄Cl furnish strong support for Lapworth's theory that the abs. potential of a metal in a satd. soln. of a given salt is the same whether the solvent be H₂O or some other liquid, provided each ion involved has the same affinity for water as for the other solvent. The satd. soln. potentials are at least of the right order demanded by theoretical considerations, and are more reliable than the dropping-electrode values.

E. B. MILLARD.

Some aspects of the theory of acids. A. LAPWORTH. *J. Chem. Soc.* 107, 857-68 (1915); cf. Newbery, preceding abst.—During some of the most remarkable changes in activity which an acid undergoes (on account of changes in the medium or the addition of substances of a basic character), the parallelism between catalytic activity and the power of forming salts with weak bases is complete (so far as the ionized part of the acid is concerned). Two solns. may be regarded as being equal in "acidness" when they affect a given weak base under fixed conditions in the same manner and to the same extent. Two solns. are equally "acidic" with regard to the non-ionized acid when the thermodynamic potential of the non-ionized acid is the same in the 2 solns., and equally "acidic with respect to H ions" when the thermodynamic potentials of these ions are identical in the solns. The fact that the transference numbers of Na⁺, NH₄⁺, K⁺, Ag⁺, NO₃⁻, Cl⁻, etc., are the same in alc. as in H₂O, indicates either that the ions have no affinity for either solvent or that the affinities are approx. the same for both solvents. If this is true, the single potential differences between Hg and solns. satd. with both HgCl and NaCl should be the same in alc. and aq. solns., as found by Newbery. The transference number of H⁺ ion in alc. soln. at 25° has been detd. in the app. in Ostwald-Luther (3rd ed., p. 504), using a copper coulometer and analyzing only the cathode side. From the mean of 4 expts. at 0.1110 *N* and 1 at 0.8360 *N*, the value 0.31 was given. The individual values varied from 0.32 to 0.29. From a similar series in which the analysis was made from conductivity, 0.37 was obtained. The value for Li ion in abs. alc. at 25° was found to be 0.63 in 0.2 *N* and 0.65 in 0.04 *N* LiCl.

E. B. MILLARD.

Diffusion of gases at low pressures made visible by color effects. C. T. KNIPP. *Science* 42, 93-4 (1915).—If a very small quantity of illuminating gas is introduced into one end of a long discharge tube contg. a Geissler vacuum during discharge, a greenish white color appears at once. The color diffuses slowly toward the other end, becoming paler as it progresses. At the end of 3 or 4 min. the color throughout is grayish. The reverse expt., the diffusion of air into the illuminating gas at low pressure, may be shown immediately in the same app. (without removing the H₂O vapor, etc., formed) by adding a very small quantity of air at low pressure. The resulting orange-red color characteristic of air, with its slow diffusion through the gray tint of the illuminating gas, is readily seen.

E. B. MILLARD.

Binary and ternary systems of the nitrates of the alkali and alkaline earth metals. W. D. HARKINS AND G. L. CLARK. *J. Am. Chem. Soc.* 37, 1816-28 (1915).—F. ps. of 81 mixtures of NaNO₃, KNO₃ and Ba(NO₃)₂ have been detd. in an app. similar to that of Menzies and Dutt with some added refinements. Twelve detns. in the system NaNO₃-KNO₃-Sr(NO₃)₂, 11 in the system KNO₃-LiNO₃, and 8 in the system KNO₃-LiNO₃-Ba(NO₃)₂ have also been made. Temps. up to 250° were measured with a Gerhardt Hg thermometer, from 250 to 350° with a N-filled Hg thermometer, and above 350° with a Pt resistance thermometer which was used to calibrate the other instruments. The f. p. of Ba(NO₃)₂ was accurately detd. as 595.53°. The usual triangular diagrams have been drawn, together with plane figures for temp.-compn.

E. B. MILLARD.

Relation between the diagrams of fusion and viscosity of binary systems. I. KURNAKOV, D. KROTKOV AND M. OKSMAN. *J. Russ. Phys. Chem. Soc.* 47, 558-88 (1915).—A comparison was made between the diagram of fusion and that of viscosity of each of the following binary systems: $C_{10}H_8$ and $PhNO_2$, $m-C_6H_4(NO_2)_2$ or $1,3,5-C_6H_3(NO_2)_3$; $SbCl_3$ and C_6H_6 , $C_{10}H_8$, Ph_3CH_2 or Ph_3CH ; $SbBr_3$ and Ph_3CH , Ph_3CO , toluene or $PhNH_2$. The viscosity diagrams were detd. by the authors, while the fusion diagrams were taken from the literature. The results, given in numerous tables and curves, may thus be summarized: The definite compds. of $C_{10}H_8$ with the NO_2 derivs. of C_6H_6 are capable of existence in solid condition only, being more or less completely decompd. when liquefied. Hence their formation is revealed on the fusion diagrams, but not on the viscosity diagrams, while in the liquid systems of the Sb halides the interaction of the components is shown on both the fusion and the viscosity diagrams. In these systems there is an intimate relation between the max. on the viscosity diagrams and the dystectic point on the corresponding fusion diagrams. The viscosity diagrams of these systems reveal very readily the existence of compds. of irrational type whose max. are gradually displaced towards the rational ordinate by lowering the temp., while raising the temp. has the opposite effect. This is ascribed to partial dissociation of the rational compds. by heat. In the system $SbBr_3-Ph_3CH$ the viscosity diagram reveals the existence of a compd. $SbBr_3 \cdot CHPh_3$, which is not shown on the fusion diagram at all. This is probably due to the very viscous $SbBr_3$, being unfavorable to the crystn. of the compd. H. M. GORDIN.

Application of the conception of expansibility tension to the theory of hydrates. L. GAY. *J. chim. phys.* 13, 33-51(1915); cf. *C. A.* 8, 853; 9, 985.—G. discusses "expansibility" again, and applies it to a mathematical discussion of the equil. of 2 hydrates, and the stability of a hydrate. E. B. MILLARD.

Effect of temperature on the heat evolved in certain reactions. J. W. MELLOR. *J. chim. phys.* 13, 52-4(1915).—In addition to the type of reaction which is endothermic at low temps. and exothermic at higher temps., another type is possible, in which the change is from exo- to endothermic. Thus, if a polyatomic substance dissociated in stages $A_n \rightarrow A_{n-2} \rightarrow A_{n-4}$, etc., reacted with a diatomic substance or another one which also dissociated in stages, the heats of formation of the compd. at higher and higher temps. might change sign. No example has been given E. B. MILLARD.

Heat of formation and polymerization of some oxides and determination of the heat of combustion of water by fusion with sodium peroxide. W. G. MIXTER. *Am. J. Sci.* 40, 23-32(1915); cf. *C. A.* 9, 1437.—Pptd. $CaSO_4 \cdot 2H_2O$ was mixed with S and Na_2O_2 , and the heat effect on fusion detd. CaO gives no heat effect on fusion with Na_2O_2 ; the other effects were computed from existing data. The heat of combination of $CaSO_4$ with $2H_2O$ was found to be 4800 cal.; for $MgO + H_2O$, 9400 cal. The statement (*C. A.* 7, 2888) that the heat effect of each of the 3 atoms of O in Fe_2O_3 is the same has been modified. Part of the heat of formation of Fe_2O_3 at high temps. is due to the formation of complex mols., so that the heat effect of the third O is considerably less than that of the first one. For the heat of condensation of TiO_2 on ignition the value 3000 cal. was found. TiO_2 contg. 2.2% H_2O evolves between 3 and 6 Cal. on ignition. SiO_2 polymerizes at high temps. with little heat effect. If the hydroxide is regarded as formed by the union of H_2O with unpolymerized mols., the following values may be derived: $ZnO + H_2O = 2.4$ Cal., $MnO + H_2O = 4.0$ Cal., $FeO + H_2O = 4.0$ Cal., $CdO + H_2O = 8.7$ Cal. (approx.). The first values may be too low since the heats of formation of the oxides may include a small heat effect due to polymerization at high temps. E. B. MILLARD.

Changes of phase under pressure. II. New melting curves, with a general thermodynamic discussion of melting. P. W. BRIDGMAN. *Phys. Rev.* 6, 1-33(1915); cf. *C. A.* 8, 2295.—Details are given of new expts. on CHBr_3 , SiCl_4 , $\text{C}_6\text{H}_5\text{Cl}$, $\text{C}_6\text{H}_4\text{Br}$, benzophenone, *p*-nitrophenol, *p*-toluidine and Me oxalate. In most cases the m. p., compressibility, dr/dP , latent heat of melting and change of energy have been calcd. for each 1000 kg. per sq. cm. up to 8000 kg. Diagrams showing the relation of pressure to temp., and to ΔV have been drawn. The same data have been taken on Bi up to 12000 kg. per sq. cm. The following substances were examd. for new solid forms without result: Menthol, anethole, C_{10}H_8 , acetophenone, and SbI_3 , though some melting data were collected. The work on Na has been recalcd. for new values of ΔH and ΔE . The thermodynamic discussion is to appear in the next installment of the paper.

E. B. MILLARD.

Mechanism of the chemical action of electrical discharges. Role of ionization. E. BRINER. *J. chim. phys.* 13, 18-32(1915); cf. *C. A.* 9, 880.—Using the same app. as before, but adding a pair of auxilliary electrodes connected to a Wulf electrometer to measure ionization, the combination of N with H or O has been investigated. As before, the % NH_3 was a max. at 100 mm. pressure. The action of the discharge may be thermal, elec. or photochem., but the latter effect was absent in the fixation of N. From these expts. B. concludes that the action of the arc is almost entirely thermal in nature, not ionic. The heat of formation of NH_3 from the atoms was calc. to be 300 cal.

E. B. MILLARD.

Application of integral equations to the theory of electrolysis. KURT SCHELLENBERG. *Ann. Physik* 47, 81-127(1915).—Wholly mathematical.

E. B. MILLARD.

The influence of silent electric discharge upon mixtures of hydrogen and nitrogen. M. LE BLANC. Univ. Leipzig. *Ver. K. Sach. Wiss. Leipzig* 66, 38-63(1914).—The amt. of NH_3 formed by the elec. discharge through H and N depends upon the size of the discharge tube, c. d., H residue, and frequency of exciting current, and is an extremely complicated function of these variables. The chem. reaction does not obey the law of mass action. Cf. *C. A.* 8, 3520.

PAUL D. FOOTE.

Kinetics of chemical reactions. XI. E. I. ORLOV. *J. Russ. Phys. Chem. Soc.* 47, 624-41(1915).—It was shown in a series of former articles on this subject that the usual equation for monomol. reactions must be modified whenever secondary reactions influence the progress of the main reaction. A case in point is esterification in presence of acid catalyzers. In most cases of esterification under such conditions the secondary reaction consists in the liberated H_2O uniting with some of the H ions of the catalyzer to form unstable H_2O mols., while in other cases it may have a more complex nature. The modified equation to be used will, therefore, depend upon the character of the secondary reaction. In the light of these considerations, O. examd. the investigations of Kailan (*C. A.* 8, 607, 2701), Nernst and Homan (*Z. physik. Chem.* 71, 379) and Zal'kind and Pishchikov (*C. A.* 9, 2067) and found that his equations give much more concordant values for the velocity consts. than the equation used by these authors. As an example of a secondary reaction of a complex nature the esterification of malic acid in presence of HCl as catalyzer (K., l. c.) may be mentioned. Here there are 3 reactions involved: formation of ester, substitution of Cl for OH, and regeneration of HCl with formation of $(:\text{CHCO}_2\text{R})_2$. Something similar takes place in the decomp. of bromosuccinic acid (Muller, *Z. physik. Chem.* 41, 483) where both ions of the liberated HBr enter into reaction with the fumaric acid produced. Numerous tables and calcs. illustrate the article.

H. M. G.

The kinetics of photochemical reactions and the law of radiation. A. SCHIDLOV. Genève. *Arch. sci. phys. nat.* 38, 97-112(1914).—It is postulated that in a photo-

chem. reaction the exciting radiation acts only on certain mols. which are the resonators. If a mol. of this kind goes from a modification without the power of resonance to a modification possessing this property, the energy absorbed in the transformation is a definite known function of the frequency of the exciting radiation. Further, the velocity of the photochem. reaction for each kind of active mol. is a function of the frequency and the mean energy of the resonator. With these assumptions the radiation laws, such as Planck's, and the equation of photochem. equil. are derived. The paper makes use of the quantum theory of emission, and the involved mathematic development does not permit a satisfactory abstract.

PAUL D. FOOTE.

The halogen-oxygen compounds. IX. Kinetics of the bromate-bromide reaction. A. SKRABAL AND S. R. WEBERITSCH. *Monatsh.* 36, 211-35(1915); cf. *C. A.* 8, 1533, 3736; 9, 996; and following abstr.—The kinetics of the reaction $\text{BrO}_3^- + 5\text{Br}^- + 6\text{H}^+ = 3\text{Br}_2 + 3\text{H}_2\text{O}$ was investigated by several methods. It was shown that (1) the velocity is proportional to the first power of BrO_3^- and Br^- and to the second power of H^+ ion concn.; (2) the velocity constant for 25° is of the order of magnitude of 200; (3) the temp. coeff. is 2; (4) Cl^- ion accelerates the reaction. The laws governing the temp. coeffs. given in Part VIII were proven for the general halogen reaction: $\text{XO}_3^- + 6\text{Y}^- + 6\text{H}^+ = \text{X}^- + 3\text{Y}_2 + 3\text{H}_2\text{O}$.

E. SCHRAMM.

Halogen-oxygen compounds. X. Kinetics of the formation of bromates from bromine. ANTON SKRABAL AND S. R. WEBERITSCH. *Monatsh.* 36, 237-56(1915); cf. preceding abstr.—The kinetics of the reactions $3\text{Br}_2 + 6\text{OH}^- = 8\text{Br}^- + 3\text{H}_2\text{O} + \text{BrO}_3^-$ and $3\text{Br}_2 + 6\text{OH}^- = 5\text{Br}^- + \text{BrO}_3^- + 3\text{H}_2\text{O}$ have been investigated. The velocity of bromate formation increased with the concn. of Br_2 and of OH^- and decreased with increasing concn. of Br^- . Values of the exponent of conc. varied with the speed of the reaction. Neutral salts retarded the reaction. The following relations also appeared probable: $-d(\text{Br}_2)/dt = k_1(\text{OH}^-)(\text{Br}_2)^{1/2}/(\text{Br}^-)^2$, or $-d(\text{Br}_2)/dt = k_1'(\text{OH}^-)(\text{Br}_2)/(\text{Br}_2)^2$ for the rapid reaction and for the slow reaction $-d(\text{Br}_2)/dt = k_2(\text{OH}^-)^4(\text{Br}_2)^{1/2}/(\text{Br}^-)^2$, or $-d(\text{Br}_2)/dt = k_2'(\text{OH}^-)^4(\text{Br}_2)^2/(\text{Br}^-)^4$. The temp. coeff. of the slower reaction in a monophosphate-biphosphate soln. was of the order of 17. From the velocity of the rapid reaction and that of $\text{HBrO} + \text{OH}^- = \text{BrO}_3^-$ the equil. Br -hypobromite can be calcd., and from the slower reaction and $\text{BrO}_3^- + \text{Br}^- + \text{H}^+ = \text{Br}_2$ the Br - BrO_3 equil. can be calcd.

E. B. MILLARD.

Energy exchange during photochemical processes in gases. V. Absorption of ultraviolet radiation by oxygen. E. WARBURG. *Sitzb. kgl. preuss. Akad.* 1915, 230-42; cf. *C. A.* 8, 613.—The previous work has been extended. The absorption of ultraviolet radiation by O depends on the pressure and wave length, since the deviation from Einstein's law of equivalents was found to be greater in the ozonization of O by $\lambda = 0.209 \mu$ than for $\lambda = 0.253 \mu$. Expts. were made on 95% O_2 for both of these wave lengths from $p = 27.5$ to $p = 392.5$ kg. per sq. cm. Neither the law of Beer nor that of Liveing and Dewar was satisfied, though the deviations were greater for Beer's law.

E. B. MILLARD.

Modern pyrometry. R. S. WHIPPLE. *J. Gas Lighting* 130, 635(1915).—A review.

E. J. C.

Estimation of high temperatures by the method of color identity. C. C. PATERSON AND B. P. DUDDING. *Phil. Mag.* 30, 34-63(1915); see *C. A.* 9, 1869.

G. L. WENDT.

The specific heat (c_p) of superheated steam for pressures of eight to ten atmospheres and at saturation temperatures to 380° . O. KNOBLAUCH AND A. WINKLER. *Z. Ver. deut. Ing.* 59, 376-9, 400-5(1915).—The manner of conducting the test and the arrangement of app. used in the detn. were the same as described in *C. A.* 8, 610. The

detn. with steam passing through the app. is supplemented by a detn. made without steam passing; by this means the fraction of energy lost by radiation and conduction, while superheating the steam, is detd. The exptl. data obtained are recorded in the form of curves and tables. The results confirm the previously found data (*loc. cit.*) that c_p increases with increasing pressures, and in the case of increasing temps. above satn. pt. at first decreases, then later increases. The c_p isobars for 2 to 8 atms. in the proximity of satn. temps. are low in comparison with those previously published.

H. R. GUNDLACH

Pole effects in the iron arc. C. E. ST. JOHN AND H. D. BABCOCK. *Proc. Nat. Acad.* 1, 295-8(1915); cf. C. A. 9, 1424.—The pole effect for several lines grouped near λ 4085.14, λ 4766.41, λ 5528.14 and λ 6350, and the pressure shift per atm. have been detd. The pressure displacements varied as the cube of λ , but there was no apparent relation between λ and the pole effect. Emphasis has been placed upon the necessity of considering the pole effect in the redetn. of the wave lengths in international units. The wave lengths of these sensitive lines are not affected by a wide variation of density of the radiating vapor nor by changes of temp. over the range 2100 to 2600°. For the lines considered the pole effect does not occur *in vacuo*, and in so far appears independent of elec. conditions. Unless the pressure changes in certain definite ways with the wave length, the pole effect cannot be explained as a pressure effect.

E. B. MILLARD.

The quantum theory of radiation and line spectra. WM. WILSON. Univ. London. *Phil. Mag.* 29, 795-802(1915); cf. C. A. 8, 1535.

G. L. WENDT.

The principal series in the spectra of the alkali metals. W. M. WATTS. *Phil. Mag.* 29, 775-83(1915).—A comparison of the values from various formulas with observations.

G. L. WENDT.

Measurements of the spark spectra of the platinum metals: ruthenium, rhodium, palladium, iridium and platinum in the extreme ultraviolet. GUSTAV KAIL. *Sitzb. K. Akad. Wiss. Wien* 123, II A, June, 1914, 36 pp.—By the aid of known lines a dispersion curve was prepd. for the quartz spectrograph used. The shortest wave lengths measured for the Pt metals were as follows: Ru 1874.94 Å, Pt 1866.46 Å, Pd 1858.51 Å, Ir 1852.21 Å. A total of 1071 lines, of which 690 were previously unknown, has been measured.

E. B. MILLARD.

Application of interference methods to the study of the origin of certain spectrum lines. T. R. MERTON. *Proc. Roy. Soc. London (A)* 91, 421-31(1915).—In the case of radiations produced at low pressures, the limiting order of interference at which fringes may still be visible is given by the relation $N = K\sqrt{M/T}$, where N is the limiting order of interference, K a const., M the at. wt. of the luminous particle, and T the abs. temp. A convergent beam of light was thrown on the plates of a Fabry and Perot sliding interferometer and the ring systems were focused by means of an achromatic lens on to the slit of a large Hilger constant deviation spectroscope, each line thus appearing as a narrow strip of a ring system. The interferometer plates were slowly separated until a point was reached at which the fringes were just visible. From the separation of the plates at this point the value of N could be calcd. The value adopted for K was 1.22×10^4 (cf. Buisson and Fabry, *J. physique* 2, 442(1912)). Expts. on the g , H and K lines of Ca were not satisfactory, but a value of $N_{\text{Ca}} = 189259$ was obtained, from which $T = 1662^\circ$ abs., a value which appears to be too low for the temp. of the vacuum arc. From the H line, $T = 3100^\circ$ abs., which seems to show that in the g line M should be 80, i. e., the Ca_2 mol., while the H line is due to Ca atoms. The Sr lines λ 4607 and λ 5535 are strictly analogous to the g line of Ca. For λ 4606 (Sr), fringes were observed which, if due to Sr atoms, would give 834° as an upper limit for the temp. of the Sr arc. The molecules must be concerned in the production of this

radiation and of λ 5535. The red spectrum of A, for λ 4511, gave fringes corresponding to $T = 335^\circ$ abs., and the blue spectrum (excited by a rather weak condensed discharge) gave $T = 7400^\circ$ abs., an inadmissible value. E. B. MILLARD.

Band spectrum associated with helium. J. W. NICHOLSON. *Proc. Roy. Soc. London (A)* 91, 432-9(1915); cf. Fowler, *C. A.* 9, 1426.—In the He spectrum the approx. superposition of 2 series with the same limit but with very different modes of convergence among their coeffs. appears to be the cause of the unusual character of the doublet separations. A formula of the proper generalized Rydberg type has been calcd. from the first 4 lines of a rather simple series which gives a limit almost exactly that obtained by Fowler from the simple series, which he concluded must be nearly correct. The paper gives further support to Fowler's conclusions that the heads of the bands in the band spectrum of Goldstein and Curtis follow ordinary line-series laws, by showing that the doublet separations tend to zero at the limit of the series. Both the doublet series isolated by Fowler are strictly analogous to principal series in line spectra. The generalized Rydberg formula gives the most suitable representation of these series as well as of line series. E. B. MILLARD.

Enhanced series of lines in spectra of the alkaline earths. W. M. HICKS. *Proc. Roy. Soc. London (A)* 91, 451-63(1915). E. B. MILLARD.

Extension of the spectrum beyond the Schumann region. THEODORE LYMAN. *Proc. Nat. Acad.* 1, 368-71(1915).—By using a vacuum spectroscope contg. a concave diffraction grating arranged in such a manner that the light path from the source to the plate was wholly in gas, and using purified He at 3 mm. pressure, the spectrum has been extended from Schumann's limit of λ 1230 Å to λ 600 Å. Expts. on H established the line at 1216 Å which forms the first member of series predicted by Ritz, and the next 2 members of this series, λ 1026 and λ 972 Å. The region between λ 600 and X-rays (λ about 1 Å according to Bragg) is still to be explored; the present app. seems adapted for part of the region at least. E. B. MILLARD.

Dissociation spectra in the visible region and in the ultraviolet. II. Ultimate rays in general. A. DE GRAMONT. *Ann. chim.* 3, 269-87(1915); cf. *C. A.* 3, 2900. E. B. MILLARD.

Cathodic phosphorescence of scheelite and alumina. C. DE ROEDEN. *Ann. chim.* 3, 338-66(1915); see *C. A.* 9, 43. E. B. MILLARD.

Rotatory power. J. MINGUIN. *Ann. chim.* 3, 367-94(1915); cf. *C. A.* 8, 3036, 3288.—Report on a large number of expts. on rotatory power in homologous series, influence of the solvent, etc. The paper is a résumé of work which has already been published. E. B. MILLARD.

The number of electrons concerned in metallic conduction. G. H. LIVENS. Sheffield. *Phil. Mag.* 30, 105-12(1915).—A mathematical paper showing H. A. Wilson's theory (*C. A.* 5, 2463) to be inadequate. G. L. WENDT.

Frictional electricity on insulators and metals. W. M. JONES. Univ. Wales. *Phil. Mag.* 29, 261-74(1915).—Evidence is given that frictional electricity is an effect of a different order from that of contact electricity. Exptl. results are in fairly good agreement with the hypothesis that the rubbing friction has the effect of removing electrons from either the rubber or the specimen rubbed at a rate proportional to the rate of rubbing. It is shown that on this theory the frictional electricity reaches a const. max. value when the generation of charge is compensated by the leakage. A. T. CAMERON.

Conduction of electricity through metals. J. J. THOMSON. *Phil. Mag.* 30, 192-202(1915).—If atoms contain electrical doublets which, under the action of an electrical force, tend to arrange themselves so that their axes fall in a polarized line, conduc-

tion takes place when the electrical forces of the polarized atoms can abstract electrons from any atom and pass them on to its neighbor, and so form a chain. The polarized state is easily broken down by the rotation of the atoms. But at very low temps., where the kinetic energy of the atoms is very low, the polarized state persists after the electric or magnetic exciter is removed, and the current may continue indefinitely, as has been found experimentally at the temp. of liquid He by K. Onnes (*C. A.* 8, 2294, 3264). G. L. WENDT.

Energy of a moving electron. LEIGH PAGE. *Am. J. Sci.* 40, 116-28(1915); cf. *C. A.* 8, 3256.—The energy of a Lorentz electron moving with const. velocity has been calcd. by 3 different methods, and the expressions for this energy have been compared. The first method consists in finding the elec. and magnetic energies of the electron's field; the second consists in subjecting an electron which is at rest relative to the observer to an infinitesimal force for an infinite time. In this way a finite velocity is imparted to the electron without any finite radiation of energy; hence the sum of the initial electrostatic energy of the electron, the work done by the force in accelerating it and the work done by the ether pressure in producing the progressive contraction of the electron as its velocity relative to the observer increases, gives the energy of the electron. Starting with an uncharged moving electron, an infinite number of shells of infinite radius, each carrying an infinitesimal charge, are shrunk down to the radius of the electron, and the energy calcd. from the sum of this work and that done in maintaining the velocity of the spheres. This work was found to be equal to that of the magnetic energy of the field, but to differ from the expression for the kinetic energy peculiar to Einstein's relativity dynamics. E. B. MILLARD.

An atomic model with a magnetic core. H. S. ALLEN. King's Coll., London. *Phil. Mag.* 29, 714-24(1915).—An at. model is suggested consisting of a ring or rings of electrons surrounding a central core, having a radius considerably greater than the nucleus of the Rutherford atom and in consequence capable of producing appreciable magnetic forces in its vicinity. The total charge of the core must be equal to Ne , where N is the at. number. The magnetic moment of the core arises from the orbital motion of the discrete electrified particles (α particles, β particles, H nuclei or positive electrons) of which it is composed. The diamagnetic properties of the atom arise mainly from the external electrons revolving in orbits whose radius is of the order 10^{-8} cm. The magneton is regarded not as an independent entity, but as a unit convenient for measuring magnetic moments introduced in consequence of the principle of the constancy of angular momentum. A. T. CAMERON.

Negative thermionic currents from tungsten. K. K. SMITH. Princeton Univ. *Phil. Mag.* 29, 802-22(1915).—There is a marked increase in the current after the filament has been heated for some time above 2700° K. in a good vacuum, owing to the removal of oxides and impurities from the surface. The state then attained is permanent unless gas is liberated inside the lamp from excessive heating or water vapor is introduced. The formula $i = aT^{1/2}e^{b/T}$, where i is the satn. current, and a and b are consts., is shown to hold for values of T from 1050° K. to 2300° K., giving a variation in i of 10^{12} . G. L. WENDT.

A new type of ion in the air. J. A. POLLOCK. Univ. Sydney. *Phil. Mag.* 29, 636-46(1915).—A description is given of certain characteristics of an ion in the air with a mobility intermediate between that of the small gas ion and that of the large ion of Langevin. The mobility is found to depend on the water-vapor pressure rather than on the relative humidity. Both the intermediate and large ions exist in the air at the same time provided the vapor pressure is below 17 mm. Above this pressure only the large ions are found. It seems probable that the intermediate ion consists of a rigid nucleus enveloped by a dense atm. of water vapor. The mass of the ion becomes

greater as the vapor pressure increases until at a critical pressure the adsorbed fluid assumes the liquid state, and the aggregation develops, by the rapid condensation which ensues, into the large ion of Langevin. The intermediate and large ions thus appear to form a striking illustration of Trouton's discovery (*C. A.* 2, 11) of the 2 modes of condensation of water vapor on rigid surfaces. A. T. CAMERON.

The larger ions in the air. J. A. POLLOCK. Univ. Sydney. *Nature* 95, 286-8 (1915); cf. *C. A.* 9, 1430 and preceding abstr. W. H. ROSS.

Remarks regarding the series spectrum of hydrogen and the constitution of the atom. L. VEGARD. Univ. Christiania. *Phil. Mag.* 29, 651-5(1915).—By a modification of Allen's reasoning (*C. A.* 9, 753) a similar result is obtained which allows a const. difference of momentum to be maintained between the outer and inner systems of the atom. A. T. CAMERON.

Radiation from an electric source and line spectra. The hydrogen series. I. SILBERSTEIN. Univ. Rome. *Phil. Mag.* 29, 709-14(1915). A. T. CAMERON.

Substances possessing anomalous dispersion and molecular rotatory power. II. Verification of the theories of light propagation in active absorbing media. G. BRUHAT. *Ann. phys.* 3, 417-89(1915); cf. *C. A.* 9, 2178.—Theoretical. E. B. M.

Correction of the Curie-Langevin law of magnetization for molecular distances. E. A. HOLM. *Ann. Physik* 47, 1-48(1915).—Theoretical. An expression for the mean kinetic energy of a gas mol. in a magnetic field at the moment of impact has been derived and introduced into the Maxwell distribution law. Assuming the approximate expression of O. E. Meyer for the mean free path corresponding to a given velocity, a correction term has been computed for the Curie-Langevin law which is a function of the mean free path, both moments of inertia, and the mass of the mol. The mathematical treatment cannot be briefly abstracted. E. B. MILLARD.

Magnetostriction and resistance of iron and nickel. C. W. HEAPS. *Phys. Rev.* 6, 34-42(1915). E. B. MILLARD.

Emulsification and detergent action (SHORTER) 27. Gaseous combustion at high pressure (BONE) 21. Steric influence, static and dynamic (DAVIS) 10.

3. RADIOACTIVITY.

WILLIAM H. ROSS.

The variation with meteorological conditions of the amount of radium emanation in the atmosphere, in the soil gas, and in the air exhaled from the surface of the ground at Manila. J. R. WRIGHT AND O. F. SMITH. *Physic. Rev.* [2] 5, 459-82(1915).—Using the method of absorption by coconut charcoal the Ra Em content of the air was detd. by comparison with the Ra Em furnished by a standard Ra soln. for a period of 13 months. The mean value in g. of Ra equiv. to the Em per cu. m. is 71.0×10^{-12} , with a max. in January about 10 times the minimum in July. High values correspond to low rainfall and low wind movement, and *vice versa*; but there is no connection with atmospheric pressure, humidity, or direction of the wind. The same relations are found in the diurnal variations, where the night value is 3.31 times the day value. After heavy rains the Em exhaled from the soil decreased by 60%. Such a decrease is accompanied by a large increase in the Em content of the soil gas at a depth of 30 cm., but at 70 cm. and 120 cm. there is little variation with the weather. At 120 cm. the mean value is 304.5×10^{-9} g. per cu. m., about 7 times the value at 30 cm.

G. L. WENDT.

A modified variable condenser for use with the quadrant electrometer. HARRY CLARK. Harvard Univ. *Physic. Rev.* [2] 6, 43-5(1915).—The ionization current in radioactive measurements is here compensated by varying the capacity of a condenser, composed of a pile of semicircular plates mounted on a central rotating shaft, and maintained at a fixed potential. Another set of such plates, mounted on the same shaft but insulated from the first, compose actually another condenser which is kept earthed and which rotates into the position of the first when that is turned. The total capacity is thus unchanged and measurements can be made which allow the spot of light to drift some distance to one side of the zero at the start and at the end. By changing the potential the instrument is capable of a wide range of charge. G. L. WENDT.

Exchange of atoms between solid and liquid phases. G. v. HEVESY. Vienna. *Physik. Z.* 16, 52-5(1915).—The question of the exchange of atoms between a solid and liquid phase, for example between metallic Pb and a soln. of $\text{Pb}(\text{NO}_3)_2$, may be examd. by mixing with the Pb salt its radioactive isotope, Th B, and detg. how much of the Th B passes into the other phase in a given time. For the case, $\text{Pb} \mid \text{Pb}(\text{NO}_3)_2$, the exchange is very rapid, caused by local currents, Pb going into soln. at some points and depositing out at others. The exchange between a layer of PbO_2 and a $\text{Pb}(\text{NO}_3)_2$ soln. is much slower and amounts in the case of a 0.001 *N* soln. to an exchange in 1 min. of $\frac{1}{2}$ of the mol. layer of PbO_2 . Ten min. are required for the exchange of the entire layer. In the employment of the layer of PbO_2 one approaches much nearer to the ideal case of "kinetic exchange," that is, under conditions of thermodynamic equil. between the 2 phases, than in the case of the easily attacked metallic Pb layer. S. C. LIND.

The question of isotopic elements. Reply to K. Fajans. G. v. HEVESY AND F. PANETH. Vienna. *Physik. Z.* 16, 45-51(1915).—In spite of the thermodynamic considerations which Fajans (*C. A.* 9, 1149) has brought forward to show the untenability of the views advanced by the authors (*C. A.* 9, 175) regarding the mutual interchangeability of isotopic elements, the latter are prepared to reiterate their contentions in the main, that the expression for ionic conc. in the Nernst formula for e. m. f. should be understood as referring to the sum of the concs. of isotopic ions, and that isotopes can fully replace each other in all types of chem. reactions. The authors agree with Fajans in considering different isotopes as thermodynamic individuals, but the only practical objection raised by Fajans to their electrochem. expts., viz., that an isotopic elemental electrode cannot possess a definite e. m. f. toward the ions of a different isotope in soln., is now claimed to have been disproved by the following expt.: An electrode of PbO_2 exhibits exactly the same potential toward 2 different solns. of the same mol. conc., the one containing $\text{Pb}(\text{NO}_3)_2$ and the other $(\text{RaG})(\text{NO}_3)_2$, although the time of contact was by no means sufficient for equil. to have been established between the solid and liquid phases, a condition which Fajans claimed is necessary for the establishment of a definite potential. S. C. LIND.

Stereoscopic photography by Röntgen rays. BÉLA ALEXANDER. *Physik. Z.* 16, 141(1915).—A description and reproductions of X-ray photographs of a roll of wire netting which bring out the effect of a third dimension with great distinctness. S. C. LIND.

Radioactive and chemical analysis of the uranium pitchblendes of Joachimsthal. A. BECKER AND P. JANNASCH. Univ. Heidelberg. *Jahrb. Radioakt. Elektronik* 12, 1-34(1915).—Besides the detn. of the Ra/U ratio in pitchblende, the authors have also made in duplicate a complete analysis of pitchblende, having in mind its possible future application in investigating the question of the genetic relation of other elements than Ra and U. To this end a sample of pitchblende of great purity and homogeneity was chosen. The chem. analyses were carried out by J., and the radioactive measurements by B. The chem. sepsns. are described in detail, and much weight is laid upon the use

of the hydroxylamine method for the sepn. of Fe and U. The results of the analyses are as follows: U_2O_5 76.41, 76.82; Fe_2O_3 4.15, 4.00; PbO 4.67, 4.63; Bi_2O_3 0.63, 0.67; As_2O_3 0.99, 0.82; Sb traces; ZnO 0.08, 0.22; MnO 0.13, 0.04; SiO_2 5.57, 5.07; CaO 3.03, 2.45; MgO 0.13, 0.19; K_2O 0.16, 0.28; Na_2O 1.21, 1.19; rare earths 0.43, 0.52; H_2O 3.25; S 1.37, 1.15%. The Ra measurements were carried out in an emanometer (*C. A.* 5, 604) which was calibrated by means of standard solns. prepared from Ra salts which had been compared with the Ra standard of the Radium Inst. of Vienna. The accumulation method from zero was used for pitchblende both in HCl and HNO_3 solns. and also in a fusion method with Na_2CO_3 - $LiCO_3$ mixt. The av. Ra/U ratio found by the soln. method was $3.383 \times 10^{-7} \pm 1\%$; and by the fusion method, $3.415 \times 10^{-7} \pm 0.7\%$. The latter value is about 2% higher than that found by Heimann and Marckwald (*C. A.* 7, 3269). S. C. LIND.

Extraction and separation of the radioactive constituents of carnotite. H. M. PLUM. *J. Am. Chem. Soc.* 37, 1797-1816(1915).—Several of the commercial methods for extracting U and V from carnotite ores have been examined and modified so as to apply to mixtures of carnotite and vanadiferous silicates. No single operation was found to remove V and U thoroughly. U was removed by boiling with Na_2CO_3 pptd. as $UO_2CO_3 \cdot 2Na_2CO_3$ by concn. of the soln., and the Na_2CO_3 recovered. Ra, Act and Radio-Pb were extracted from the residue insol. in Na_2CO_3 by HCl; the portion of Ra still undissolved was removed by HNO_3 and the Io was finally extracted by dil. H_2SO_4 and pptd. with Ce. HNO_3 was not a suitable reagent for primary treatment of carnotites. H_2SO_4 completely extracted U and V, but left the radioactive constituents in the residue. Most of the Ra was in the HCl extract, and about 90% of the total Ra was obtained by extracting with both HCl and HNO_3 ; this yield was increased about 2.7% by pptg. more $BaSO_4$ in the acid filtrates. E. B. MILLARD.

A method of calculating the absorption coefficients of different substances for homogeneous X-radiation. H. MOORE. *King's Coll. Proc. Phys. Soc. London* 27, 432-8(1915). Discussion, 438-9; see *C. A.* 9, 1718. PAUL D. FOOTE.

Some characteristics of cathode ray tubes. J. P. MINTON. *Gen. Elec. Rev.* 18, 636(1915).—The vacuum characteristics and cathode electrostatic effects of cathode ray tubes are discussed. Vacuum changes are not due to large ends of the tubes in which screens were placed because "softening" effects were observed for small test tubes. Expts. also show that water vapor is not responsible for this "softening" effect. A short review of the causes of cathode electrostatic effects is given. W. E. RUDER.

Constitution of matter (RUTHERFORD) 2.

4. ELECTROCHEMISTRY.

COLIN G. FINK.

Emil Rhatenau. *Naturwissenschaft.* 3, 361(1915).—Obituary. C. G. F.

The epoch-making contributions of Julius Elster and Hans Geitel to our knowledge of atmospheric electricity. K. BERGWITZ. *Naturwissenschaft.* 3, 377(1915).

C. G. F.

Julius Elster and Hans Geitel as scientific investigators. E. v. SCHWIDLER. *Naturwissenschaft.* 3, 373(1915).—Review and eulogy. C. G. F.

Stassano electric furnace at Redondo. W. M. MCKNIGHT. *J. Elec. Power & Gas* 35, 37(1915).—A description of the first Stassano arc furnace installed in the U. S. It was installed in 1913 to replace the crucible process, has a capacity of 1 ton and has been in continuous operation since installed except for short intervals for re-

lining. Six heats can be run daily. The heat insulation is sufficient to hold the charge molten through a power interruption of 4 hrs. The relining with magnesite 3 times a month requires 2 days and costs \$225.00. This furnace differs from the regular type in that the top has been made removable. The av. arc is 10 in., although at times 18 in. is drawn. The current consumption is 800–2000 amps. per terminal on a 3-phase 150 v. circuit. To keep the balance, a ground connection is tapped through an oil switch and overload release, to the middle point of the Y on the main circuit. There is very little fluctuation, as shown by the graphic chart, from the av. demand of 225 kw.

W. E. RUDER.

New installations of Héroult electric furnaces. ANON. *Iron Age* 96, 337(1915).—The installations of a 3-ton Héroult at Longueuil (Canada), a 15-ton at Canton and a 6-ton at Indiana Harbor are announced.

C. G. F.

Electrolytic cell for preparing alkali amalgams. FRIEDRICH C. G. MÜLLER. Brandenburg. *Z. physik. chem. Unterr.* 28, 148–50(1915).—The bottom of a short, wide-mouthed bottle is cut off and a piece of closely woven canvas drawn over and up the sides about 2 cm. and bound on with a fine Fe wire above the surface of the electrolyte. A large wire is twisted around the neck of the bottle so that 3 arms extend and rest on the edge of a crystg. dish about 8×8 cm., into which 200 cc. of the electrolyte is poured. About 150 g. Hg is put in the bottle. Eight amp. at 12 v. for 10 min. is sufficient to produce considerable quantities of amalgam.

J. H. MOORE.

Notes on the uses of mercury type electrolytic meters. R. BOSSOM. *Electrician* 75, 516(1915).—The great accuracy of this type of meter at all loads, their ability to register very small currents and their extremely low upkeep, make them very desirable instruments to use as "checks" on other meters *in situ*. Some notes are given on methods of testing in quantity. The advantages of this type of meter in dry cell testing and in storage battery charging are discussed.

W. E. RUDER.

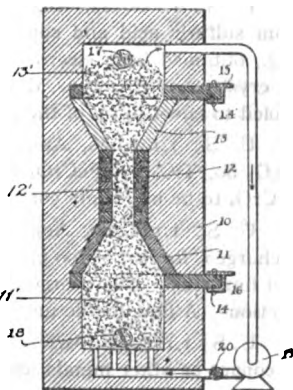
Strip electrode. HEINRICH GÖCKEL. Berlin. *Chem. Ztg.* 39, 484(1915).—One side of a strip of sheet Pt is fused into the wall of the vessel, allowing better cooling of the electrode and electrolyte.

J. H. MOORE.

The law of "corona" and spark-over in oil. F. W. PREK, JR. *Gen. Elec. Rev.* 18, 821–7(1915).—It is shown that in general the mechanism of breakdown in gaseous and liquid insulations is very much the same; the general laws which P. has developed for calcg. the breakdown voltages for air apply also to transil oil. Data on the various properties of oil for 60-cycle, high frequency and impulse voltages are given. Curves are given showing the relation of the effective K. V. to the spacing for needles, small (1.1 cm.) and large (12.5 cm.) spheres, and concentric cylinders. The effect of H₂O and temp. are also shown graphically. The permittivity of oil is $2.6 \times$ its sp. gr. The use of barriers, limiting the energy distance, is a great advantage. W. E. RUDER.

Iron losses in transformer plate. A. PRESS. *Electrician* 75, 585(1915).—A theoretical paper. C. G. F.

U. S., 1,147,703, July 27. J. W. BROWN. **Electric furnace for manufacture of graphite.** The granular charge is supplied to the upper chamber 13' and passes downwardly through the furnace. Current is supplied through the material as it passes through the restricted portion 12' by electrodes 14 and 14'. Inert gas circulated by the fan 19 cools the product and the conveyer 18 delivers it to the air. Cf. C. A. 9, 1279.



U. S., 1,147,718, July 27. J. A. HALL. **Electroplating aluminium with other metals.** The Al surface is first treated with a cleansing soln. containing a large % of HNO_3 , then plated for a few seconds electrolytically in a bath of H_2O , NaCN and ZnCO_3 and then a plating of other metal such as Ni, Cu, Ag or brass is electro-deposited on the thin Zn coating.

U. S., 1,147,753, July 27. L. J. SCHATZEL. **Dry battery with a depolarizing mixt.** formed of C 8, MnO_2 8 and K persulfate 2.75 parts. Persulfate of Ba, Sr, NH_4 , Cu, Mn, Ca, Na, or Li may be substituted and will effect rapid recuperation of the cell after use.

U. S., 1,147,989, July 27. A. A. TOWNR. **Apparatus for purifying liquids by treatment with an electric current.**

U. S., 1,148,062, July 27. C. E. TUCKER. **Utilizing battery waste containing PbSO_4 , PbO_2 and acid,** by heating to drive off the acid, continuing the heating to reduce part of the PbO_2 to PbO , adding Na_2CO_3 or other flux and oxidizing agent such as KNO_3 , grinding and leaching, after further heating, and thus obtaining PbO as a residue.

U. S., 1,148,152, July 27. F. S. B. DE MELLO. **Depolarizing primary or secondary batteries** by use of Cu_2S produced by electrolysis of CuS in a soln. of alkali hydroxide and subsequently oxidized by exposure to the air.

U. S., 1,148,183, July 27. W. R. MOTT. **Arc-lamp electrodes for flaming arcs** are made of pptd. silica particles, coated with $\text{B}_2\text{O}_3 \cdot \text{P}_2\text{O}_5$ 6, K_2CO_3 or Na_2CO_3 5, CaF_2 or a rare earth fluoride 32 and C 55 parts. The electrodes give high c. p. and practically no slag.

U. S., 1,148,184, July 27. W. R. MOTT. **Positive electrodes for flaming arc lamps** are formed of C 50-60, pptd. silica 1-6 and flaming materials 34-49 parts. These electrodes are used in connection with negative electrodes of the compn. stated in the preceding pat. The pptd. silica prevents disintegration from exposure to the moisture of the air.

U. S., 1,148,189, July 27. B. PERRIS. **Arc-lamp electrodes** formed of usual ingredients are coated with powdered Cu, powdered bronze or other powdered metal mixed with varnish. The coating adheres firmly and is consumed at a uniform rate with the body of the electrode.

U. S., 1,148,230, July 27. M. E. HOLMES. **Electric dry battery cell with a depolarizer** containing Mn perhydrol, Mn(OH)(O.OH) .

U. S., 1,148,274, July 27. E. A. and H. I. ALLEN. **Cell for electrolysis of alkali metal chlorides.**

U. S., 1,148,522, Aug. 3. O. C. MARTIN and F. JAEGER. **Removing arsenic from sulfuric acid and copper sulfate electrolyte solutions.** The impure electrolyte, e. g., obtained from electrolytic Cu refining, is concd., most of the CuSO_4 is removed by crystn. or electrolysis, the remaining soln. is treated with SO_2 and then is dild. and cooled to effect pptn. of the As.

U. S., 1,148,696, Aug. 3. G. M. LITTLE. **Arc lamp electrodes** are made of Fe_2O_3 60, TiO_2 27, FeCrO_4 9, NaF 0.5 and H_3BO_3 5 parts. The H_3BO_3 causes the FeCrO_4 to be uniformly consumed during the burning.

U. S., 1,148,700, Aug. 3. F. J. MACHALSKE. **Reducing iron ore electrically.** A charge is formed of 100 parts of Fe ore containing Ti and P, 14 parts artificial graphite and lime flux. The charge is treated with elec. current and kept basic during the reduction. A fine ductile uniform Fe, free from occluded gases, is produced.

U. S., 1,148,798, Aug. 3. F. R. PYNE and H. M. GREEN. **In electrolytic refining of copper or other metals,** stratification of the electrolyte is effected by avoiding rapid

circulation and the lower portion containing a more conc. soln. is drawn off separately from the upper stratum.

U. S., 1,149,064, Aug. 3. H. T. KALMUS. A fused alumina abrasive is made from crude aluminous material containing MgO , TiO_2 , and some impurities such as Fe_2O_3 and SiO_2 by mixing with sufficient C to reduce the impurities, fusing and reducing in an elec. furnace at a temp. below the reduction temp. of Al_2O_3 and sepg. the reduced impurities from the Al_2O_3 .

Brit., 18,357, Aug. 12, 1913. E. MÖLLER. Construction of the discharging electrodes used in app. for separating suspended particles from gases by high-tension elec. discharges. Cf. C. A. 9, 2193.

Brit., 8,367, Apr. 2, 1914. MASCHINENFABRIK SÜRTH GES. App. for mfg. oxygen and hydrogen electrolytically. Cf. C. A. 8, 3156.

Brit., 8,483, Apr. 3, 1914. J. PETTIGREW and E. GERBEL-STROVER. Corundum for making grinding-wheels is obtained by fusing bauxite in an elec. furnace and subjecting the broken product to a temp. below its m. p. in a strongly oxidizing atm., so that any lower oxides of Fe are converted into Fe_2O_3 . Heating for 6 hrs. at 800° in a reverberatory furnace supplied with an excess of air is suitable.

Ger., 282,709, Jan. 25, 1914. J. C. POLE. Construction of a metal vapor lamp.

Ger., 282,956, May 29, 1913. L. UBBELOHDE. Electric furnace with resistance wire of base metal wound about the tube, muffle, or crucible in spiral form, in the usual manner. Between the sep. windings finely powdered coal is filled in, with a suitable binder, and the whole is surrounded by a non-conducting jacket, which may consist of a second porcelain tube or of a mixt. of asbestos and kaolin or the like. The C spiral protects the heating element from oxidation, without entailing material disadvantages.

Ger., 283,071, Jan. 17, 1914. J. KREMENEZKY. Incandescent metal filament for electric lamps. BN or Ti_3N_2 is incorporated into the metal in an amt. not exceeding 1%, with a view to preventing recrystn., upon burning the lamp, and the change in structure of the filament (W filament obtained by drawing or squirting) that shortens the life of the lamp. The lamp is N-filled in order to prevent decompn. of the nitride. To prevent dissociation of the nitride during manuf., the sintering is effected, not in pure H, but in N or in a mixt. of N and H, or first in H and then in N. The paste can, however, be made of metal and the element (B, Ti) used to form the nitride, and the nitride can be formed afterwards by strongly heating the mixt. of the elements in a N atm.

Ger., 283,389, Mar. 14, 1914. DEUTSCHE GASGLÜHLICHT-AKT.-GES. (AUER-GESELLSCHAFT.) Electric incandescent lamp with spiral lighting element and filled with gas to prevent volatilization of the incandescent body. Cf. C. A. 8, 2054.

Ger., 283,517, Dec. 14, 1913. F. KRUPP, A.-G. Constructional details of an electric melting furnace. Cf. C. A. 9, 2193.

Ger., 283,600, May 14, 1914. PFRETZSCHNER & Co. Electric heating element, composed of a metal which melts below the temp. desired in the app., and which in the molten state expands and presses against the walls of the material in which it is embedded, thereby insuring better conduction of heat. For a temp. of 200° , Sn is used, Pb for 300° , Zn for 400° , and Al for 600° .

Ger., 283,613, Nov. 29, 1912. DEUTSCHE GASGLÜHLICHT-AKT.-GES. (AUER-GESELLSCHAFT.) Electric gas or vapor lamp, filled with rare gas and provided with an auxiliary electrode.

Ger., 283,765, Sept. 15, 1910. THE NITROGEN CO. Obtaining alkali or alkaline earth metals by the electrolysis of a fused electrolyte, employing an anode consisting of an alloy of the alkali or alk. earth with a heavy metal. A molten cyanide or

cyanamide compd. of the alkali or alkaline earth metal sought is employed as electrolyte. Pb has proved desirable as the alloy metal of the anode. In one cell, the alkali and alk. earth compds. are electrolyzed with the alloy metal as cathode, and in a 2nd cell the resulting alkali or alk. earth heavy metal alloy acts as the anode. The electrolytes employed in the 2nd process heretofore, such as molten NaCl, NaBr, or NaI, or molten mixts. of KOH and NaOH, did not give economical results. Better results were obtained by the use of electrolytes composed of molten cyanide or cyanamide compds. of the alkali or alk. earth metals, inasmuch as the CN compds. do not combine with the Pb of the anode, even at the high temps. (red heat) necessary for the formation of the anode alloy in the primary cell. By maintaining a temp. of 700-800° the production of the alkali or alk. earth metal in the 2nd cell can be rendered continuous, without the necessity of constantly regulating the temp., noting the current d., or exercising care as to the comp. of the alloy. The alkali or alk. earth heavy metal alloy, which serves in the 1st cell as cathode and in the 2nd cell as anode, may be allowed to circulate continuously between both cells, thereby equalizing the temp. and agitating the electrolyte.

Ger., 283,886, Apr. 15, 1913. ELEKTRO-OSMOSE-AKT.-GES. (GRAF SCHWERIN-GES.). Mfg. soluble chemically pure silicic acid by subjecting to the action of the elec. current, alkali silicate solns. in the anode chamber of a cell provided with diaphragms, of such potential as to prevent simultaneous diffusion of alkali and silicic acid. A 5-10% alkali silicate soln. is poured into a diaphragm cell or into the anode side of a diaphragm app. Perforated electrodes, resting on the wall of the diaphragm, are used preferably. This diaphragm is placed in a vessel filled with pure H₂O, a wire gauze, mounted on the outer wall of the cell, serving as the cathode. The mounting of the electrodes on the wall of the diaphragm prevents the sepn. of amorphous silicic acid. Pt wire gauze is used for the anodes in the production of silicic acid for medicinal purposes, while the Pb-Sb anode, according to 251,098 (C. A. 7, 29), is used in mfg. a tech. product. A brass wire gauze can be used to advantage for the cathode. When the current is passed, the alkali passes through the diaphragm into the cathode chamber, while sol. silicic acid remains in the anode chamber. By choice of a suitable diaphragm the silicic acid is prevented from entering the anode chamber, which is possible on account of its amphoteric character in the colloid-chem. sense. Therefore, such a potential is given to the diaphragm that only the alkali passes through the diaphragm while the silicic acid remains in the anode chamber. Preferably a diaphragm is made of a mixt. of carborundum and corundum. At first a low tension can be employed, while finally, in order to eliminate the last traces of alkali, the tension is raised to 60-70 v. In order to remove the last traces of mineral acids and CO₂ from the silicic acid, an anode purification is allowed to follow the cathode treatment. For this purpose, the silicic acid is charged into a vessel serving as cathode, while the anode is surrounded with a diaphragm of parchment paper. Upon passage of the current the acid residues pass through the diaphragm from the cathode to the anode, while the sol. silicic acid does not change. In proportion to the passage of the acid residues, the v. is increased, in order that the last traces of acid may be rapidly eliminated. The silicic acid product is chem. pure and stable when properly preserved; it also possesses a very low mol. wt.

5. PHOTOGRAPHY.

LOUIS DERR.

New researches on metallic clouds. IV. Effect of light on solid silver chloride and silver bromide. A contribution to the theory of the latent photographic image. RICHARD LORENZ AND K. HIRGE. Frankfurt a/M. *Z. anorg. allgem. Chem.* 92, 27-

34(1915).—To obtain evidence as to the relation between metallic clouds (cf. *C. A.* 9, 1565) and the latent photographic image, optically clean, clear AgBr and AgCl crystals were prepd. as before and the changes caused by illumination observed. On exposure to light, a very fine cloud first develops in the crystal; this grows until the particles become visible in the ultramicroscope. When a prepn. is exposed to light until the fine cloud forms, then heated in the dark at 350°, some of the particles grow at the cost of the surrounding cloud; blank expts. showed no effect. It is concluded that the latent image produced by exposure of a photographic plate to light is primarily a metallic cloud, similar to those previously described. GEORGE W. MOREY.

6. INORGANIC CHEMISTRY.

H. I. SCHLESINGER.

The double salt of sodium and potassium sulfates. KICHIRO OKADA. *Mem. Coll. Sci. Kyoto* 1, 95-103(1914); *J. Chem. Soc.* 108, II, 344.—The equil. relationships in the system $\text{Na}_2\text{SO}_4\text{--K}_2\text{SO}_4\text{--H}_2\text{O}$ have been investigated at 15°, 25°, 40°, 50°, 60°, 70° and 80°. Mixts. of Na and K sulfates in varying proportions were shaken with an equal wt. of H_2O for about 24 hrs., and the compn. of the satd. soln. and of the residue detd. by the tartrate method (cf. *C. A.* 9, 2492). From the results, the conclusion is drawn that Na and K sulfates form a double salt of the formula $\text{K}_2\text{Na}(\text{SO}_4)_2$. This double salt forms solid solns. with Na_2SO_4 , but not with K_2SO_4 . The limits of existence of the solid solns. become more widely sepd. as the temp. rises from 15 to 60°, but approach one another between 60 and 80°. Up to 60° O.'s data are in accord with those obtained by Nacken (*C. A.* 5, 17), but this observer assumes that the solid soln. field widens with rise of temp. up to 180°. E. J. C.

Oxidizing properties of sulfur dioxide. J. A. SMYTHE AND W. WARDLAW. *Proc. Durham Phil. Soc.* 5, 187-201(1913-14); *J. Chem. Soc.* 108, II, 335.—Hitherto known reactions in which SO_2 behaves as an oxidizing agent are summarized. The oxidizing action of SO_2 on the lower chlorides of Sn, Ti, Hg and Fe has been investigated. SnCl_2 and TiCl_3 were oxidized in warm, strongly acid soln. to SnCl_4 and TiCl_4 , the SO_2 being reduced to H_2S . In solns. not too strongly acid, the corresponding sulfides were accordingly pptd.; otherwise S was formed: $3\text{SO}_2 + 12\text{HCl} + 6\text{SnCl}_2 = 6\text{SnCl}_4 + 6\text{H}_2\text{O} + 3\text{S}$ and $3\text{SO}_2 + 12\text{HCl} + 12\text{TiCl}_3 = 12\text{TiCl}_4 + 6\text{H}_2\text{O} + 3\text{S}$. In concd. HCl, HgCl_2 was slowly but completely oxidized, with the deposition of S; no H_2S was formed. In strong acid soln., only about 7% FeCl_2 was oxidized on the average, and increase in the total conc. of the Fe lessened the relative amt. of Fe^{++} salt. The SO_2 was reduced to S. The reaction is not a balanced one, but appears to be brought to a standstill by direct inhibition by the FeCl_3 . When more than 14% of the total Fe was in the Fe^{++} state, no S was deposited on leading in SO_2 , and no oxidation took place at all. It is suggested that the oxidizing action of SO_2 in the above cases, which is only manifested in presence of conc. HCl, may be due directly to the intermediate formation of SOCl_2 . E. J. C.

Complex compounds of platinum with tellurium ethers. É. FRITZMAN. *J. Russ. Phys. Chem. Soc.* 47, 588-90(1915).—Te ethers, like the S ethers (Chugaev, "Chem. Constitution of Complex Compds.," 1910, St. Petersburg), are capable of forming complexes with PtCl_2 . To prep. *platinumdichlorodibenzyl telluride*, $\text{PtCl}_2 \cdot 2(\text{PhCH}_2)_2\text{Te}$ or, in Werner's system, $\text{Pt}_2(\text{C}_7\text{H}_7)_4 \cdot \text{Te} \cdot \text{Cl}_2$, either of the following methods may be used: alc. $(\text{PhCH}_2)_2\text{Te}$ (a) is mixed with aq. K_2PtCl_4 , or to (a) in abs. alc. is added $(\text{Pr}_3\text{N})_2\text{PtCl}_4$. The substance is a greenish orange, microcryst. powder (from CHCl_3), beginning to darken and decomp. 115-20°, but not m. even at 200°, stable when dry, but quickly

decomp. in soln. with formation of Pt, Te and $(\text{PhCH}_2)_2$, readily sol. in CHCl_3 or CHBr_3 , difficultly in alc., and insol. in Et_2O . Its mol. wt. was detd. cryoscopically in CHBr_3 . Similar compds. of other Te ethers are under exam. H. M. GORDIN.

Calcination of magnesium ammonium phosphate and the factors which cause it to turn black. JOSÉ GIRAL PEREIRA. Salamanca. *Anales soc. españ. fis. quim.* 12, 109-12 (1914).— Mg NH_4 phosphate was obtained by the warm pptn. of NH_4 phosphate with an acid magnesia mixt. (Schmidt procedure); the primary reagents were carefully tested for purity (especially regarding the absence of pyridine in the NH_4OH). Filtration was effected in a Gooch crucible with calcined asbestos and excess of NH_4OH was removed by washing with distd. H_2O ; the use of filter paper or any other organic material was avoided. The Mg NH_4 phosphate was then subjected to various tests; in some cases the ppt. remained perfectly white, while in other cases it acquired a grayish or blackish tint. The latter ppts. gave positive tests (coloration of flame, action of acids, blackening of AgNO_3 , etc.) for phosphides, while the white ppts. gave negative tests. The results appeared to justify the following conclusions: (1) blackening is caused by any one of a number of various organic materials (pyridine, filter paper, etc.); (2) blackening of Mg pyrophosphate is, in many cases, independent of the manner in which calcination of Mg NH_4 phosphate is effected; (3) production of phosphides appears to be due to the reduction of Mg pyrophosphate by the C of organic material which is present; (4) a gradual increase in temp. during calcination is not necessary in order to obtain a white residue in case organic substances are absent; (5) absence of organic material always results in white residues without a trace of coloration. H. S. PAINÉ.

7. ANALYTICAL CHEMISTRY.

E. G. R. ARDAGH.

Standardized colored fluids. H. V. ARNY AND C. H. RING. *J. Frank. Inst.* 180, 199-213 (1915).—In continuance of previous work (*C. A.* 8, 2540), the authors prepared 0.02 *N* solns. of CoCl_2 (red), $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ (yellow), and CuSO_4 (blue). When mixed in various proportions they produce all hues except a few delicate pinks and violets, which are reproduced by 0.001 KMnO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$ solns. The above colors give better results than those previously used. These solns. may be used to prepare scientific color standards. H. C. BERMAN.

A new method for the determination of alkalinity and acidity. I. TRAUBE. *Ber.* 48, 947-9 (1915); see *C. A.* 9, 213. E. W. BOUGHTON.

Determining weight of deposit. L. C. WILSON. *Metal Ind.* 13, 152-4, 277-8 (1915); cf. *C. A.* 9, 756.—Cu coatings are seldom of uniform wt. over the plated part. To det. areas of light and heavy deposit, cover the article completely with beeswax, remove this from the areas in question and immerse the article in dil. HNO_3 (1:3). Det. Cu in the soln. by any of the common methods. H. L. OLIN.

Estimation of sodium and potassium in a mixture of their salts. KICHIRO OKADA. *Mem. Coll. Sci. Kyoto* 1, 89-93 (1914); *J. Chem. Soc.* 108, II, 373.—The method depends on the slight solubility of K H tartrate and on the fact that when a definite quantity of a mixt. of Na and K salts is added to a fixed quantity of Na H tartrate in soln., the conc. of tartrate remaining in the soln. at const. vol. and temp. is a function of the % of K salt in the mixt. Shake the soln. for at least 5 hrs. at 25° , and evap. a fixed vol. of the clear soln. to dryness; heat the residue to redness. Then add a definite vol. of standard HCl and titrate the excess of acid by means of a standard NaOH . Det. the vol. of standard HCl neutralized by the residue by means of expts. with mixts.

of varying comp. Plot this vol. against the % molar compn. of the mixt., and utilize the curve thus obtained in the evaluation of unknown mixts. E. J. C.

Volumetric determination of aluminium. I. P. OSIPOV. *J. Russ. Phys. Chem. Soc.* 47, 613-5(1915).—A comparison of the results in the detn. of Al by Stock's method (*Compt. rend.* 130, 175) and by its modifications proposed by Moody (*Z. anorg. Chem.* 46, 424), Ivanov (*C. A.* 8, 3765) and Kovsharova (following abstr.) showed that K.'s method is the most convenient and most exact. H. M. GORDIN.

Application of Stock's reaction to the volumetric determination of aluminium. T. V. KOVSHAROVA. *J. Russ. Phys. Chem. Soc.* 47, 616-24(1915).—Al may be detd. volumetrically by the following modification of Stock's method (cf. preceding abstr.): To the mixt. of ingredients given in S.'s equation add an excess of 0.1 *N* $\text{Na}_2\text{S}_2\text{O}_8$, and after warming for a short time, titrate the excess of the latter with 0.1 *N* I. As the conditions of the reaction were found greatly to affect the exactness of the method, a very large number of expts. were made in order to det. the influence of each of the factors. The results are given in several tables, but as the work had to be discontinued, no definite conclusions were reached. Tentatively the following conditions are set up as conducive to obtaining good results: The excess of $\text{Na}_2\text{S}_2\text{O}_8$ must not be great, the mixt. must be as neutral as possible, and the heating should not last more than 20-30 min. H. M. GORDIN.

Rapid electrolytic methods for the determination of copper. M. NAKAO. *J. Pharm. Soc. Japan* 1915, No. 400, 666.—From comparative tests of rapid electrolytic methods for Cu, N. concludes that for the pptn. of 0.25 g. Cu in 125 cc. HNO_3 - H_2SO_4 soln. within 10 min. the following conditions should be observed: (1) the use of a gauze electrode according to A. Fischer; (2) speed, 800 r. p. m.; (3) temp. 50°; (4) acid content of soln. 10 cc. concd. H_2SO_4 , 1 cc. dil. HNO_3 ; (5) the addition of 10 g. $(\text{NH}_4)_2\text{SO}_4$ and 0.3 g. acetamide. The high acid content shortens the process by maintaining a high cond. while the salt and acetamide destroy any HNO_2 formed and insure an oxide-free ppt. H. L. OLIN.

Determination of arsenic. HERMAN PALME. *Svensk Farm. Tidskrift* 19, 333-5 (1915).—The official method for the detn. of As in cases of poisoning, based on the reduction of the As with SO_2 and titration with 0.002 *N* I soln., gives low results when the As present exceeds 0.5 mg. The various steps in the method were carefully examd. and the only discrepancy noted was in the time element of contact of the SO_2 with the sample. Instead of letting the HCl distillate to which SO_2 has been added stand 2 hrs., P. recommends that it be set aside until the next day before the SO_2 is removed by evapn. and the arsenious acid titrated. In some cases it is advisable to add more SO_2 after standing some time. P. also suggests the use of 0.01 *N* I for samples high in As. Tables show variations of 0.01 to 0.38 mg. from the theoretical amts. in detns. with 2 hrs. contact with the reducing agent, and in detns. in which the mixt. stood 12 hrs. the differences were 0 to 0.06 mg. The total amts. in the samples used ranged from 3 mg. to 14 mg. As. A. R. ROSE.

The Fresenius-Babo soda-potassium cyanide method for the determination of arsenic. PETER KLASON. *Svensk Kem. Tidskrift* 27, 101-11(1915).—A brief critical review of the literature on the detn. of As and a careful lab. exam. of the Na_2CO_3 -KCN method. The tests were made on the oxides and sulfides derived from a pure prepn. of H_3AsO_4 . The fusion mixt. used was 0.3 g. Na_2CO_3 and 0.1 g. KCN. It was placed in the 3.5 cc. bulb of the As tube. The tube was provided with an asbestos plug and to prevent "back sublimation" a glass rod was inserted in the other end. The CO_2 current was passed through at a rate of 2 bubbles per sec. Expts. showed that this gas need not be dried. The As capillary tube must be clean, especially free from fatty

matter. The bulbud tube rested on the Argand burner and was carefully manipulated in the flame. The completion of the reduction was manifested by the clearness of the melt. With a single burner about 98% of the As is recovered; by applying the flame of a micro-burner to the capillary, a second mirror is formed and there is complete recovery of the As. The As mirror was weighed on a micro-balance after drying at 100° for 10 min. A drop of water is passed through the capillary to dissolve part of the melt carried over mechanically. The tare wt. of the capillary is obtained by driving off the As mirror with the least necessary free flame. Some mirrors were converted into arsenic acid and titrated with 0.001 *N* Ba(OH)₂ (phenolphthalein indicator). This titration is sensitive to better than 0.1 cc. of the Ba(OH)₂ soln. In titration, the As equiv. is 37.9. The forms of As used were As₂O₃, As₂O₅, As₂S₃, As₂S₅; the amts., 0.0375 to 1.125 g. The max. error in the total amt. of As in the sample used was 4%; in most cases the loss of As did not exceed 0.005 mg. The reactions involved are discussed. K. does not consider that the KCN enters into the reduction reaction when the As is under 3 mg. to 200 mg. melt. In these amts. there is no KCNS formed in the reduction of As₂S₃. The KCN is introduced chiefly to facilitate fusion. The sensitiveness of the method as a test is shown by mirrors obtained after dilns. of the H₂AsO₄. Two cc. 0.0001 *N* soln. gave a transparent mirror 6 mm. long; a trace of a mirror was noted from 1 cc. 0.000001 *N* of the H₂AsO₄ soln.

A. R. ROSE.

Relative error in alluvial sampling. CHARLES S. HALEY. *Mining Sci. Press* 111, 79-80(1915).—A discussion of the mechanical difficulties of taking drill samples.

H. L. OLIN.

The determination of selenium in organic compounds. A. MICHAELIS. *Ber.* 48, 873-4(1915).—A statement that M.'s method is reliable and simple as has been confirmed by Bauer. Cf. *C. A.* 9, 2205.

E. W. BOUGHTON.

The detection of methane. II. O. HAUSER AND H. HERZFELD. *Ber.* 48, 895-6 (1915).—The method is based on the fact that CH₄ and ozone react to form CH₃O (cf. *C. A.* 7, 1152). The ozone is prepared by the electrolysis of dil. H₂SO₄ using Pt electrodes. The one serving as anode is sealed through the wall of the tube in such a manner that half of it extends on the inside and half on the outside of the tube. If the tube is cooled with ice water during electrolysis, a sufficiently low temp. is reached to prevent the decompn. of the ozone. The gas mixt. to be tested is conducted into a side branch of the anode tube where it comes in contact with the ozone. The resulting CH₃O is absorbed by moist glass wool and is detected by morphine-H₂SO₄. 1.9% of CH₄ in the air may be easily detected.

E. W. BOUGHTON.

A modified reduction method for the volumetric determination of nitro compounds. A. J. BERRY AND C. K. COLWELL. *Chem. News* 112, 1-2(1915).—To the soln. of the nitro compd. add an excess of standard SnCl₂ soln. with HCl and a measured quantity of strong KBr soln. Pass in a current of CO₂ and boil for 15 min. RNO₂ is reduced to RNH₂, while Sn⁺⁺ becomes Sn⁺⁺⁺. Titrate the excess of Sn⁺⁺ with a strongly acid standard Cu⁺⁺ soln. to which is added KBr. This brown-violet soln. becomes orange-yellow on reduction and no other indicator is necessary. The SnCl₂ must be standardized with the Cu soln. before each detn. Accuracy, 1-2%. H. L. OLIN.

Notes on the galactan determination. W. H. DORE. *J. Ind. Eng. Chem.* 7, 721-2(1915); cf. Miyake, *C. A.* 6, 2958.—Criticism of the official method (Bur. of Chemistry, *Bull.* 107).

ISADOR MILLER.

Determination of the nitrogen contained in vegetable matter according to the Gunning-Atterberg method. A. LÉBÉDIANYZEV. *Russ. J. Exp. Landw.* 16, 95-105(1915).—Expts. show that a loss of N takes place when the correlation between H₂SO₄ and K₂SO₄ becomes too narrow. This result can be lessened by the introduction of abun-

dant K_2SO_4 and by increase of the wt. of the matter to be oxidized. For material rich in fat the sample taken should be reduced at least to 1.5 g., and to 2 g. for other materials.

W. H. FRY.

Amalgamation tests (SHARWOOD) 9. Modified buret calibrating pipet and the use of such instruments (FOULK) 1. Calcination of magnesium ammonium phosphate (PEREIRA) 6. Determination of benzene in gas mixtures (BURRELL) 21. Sampling plant at Hamburg, Ger. 1. Mechanical ore sampler (TAYLOR) 1. Determination of iodine number (PAGNIELLO) 27.

8. MINERALOGICAL AND GEOLOGICAL CHEMISTRY.

EDGAR T. WHERRY.

A preliminary check-list of Philippine minerals. WARREN D. SMITH, F. T. EDDINGFIELD AND PAUL R. FANNING. Div. Mines, Bur. Sci., Manila. *Philippine J. Sci.* 10 (A), 81-96(1915).—The 113 mineral species and varieties which have been identified with certainty from the Philippines are listed alphabetically, with notes on their geologic relations, localities, and economic value. E. T. W.

The constitution of sphalerite, wurtzite, and hauerite. A. BRUTELL AND M. MATZKE. Breslau. *Centr. Min. Geol.* 1915, 263-72.—A continuation of the studies of B., C. A. 5, 2795, 3667; 6, 466, 2051; and of Arbeiter, C. A. 8, 646. The disulfides and diarsenides studied appeared to owe their dimorphism to difference in chem. constitution, so a similar investigation has been extended to the monosulfides of Zn, sphalerite and wurtzite. To test the conclusions of Weber (C. A. 2, 1253) that the former of these contains too much S, the latter too little for the formula ZnS , very accurate analyses were made of 2 samples of each and the 1:1 ratio found to hold exactly. Expts. with Ag foil (cf. B., C. A. 8, 1074) were also made with these and other specimens, and free S (or S held in solid soln.) found to be absent. Weber's views could thus not be confirmed. The detailed results of studies of the 2 minerals are to appear in a dissertation by Matzke; the main conclusions are here presented. When treated with dil. H_2O_2 soln. both minerals yield Zn and S to the soln. in identical ratio, exactly 1:1. As this result is not dependable, since it is controlled by the fact that the H_2SO_4 formed dissolves an equivalent amt. of ZnO, the expt. was repeated with H_2O_2 soln. made alk. with Na_2CO_3 . Sphalerite then yielded Zn:S in the ratio 1.18-1.63:1, while in wurtzite it was much nearer 1:1. In the former the variation was found to be proportional to the diln. of the H_2O_2 soln.; in the latter the ratio was independent of this factor. The limiting ratio in the case of ZnS is 2:1; it follows that, on oxidation, half of the S of sphalerite seps. as free S and the other half oxidizes to H_2SO_4 . With wurtzite the results varied slightly, because of the impurities present, so pure artificial material was prepared, and it gave results showing conclusively that in this mineral all the S goes to H_2SO_4 . The presence of free S in the oxidized sphalerite was proved by heating in a vacuum, while wurtzite under like conditions gave no S. These behaviors are in ac-

cord with the following structure for wurtzite: $Zn \begin{array}{c} \diagup S \diagdown \\ \diagdown S \diagup \end{array} Zn$. Sphalerite must have at

least the 4-fold formula Zn_4S_4 ; there are then different possibilities for its constitution, but the data at hand are insufficient to decide between them. It is noteworthy that the röntgenograms of sphalerite which have been made by Bragg and others give no aid in this direction, as they indicate no chem. difference in the S atoms. A crystal of hauerite, MnS_2 , shown by analysis to be pure, was tested in the same way, although

here the air was an adequate oxidizing agent. The results showed that in the oxidation of this mineral no S was oxidized to H_2SO_4 . In pyrite, on the other hand, $\frac{1}{4}$ of the S is thus oxidized, so it follows that hauerite does not belong to the pyrite group. It is possible that in hauerite the Mn is tetravalent, but since both S atoms behave alike no definite indication as to its constitution can be obtained. E. T. W.

The modifications of witherite at high temperatures. I. SAMOILOV. Moscow. *Centr. Min. Geol.* 1915, 161-3; H. E. BOEKE. Frankfurt. *Ibid* 272.—S. announces the discovery of a new modification of witherite, which he names β -witherite; it forms on heating at 970° , and disappears again on cooling at 940° . B. points out that he had previously observed the same modification (C. A. 7, 3946). E. T. W.

The law of admixture of the alkali-free augites. G. TSCHERMAK. *Centr. Min. Geol.* 1915, 225-32.—A reply to Boeke (C. A. 9, 2045). The difference of opinion which has arisen is largely a question of terminology and definition. The relations shown by some of the best analyses of augite are discussed in detail, and shown to substantiate T.'s former conclusions that the augites are isomorphous mixtures. Four components have been used for convenience in discussion, but 3 are likely to prove sufficient, namely CaSiO_3 , MgSiO_3 , and Al_2O_3 . E. T. W.

Vesuvianite and hastingsite from the nepheline-syenite from Almunge. PERCY QUENSSL. Stockholm. *Centr. Min. Geol.* 1915, 201-8.—Vesuvianite, which is usually a contact-metamorphic mineral, has been found to be an abundant accessory constituent of the nepheline-syenite rock from Almunge, near Upsala (C. A. 8, 2863). The mineral forms prismatic crystals up to 2 cm. long, with $\omega = 1.7311$, $\epsilon = 1.7269$ and the comp. SiO_2 36.16, TiO_2 2.49, Al_2O_3 17.59, Fe_2O_3 3.91, FeO 1.80, MnO 0.34, MgO 0.81, CaO 33.67, K_2O 0.13, Na_2O 0.86, H_2O 2.10, sum 99.86%. This is somewhat abnormal in that $\text{RO}:\text{R}_2\text{O}_3 = 3.3:1$ instead of $4:1$, but this is sufficiently explained by the unusual mode of occurrence. The presence of this mineral is best explained on the basis of assimilation, by the magma, of calcareous rocks. The amphibole of the rock from Almunge proves to be optically similar to hastingsite, with which its comp. also agrees. No simple or strict definition of the hastingsite group has heretofore been given; the most characteristic optical features are the small to minute axial angle, the variable position of the optic axes, the very low birefringence, strong dispersion and blue or blue-green absorption colors; the chem. features are low Al_2O_3 (about 10%); about the same amt. Fe_2O_3 ; 20-5% FeO [in original the last 2 oxides are interchanged by mistake.—ABSTR.]; about 10% CaO ; and low alkali content. Amphiboles belonging to this group have been given various names, as hudsonite and hornblende; apparently a single series is represented, extending from barkevikite through alkali-amphiboles to typical hastingsite. E. T. W.

Has the existence of crystallized hydrous silicates with dissolved or absorbed water been proved? A. BEUTELL AND K. BLASCHKE. Breslau. *Centr. Min. Geol.* 1915, 195-200.—Having proved that the H_2O in stilbite is chemically united (C. A. 9, 2046), B. and B. have now critically considered all previous observations on hydration and dehydration of hydrous silicates which have been regarded as indicating that their H_2O is either dissolved or absorbed. They find that in no case has the effect of cohesion, in holding the H_2O of higher hydrates until lower ones begin to decompose and so rendering the curves smooth, been avoided, so that the answer to the captioned question is negative. E. T. W.

The systematic classification of ore deposits. R. BECK. Freiberg. *Centr. Min. Geol.* 1915, 272-7.—B. points out that Sachs (C. A. 9, 2046) has misquoted his classification of ore-deposits, and as others have also not comprehended it fully, he restates the principles on which it is based. The revised classification is as follows:

Arranged according to phases of historical development.		Designated according to relative age of ore and associated rock.
I. Magmatic segregations		Syngenetic Group A
II. Contact-metamorphic ore-deposits		Epigenetic Group A
III. Lodes (Gänge)	} { Morphologic facies of a single genetic group	Epigenetic Group B
IV. Beds (Lager)		
V. Shoots (Stöcke)		
VI. Gossan-formations		Epigenetic Group C
VII. Sedimentary ore-deposits		Syngenetic Group B
VIII. Gravel deposits (Seifen)		Syngenetic Group C

E. T. W.

Origin of "sandstone" ore-deposits. CHESTER T. KENNAN. *Mining Eng. World* 43, 213-5(1915).—A summary of our knowledge as to the manner of introduction and pptn. of ores in porous rocks such as sandstone and conglomerate. Many examples are cited.

E. T. W.

The copper deposits of San Cristobal, Santo Domingo. THOMAS F. DONNELLY. *Bull. Am. Inst. Mining Eng.* 1915, 1759-68.—The region consists of Cretaceous limestone in contact with post-Cretaceous igneous rocks, principally basalt and basic tuffs cut by trachyte dikes. The 2 promising sources of ore are (1) the deposits that should occur at the contact of the igneous rocks with the limestone, which constitutes a zone 4,000 ft. in length; and (2) the fissure veins, filled with white quartz carrying as its principal Cu mineral bornite, with minor quantities of azurite and malachite. Labor conditions in the region are favorable.

H. L. OLIN.

Ore bodies of the Mesabi range. J. F. WOLFF. Duluth, Minn. *Eng. Mining J.* 100, 89-94, 135-9, 178-85, 219-24(1915).—This paper comprizes "a practical and untechnical summary of what is known as to the physical structure of these ore bodies. . . and many newly discovered facts. . ." This is treated under the headings: general geology and structure, the ore bodies as developed, their exploration and development, and the details of the geology and origin of the ores. In the last part a good discussion of the mode of conc. of the Fe ores is given.

E. T. W.

New studies on the black sands of Madagascar and the platiniferous quartzites of Westphalia. LOUIS DUPARC. Geneva. *Arch. sci. phys. nat.* 38, 401-9(1914); continuation of C. A. 8, 1725.—Specimens of these materials were studied spectrographically, both in their original form and after fusion with litharge. Only the faintest traces of Pt lines were observed, and these were due to a trace of Pt in the litharge. There is certainly no commercial amt. of Pt in either the black sands or the quartzites.

J. H. BOWER.

Potash deposits in Chile. SEVERO SALCEDO. New York. *Eng. Mining J.* 100, 218(1915).—The salts in lake beds in Tarapaca province, Chile, are shown by analysis to contain up to 14.15% KCl, with 51% NaCl and 28% Na₂SO₄, but with only traces of other substances, the absence of Mg, which is so prominent in the Stassfurt salts, being noteworthy. A very large deposit is believed to exist, and local conditions are favorable for its becoming of commercial importance.

E. T. W.

Magnesite deposits in British Columbia. R. E. MANSFIELD. *Commerce Repts.* 177, 517(1915).—Large new deposits have been found along the shore of Lake Atlin.

E. H.

Phosphate rock in Johnson County, Tennessee. JOEL H. WATKINS. Washington, D. C. *Mining Eng. World* 43, 217-8(1915).—Rock averaging 75.21% Ca₃(PO₄)₂ has been discovered interbedded in a shale formation. It has perhaps formed by replacement of brecciated limestone beds by ascending phosphatic solns.

E. T. W.

The occurrences of petroleum in eastern Mexico as contrasted with those in Texas and Louisiana. E. T. DUMBLE. *Bull. Am. Inst. Mining Eng.* 1915, 1623-38.—Mexican deposits so far as developed originated in a single horizon in a field which has been subjected to strong orogenic forces, while those of Texas and Louisiana are found at many other horizons, ranging from the Pennsylvanian to the Pliocene, in areas in which there is little evidence of orogenic action. H. L. OLIN.

Composition of the solid fraction of the naphtha paraffins as a criterion of its geologic age. M. A. RAKUZIN. *J. Russ. Phys. Chem. Soc.* 47, 641-2(1915).—In a former article (*C. A.* 9, 2148) it was shown that floridin(?), kaolin and other minerals are capable of adsorbing all of the lower paraffins from naphtha. Hence the relative age of a given sample of it and the relative depth in the earth where it was originally formed may be judged by the amt. of such paraffins it contains, the deeper the sedimentary strata where it originated, *i. e.*, the older it is, the more of these paraffins being adsorbed during its filtration through minerals to the surface. H. M. GORDIN.

Causes of formation of natural naphtha. A. E. CHICHIBABIN. *J. Russ. Phys. Chem. Soc.* 47, 714-6(1915).—The catalytic influence of metallic oxides and certain salts on the formation of S- and N-containing substances (*cf. C. A.* 9, 2512) and on the condensation of lower to higher hydrocarbons observed by Sabatier and by Ipat'ev lends support to the hypothesis of the mineral origin of naphtha, there being an abundance of such catalyzers in the bowels of the earth. As to the optical activity of natural naphtha, it speaks neither for nor against this hypothesis, until its exact causes are learned. To assume that this activity is due to living forces is for the present unwarranted. H. M. GORDIN.

Notes on the analysis of "iron-stone." H. B. VICKERY. Dalhousie Univ., Halifax, N. S. *Proc. Trans. Nova Scotian Inst. Sci.* 13, No. 3, 209-15(1912-13).—A number of analyses have been made of this stone, which contains SiO_2 , Al_2O_3 , FeO , Fe_2O_3 , MgO , S, volatile matter and H_2O . The results obtained show that considerable variation in comp. may occur. The low proportion of volatile matter and S, and the high SiO_2 content are significant of the effect of the granite intrusion upon the slate in its immediate vicinity. Microscopic exam. revealed the presence of feldspar, but in such small amt. that no est. was made of the alkalies. H. J. CREIGHTON.

Systematic classification of concretions. RAPHAEL E. LIESEGANG. Frankfurt. *Centr. Min. Geol.* 1915, 257-63.—Concretions, like crystals, form by a segregation of originally scattered material. The primary division of concretions into types may be based on whether this original material was previously present as such or has been formed by chem. reaction. Even this sepn. is not sharp, for on the one hand a new substance may be formed, even though the original one traveled in supersatd. soln., and on the other hand a substance, as for instance CaCO_3 , is dissolved by CO_2 and transported as a bicarbonate, yet on pptg. forms the original carbonate again. In spite of the manifest incompleteness of any scheme of classification, several are proposed, as follows: I (A) origin from material already present; (B) origin by formation of new chem. compd. I (A) can be subdivided according to the transportation of the substance: (a) in soln., (b) in fused condition, and (c) in gaseous form, and a still further division may be based on whether the substance was (a) wholly and (B) only temporarily in the form (a), (b), or (c). Thus I (A a B) would indicate that the concretion formed by the growth of large particles at the expense of small ones through an intermediate soln. It must be noted that true solns. and not colloidal solns. are considered, since the latter are non-diffusible. I (B) can be subdivided like I (A) in so far as only one substance is concerned, but if 2 or more react, an additional class (d), one component solid, must be introduced, and one small letter should be used for each component. Subdivision II is based on the different causes of change to the solid condition. If the sub-

stance was already formed [I (A)], then the subdivision is the same as for crystn., namely: (A) decrease of solvent, (a) by evapn., (b) by addition of a readily sol. but chem. inert substance; (B), cooling; and (C), increase (or in certain cases decrease) of pressure; (D), by temp. increase, may be added, though it is of limited application; and (E), by chem. change, covers the cases of I (B). Subdivision III comprizes the reasons for the localization of the deposit. In most classifications divergences are emphasized; here, however, similarities are considered. When many nuclei are present induration or deposition in large masses is likely to occur, but it is otherwise when: (A) nuclei are present but are few in number; these may be (a) solid particles of the same substance which have sepd., (b) antecedent nuclei (*Vorkeime*), or substances which can react to ppt. nuclei, (c) nuclei which cause the pptn. by physical means; (B) no nuclei are present, when the pptg. substance and the medium in which the concretion forms are of great influence on the nature of the resulting deposit; (C) a chem. decomp. with a pre-existing solid mass takes place, comprizing (a) penetration-pseudomorphs after crystals and the remains of organisms, and (b) formation of crusts around these; the cases under (a) are, indeed, not usually classed as concretions (original erroneously has "pseudomorphs" here.—ABSTR.), but they must be included in a genetic classification. IV. The subdivision according to the direction of growth, which has heretofore played an important role. Todd distinguished concretions and incrustations, Johnsen concretions and secretions, Dana centrifugal and centripetal concretions. In general, where a nucleus acts, growth must be from the nucleus outward and therefore centrifugal. But later changes such as weathering, recrystn., etc., may work in the opposite direction and obscure the original relation. The extent to which diln. can det. the direction of concretionary growth was shown by the following expts.: a cube of NaCl was immersed in conc. AgNO_3 soln.; AgCl replaced the surface layers, and as the AgNO_3 penetrated deeper and deeper, the whole crystal was gradually changed, by centripetal growth, into a concretion-pseudomorph. On performing a similar expt. with dil. AgNO_3 soln. AgCl first formed over the surface of the crystal, and as NaCl diffused outward, this crust increased by centrifugal growth. In nature certain replacing substances, especially Fe hydroxides, seem especially likely to follow the latter process, although when these replace pyrite either type of concretion may develop. Under IV are therefore distinguished (A) endogenous pptns., (B) exogenous pptns., and (C) a combination of (A) and (B). Other possible methods of classification could be worked out, such as a purely chem. one, in which the usual mineralogical plan would be followed, one based on the crystallinity or amorphous character of the deposit, or one based on the medium in which the concretion forms. There may be difficulty in bringing special cases into the proper subdivisions, but this system of classification will at least make it possible to express, by means of a few symbols, the explanation which it is desired to apply to a given occurrence. (Abstracted at length not because the particular letters used are worth anything, but because it is a very illuminating and inspiring treatment of an important but much abused subject.—ABSTR.] E. T. W.

Regular intergrowths in barium bromate crystals (AMINOFF) 2. Optical rotatory power in lithium sulfate monohydrate (JOHNSON) 2.

9. METALLURGY AND METALLOGRAPHY.

WILLIAM BRADY, WILLIAM T. HALL.

Pierre Martin and modern siderurgy. E. DEMENGE. *Rev. gen. sci.* 26, 427-30 (1915).

E. J. C.

Applications of oxygen in metallurgy. J. E. JOHNSON, JR. *Bull. Mining Met. Soc. America* 8, No. 2; *Met. Chem. Eng.* 13, 483-4(1915); cf. *C. A.* 9, 194.—Some possible applications of cheap O in the metallurgy of iron are discussed. It is calcd. that with an O and N blast the power required to burn a certain amt. of coke could be reduced by 33%. In the production of ferromanganese the coke consumption can be reduced to one-half with the O blast, and by reducing the vol. and increasing the temp. of the slag the loss of Mn could be cut down; furthermore, the quick drop in the temp. of the gases, due to their small vol., would prevent the volatilization of much of the Mn which in the present practice is being lost in this way. The N discarded from the blast would be valuable. Other applications are discussed.

C. A. NOWAK.

The buying and selling of ores and metallurgical products. CHARLES H. FULTON. *Bur. of Mines, Tech. Paper* 83, 42 pp.(1915).—An outline of underlying principles. A discussion of methods for detg. the various metals in their ores and concentrates as a basis for payment is included.

E. J. C.

Amalgamation tests. W. J. SHARWOOD. *Bull. Am. Inst. Mining Eng.* 1915, 1659-70(1915).—Methods for estg. free or amalgamable ore as distinguished from total ore have not been standardized. S. tabulates with references 26 methods as to app., wt. of ore, size of mesh, wt. of Hg, time, and method of extn. He outlines the following standard test: weigh 100 g. ore into a bottle, add 150 cc. H₂O and 1.5-2 cc. pure Hg from a buret. Clamp the stopper, fold the bottle in a cloth and keep it in the shaker for 2 hrs. Open, and invert it over a 3 in. porcelain dish to allow the clean Hg to run out, adding more H₂O and shaking if necessary. To the Hg in a 250 cc. beaker add 0.5 g. pure Ag foil, add 150 cc. HNO₃ (d. 1.14) previously warmed to 70°, and keep on a hot plate until the Hg has dissolved. Filter the liquid, rinse the residue on to the paper, wash once with 5% HNO₃ soln. and once with H₂O. Sprinkle the paper with test Pb, cover with 15-20 g. Pb, add enough pure Ag to insure parting and 2-3 g. borax glass. Scorify for a few min., pour and cupel. Correct for Au in the Ag and Hg.

H. L. OLIN.

Testing of ores for the cyanide process. WELTON J. CROOK. *Pahasapa Quarterly* 4, Nos. 1 and 2; *Chem. Eng.* 22, 30-2(1915); cf. *C. A.* 9, 2210.—Detailed directions are given for handling the ore and solns. in these tests.

L. W. RIGGS.

Cyanidation of low-grade sulfide ores in Colorado. II. H. C. PARMELER. *Met. Chem. Eng.* 13, 477-9(1915); cf. *C. A.* 9, 2211.—A description of the methods used at the Cariman Mill at Caribou, Boulder County, in working dumps and mines abandoned 30 yrs. ago. The dumps showed an av. Ag content of 7-8 oz. per ton, Au 40-70 cts. per ton. The ore from filled stopes and low-grade veins averaged 15 oz. Ag per ton. The Ag occurs both native and as sulfide. Galena is present in small quantity, and occasionally chalcopyrite occurs. The gang is granitic and very hard. After dry-crushing the ore is re-ground with the addition of mill soln.; CaO is also added to the feed of the first Hardinge (conical) mill; 2 mills are used. Max. size of final product is 12-mesh. The pulp is hydraulically classified and distributed to card tables. The concentrate is shipped to the smelter. The pulp, sand and slime-tailings are sent to the cyanide department. About 35% of the Ag in the ore is recovered in a concentrate containing 100 oz. Ag and 0.50 oz. Au per ton, with 5% of Pb. The tailings from the concg. tables flow to a duplex Dorr classifier, sepg. sand and slime. The sand is charged into leaching vats. A 135 ton vat is under percolation for about 55 hrs. During this period the soln. is strengthened to 2.5 lbs. KCN per ton. When the vat is full, mill soln. at a strength of 1.7 lbs. is turned on for about 100 hrs., then washed with H₂O for 20 to 30 hrs. The pregnant soln. obtained while filling the vat and during the wash with mill soln. all flows to the clarifier and thence to pptn. In treating the slime, de-

cantation and agitation are continuous through a series of one Dorr thickener followed by 3 Dorr agitators and 2 Dorr thickeners. A Portland revolving filter is used to recover cyanide. The slime pulp is thickened to an av. of 50% H_2O . The KCN soln. is raised to 3 lbs. per ton at the first agitator. The agitators are run in series and the transfer of pulp is effected by gravity. The period of agitation is 36-40 hrs. The pregnant soln. from the sand vats and a varying portion of the overflow of first thickener is clarified through filter leaves under vacuum. The clarifier soln. is pumped to a constant-head tank from which the Zn boxes are fed. Soln. is pptd. at the rate of 1.8 tons per ton of ore. The head soln. assays from 1.5 to 1.75 oz. Ag per ton, the tailing soln. 0.02 to 0.05 oz. No Pb acetate is used or other special treatment given. The ppt. is given a light roast in a Case muffle furnace, then fluxed and melted in a Case tilting crucible furnace. The flux found best consists of: Na_2CO_3 5, $Na_2B_4O_7$ 3.5, SiO_2 1.5, MnO_2 1 part by wt. This is used at the rate of 75 lbs. of ppt. The mill soln. contains 1.7 lbs. KCN per ton, with protective alkalinity of 2 lbs. CaO. The consumption of KCN is 1 lb. per ton of ore. CaO consumption is 5 lbs. per ton of ore. The total milling cost is estd. at \$1.72 per ton. The project affords an excellent example of revival in an old mining district, due wholly to improved methods of metallurgy and facilities for economic operation. F. W. SMITHER.

Refining gold by Miller's chlorine process. R. PEARSON. *Bull. Can. Mining Inst.*, July, 1915; *Met. Chem. Eng.* 13, 508(1915).—A description of the process used at the Royal Mint, Ottawa. *Requirements:* a constant supply of Cl gas at a pressure of not less than 5 to 6 lbs. per sq. in.; melting furnaces using either coke or oil for fuel; condensing chambers; suitable pots, tongs, molds, etc. The Cl is delivered from steel cylinders holding 100 lbs. liquid Cl at a pressure of 97 lbs. per sq. in. at 20°. The connections between cylinders and crucibles are Pb pipes, rubber tubing and glass stopcocks. The desired pressure is obtained by connection with a Pb receptacle like a Wolff bottle, the third neck holding a Pb pipe connected with a glass tube which is in turn connected with an enlarged Pb bulb, similar to a large pipet. The Pb receptacle holds sufficient H_2O to give a column of 11 ft. in height (= about 5 lbs. per sq. in. pressure). Should the pressure exceed this amt., the H_2O is forced up into the Pb bulb and the gas escapes outside the building. The cylinders are housed in a cupboard that is ventilated by connection with the furnace flue leading to the condensing chamber and a pipe communicating with the outside air. From 500 to 700 oz. of the metal to be refined are charged into a clay pot and placed in the plumbago crucible in the furnace. Borax is added to form a cover about $\frac{3}{4}$ in. deep. The clay crucible has a clay cover, slotted for the passage of a clay pipe stem, through which the Cl passes to the bottom of the molten mass in the crucible. The Cl is admitted cautiously until it passes with a steady pulsation. Dense fumes of $CuCl_2$ and $PbCl_2$ appear and practically all of the Cl is absorbed. Later $AgCl$ forms and floats above the Au and beneath the borax. The finishing point of the process is judged by the brown stain formed on a cold piece of clay pipe held in the fumes issuing from the pot. The fumes resulting from the chlorination and from the products of combustion are all carried through condensing chambers to a washing tower. When chlorination is complete the pot is withdrawn from the furnace and let cool until the Au sets. Then the borax and $AgCl$ are poured off and sepd. when cold. The $AgCl$ is freed from some contained Au by remelting and treating with Na_2CO_3 , sprinkling the latter on the surface of the molten chloride. Globules of Ag are reduced and sink to the bottom, carrying Au with them. The Au-free $AgCl$ is then treated with hot H_2O to remove Cu, which is sepd. from soln. by pptn. on Fe. The $AgCl$ is then reduced to Ag by contact with Fe plates in a HCl soln., and finally washed and melted. The fineness of the Au produced by the process will average 995; the Ag fineness varies from 995 to

998. The time required varies with the amt. of Ag and base metals present in the Au, e. g., an ingot weighing 500 oz. and containing 140 oz. base and 80 oz. Ag required 7 hrs. F. W. SMITHER.

Treatment of waste material containing silver. R. J. MARSH. *Metal Ind.* 13, 314-7(1915).—A detailed description of methods pursued by a large silver shop in recovering the precious metal. The proper sampling of such material before forwarding to the smelter is emphasized. The methods of collecting and burning sweepings, crushing, sifting, and sampling are described. The usual methods are also described for the treatment of filings and grindings and the recovery of Ag from acid solns. and old plating baths. F. W. SMITHER.

Lead acetate vs. litharge. C. R. MORRIS. *Eng. Mining J.* 100, 148(1915).—In expts. at the Mexican mill, Virginia City, Nev., it was found that there was not much difference in the mill between using 1 or 2 lbs. of Pb acetate. Using PbO instead of Pb acetate, putting it into the tube mill 3 times a day, gave as good an extn. Using 0.75 lb. of PbO in the tube mill and 0.25 lb. of Pb acetate in the agitators gave a better extn. Results are reported. F. W. SMITHER.

Treatment of arsenical-antimonial sulfide ore. K. B. MOORE AND H. R. EDMANDS. *J. Chamber Mines W. Australia*, Feb., 1915; *Mel. Chem. Eng.* 13, 508-9(1915).—A record of exptl. and practical work on the cyanide treatment of Au ore containing As and Sb sulfides. A representative analysis of the ore showed: insol. 70.04, Fe 8.3, Sb 0.21, As 0.96, S 5.62, CO₂ trace, MgO 2.74, Al₂O₃ 2.02, CaO 3.36, alkalis, H₂O, etc., 6.75%. Amalgamation and cyanidation yielded only about 50% of the Au. Concn. gave still poorer results, and the tailing yielded less than half its Au to cyanidation. Flotation gave disappointing results. CNBr was tried without success, and preliminary treatment with NaOH did not improve matters much, as some of the Au was associated with As and was not liberated. Expts. with roasting and cyaniding indicated that roasting was an essential, and a plant has been constructed in which the ore is dried, ground in a Krupp ball mill and roasted in an Edwards duplex furnace. After this treatment the ore is mixed with oxidized ore and given the usual cyanide treatment. Perfectly sweet roasting is not necessary in order to get a max. extn., but must be carried far enough to liberate all Au from the sulfide and leave no unaltered FeS₂ or arsenopyrite. Ore carrying 3.5 to 4% S retains from 0.5 to 1% after roasting, about 2/3 of which is sol. in Na₂CO₃. Samples taken half way down the roaster have given as good extn. as those taken from the discharge. The addition of Pb acetate is necessary to remove sol. sulfides. The roast cannot be tested satisfactorily by the ordinary I absorption method. Owing to the frequent presence in the roasted product of Sb, which seps. out on acidifying the Na₂CO₃ ext., I does not give a sharp end point. The method used is to boil 20 g. of ore in 100 cc. of 5% Na₂CO₃ for 1 min., decant 50 cc., acidify with H₂SO₄ and titrate with N/30 KMnO₄. If less than 10 cc. of KMnO₄ are required the roast is considered fair, but often a roast with far more reducing power gives quite as good extn. The loss of Au by volatilization rarely exceeds 3%. Plant soln. is tested for reducing power by acidifying 50 cc. and titrating with N/30 KMnO₄. Usually 25 to 50 cc. of KMnO₄ are decolorized. Fine grinding is essential to good extn., the av. screen test showing only about 15% plus 150 mesh. A thin pulp of about 35% solids gives better results than one of 45% solids. Zn shavings gave poor results for pptn. The authors devised a system of Zn dust pptn. that gave satisfactory results. The extn. has averaged over 84%, with a residue of 7s. per ton. Cyanide consumption does not exceed 1 lb. NaCN per ton. Total cost is 9s. per ton. F. W. SMITHER.

Notes on the metallurgy of zinc. E. H. LESLIE. *Mining Sci. Press* 111, 162-6

(1915).—A review and discussion of American and foreign practice. Statistics, cost data, etc., are given. F. W. SMITHER.

Leaching copper ore. W. L. AUSTIN. *Mining Sci. Press* 111, 199-200(1915); cf. C. A. 8, 3283.—A discussion of modern practice, pointing out the advantages of employing H_2S as a com. precipitant for Cu. F. W. SMITHER.

The Salida smelter. F. D. WEEKS. *Bull. Am. Inst. Mining Eng.* 1915, 1691-6. —A description of the copper smelting plant at Salida, Colo. H. L. OLIN.

Blast-furnace plant auxiliaries and general arrangement. J. E. JOHNSON, JR. *Met. Chem. Eng.* 13, 373-8, 429-39, 495-9(1915).—J. describes the system of water supply, including pumping machinery, standpipes, and water mains, and the connections from the water mains to the circulating system around the furnace, as well as the disposal of the foul waste water. The following other points are also discussed: Compressed air and elec. supply; production of dry blast by refrigeration and the calcs. incidental to the same; a diagram, showing the dry-blast plant designed by Frank C. Roberts & Co., single-stage, brine-circulation, non-regenerative; chart showing ratio of actual to theoretical h. p. required for refrigeration with different temp. ranges; total heat and temp. entropy diagram of air and water vapor; total heat temp. entropy diagram applied to detg. power for different methods of blast refrigeration; elevation diagram of Carrier dry-blast plant (ammonia compressors, motor-driven); plan of Carrier dry blast; diagram showing arrangement of cooling towers and regenerators in proper relation. J. then discusses the general arrangement of furnace plants, the distances of the furnaces apart, with a diagram of the general arrangement of the Federal Furnace Co.'s plant, and the general ground plan and track layout for the plant of the Indiana Steel Co. at Gary, Ind., and the general ground plan and elevation of a pair of furnaces with their stoves and dust-catcher at the same plant. Finally, the elevation of the furnace, the arrangement of the boilers and engines, the arrangement for the disposal of iron, and the disposal of slag are discussed. C. A. NOWAK.

Barth slide rule for pulp measurement. C. G. BARTH, JR. *Eng. Mining J.* 100, 228(1915).—This slide rule gives the contents, in tons, of tanks ranging in diam. from 10 to 36 ft. and in d. from 1 to 3. The rule consists of 4 scales—one giving the diam. of the tank by 6-in. intervals, a d. scale ranging from 1 to 3, a scale giving the % of H_2O from 20 to 90, and a scale giving the tons of 2000 lbs. Examples are given (with cuts) illustrating methods of use. F. W. SMITHER.

Low-pressure oil-burning metallurgical furnaces. ANON. *Met. Chem. Eng.* 13, 510-1(1915).—A description with illustrations of the low-pressure oil burner of the Case metallurgical furnaces manufactured by the Denver Fire Clay Co. Oil is introduced usually by gravity (although high pressure can be used), and issues from the central part of the burner in a cone spray diverging at an angle of 45° . All air for combustion goes through the burner, issuing from 2 annular rows of holes and forming a cone of jets converging at an angle of 60° . This produces an excellent mixt. of oil and air which enters the combustion chamber of the furnace through a small opening of the same size at the face of the burner, thus excluding auxiliary air. Both oil and air are under valve control. Air is supplied by a direct-connected motor-driven blower which runs at 3600 r. p. m. and delivers 3000 cu. ft. of air per min. at a pressure of about 6 oz. The fan has 20 blades of Al mounted in a cast Fe casing. *Advantages:* Freedom from noise, economy of fuel, control of air supply, perfect combustion without formation of C, and reduced wear and tear on the crucible and other parts of the furnace. The poor features involved in needle valves are entirely eliminated. The burner is applied to a variety of furnaces constructed for special purposes. The tilting type furnace is used for melting brass and other metals, refining cyanide ppts., and melting

Au and Ag bullion. Other types are used for the heat treatment of steel, for annealing and enameling, and for assaying. Results are given, showing economy of fuel and time, increased life of crucibles, etc., with these burners. F. W. SMITHER.

Gas blowing engines at the Steelton plant of the Pennsylvania Steel Co. *Met. Chem. Eng.* 13, 516-9(1915).—Each engine consists of 2 gas cylinders 46 in. diam. and an air cylinder 84 in. diam. in tandem. A detailed description with 5 illustrations.

W. L. BADGER.

Antimony and the war. ANON. *Engineering* 100, 43-5(1915).—A discussion of the supply, uses, methods of production, properties, prices, etc., of Sb and its compds. Its use and value as a hardener of Pb for munitions are briefly discussed. Statistics are given.

F. W. SMITHER.

Beginning of the use of (tungsten) high speed steel. J. M. DODGE. *Am. Machinist* 43, 281(1915).—Historical.

C. G. F.

Anaconda coal pulverizing plant (MATHEWSON) 21. Sampling plant at Hamburg, Ger. 1. Mechanical ore sampler (TAYLOR) 1. Petroleum as fuel for furnaces (BEST) 22.

U. S., 1,147,731, July 27. F. INGRAHAM and D. LYNCH. Furnace for annealing sheet metal, wire, etc.

U. S., 1,148,591, Aug. 3. O. H. KING. Ore concentrator.

U. S., 1,148,770, Aug. 3. C. O. HASKELL. Apparatus for amalgamating gold from ores.

U. S., 1,148,771, Aug. 3. C. O. HASKELL. Apparatus for separating metals from ore pulps by centrifugal action.

U. S., 1,148,782, Aug. 3. W. D. KILBOURN. Reducing lead from its ores in a blast furnace with flux and fuel. The latter, *e. g.*, small coke, is coated with PbO in a sufficiently thick layer to prevent ignition of the fuel at its usual ignition temp. so that it is carried through the furnace to a zone of higher temp. before its ignition and reducing action takes place.

U. S., 1,148,814, Aug. 3. L. ADDICKS and C. L. BROWER. Nearly pure copper is further refined by melting under mildly oxidizing conditions with just sufficient acid material such as SiO₂ to slag off the small amt of impurities in the Cu and produce not more than 1% the wt. of the charge of slag. The molten charge is covered with a protecting layer of C and the firing is regulated so that ash does not come into contact with the charge. The small amt. of Cu oxide formed is poled out.

Brit., 21,738, Sept. 26, 1913. A. NIEWERTH (NEE VLIEX). Furnaces for reducing ores of the kind described in 18,327, 1897, in which a central shaft communicates through openings at different levels with side chambers, and in which means are provided for forcing a current of reducing-gas in either direction through the app. Cf. C. A. 8, 2669.

Brit., 21,807, Sept. 27, 1913. E. FRITSCH. A composition for use in coating metal plates, etc., with aluminium or its alloys, consists of finely divided coating-metal, a readily fusible alloy such as soft solder or a metal such as Sn, capable of acting as a solder, and a resinous or carbonaceous flux, the whole being rendered plastic by the use of a vehicle such as turpentine. An even layer of the paste is applied to the surface of the metal, which is subjected, after drying, to a temp. of about 220° in a muffle under the protection of H, coal-gas, or N. An alloy containing 14 parts of Sn, 3 of Pb, and 1 of Bi, may be used with Al; Al alloys containing also Mn, W, or other hardening-metals, may be used.

Brit., 7,927, Mar. 28, 1914. W. H. KELLY and P. J. MORAN. In mfg. alloys of metals having substantially different m. p., such as alloys of Cu with Fe and steel, or Pb, the metals are subjected before admixt. to the action of O and H. For this purpose, steam from a boiler passes through a superheater wherein it is partly or entirely dissociated, and is then conveyed through a flexible pipe and a nozzle into each of the molten metals. A Cu-steel alloy obtained in this way is suitable for use in sheathing ships; a Cu-Fe alloy for knives; and a Cu-Pb alloy for journal boxes.

Brit., 7,928, Mar. 28, 1914. G. BENSL. Soldering aluminium or its alloys to each other or to Cu, brass, Ag, or Pb, by a solder consisting of Cd 13, Sn 1, and Zn 6 parts.

Brit., 8,270, Apr. 1, 1914. G. A. JOYCE. Alloys of Cu, Ni, and Al, with or without steel, are used for mounting diamonds for industrial purposes, or for making golf clubs. The % comps. of the alloys are as follows: Cu 80.5, Ni 17.06, and Al 2.44; Cu 27.5, 35, and 40, Ni 65, 50 and 45, steel 5, 10 and 10, and Al 2.5, 5 and 5, respectively.

Brit., 8,384, Apr. 2, 1914. W. K. BARTSCH. In sintering ores, etc., a layer of ignited fuel carried by an endless chain grate or like support is brought under a hopper to receive a superposed layer of ore, and air is passed upwards through the layers from an air-box. Several layers of ore may be deposited in succession, and fuel may be mixed with the ore or not. A scraper transfers the sintered charge to a chamber, and gases escape through flues. Cf. C. A. 9, 292.

Brit., 8,611, Apr. 4, 1914. A. RICHARDS. In the treatment of tin ores by the processes described in 26,644, 1911 (C. A. 7, 1789) and 56, 1912 (C. A. 7, 2099), in which the ore is heated with a reducing agent and a solid Cl- or Br-bearing substance, the reaction is effected at about 800° (750-850°) in a reducing or non-oxidizing atm. The charge is prevented from agglomerating into large impervious masses by stirring in a muffle furnace, or by using a rotary furnace, or by showering the granular material in a shaft furnace, producer, or gas oven, against ascending gas and flame, or by treating the charge in thin slabs or blocks. In the last case, after the extn. of the Sn, the temp. may be raised to convert the residue into building bricks or slabs or other com. forms. The extn. of the fume is facilitated by maintaining a reduced pressure within the furnace.

Ger., 282,730, Oct. 30, 1913. METALLWERKE UNTERWESER, AKT.-GES. Process of mfg. receivers for zinc furnaces.

Ger., 283,025, Mar. 22, 1914. G. KUNTZE and M. FRÄNKEL. Welding burner for welding tubes.

Ger., 283,075, Aug. 6, 1912. E. O. LEGGET, GEB. HOLMAN. In a process of refining aluminium, the Al is heated in the presence of such an amt. of H₂SO₄ and KClO₃ that after the formation of O and Cl sufficient K₂SO₄ results to take up the products due to the action of the gases on the impurities in the Al. The Al is placed in a refractory, acid-proof vessel, and H₂SO₄ and KClO₃ are added. The materials are then heated until the Al is liquid, and the mixt. is stirred vigorously to insure contact of the chemicals with all parts of the metal. The mass is then allowed to stand for a time, until the impurities collect upon the surface. The Al is finally drawn off in the pure state, while the dross remains in the vessel. To 1 kg. Al in the form of a thin plate, about 35 g. H₂SO₄ and 70 g. KClO₃ are used. Almost pure Al is obtained; under ordinary conditions it does not oxidize, and may be used for welding. For this purpose it is alloyed with a mixt. of equal parts of Sn and Pb. Sn 12, Pb 12 and Al 2 parts are used. The metals are fused and poured into stick form. The resulting solder can be used without flux.

Ger., 283,126, Feb. 23, 1913. M. KONGSBAK. Autogenous welding and cutting of metal under H_2O . Cf. C. A. 9, 782.

Ger., 283,375, Mar. 11, 1913. G. POLYSIUS. Handling and mixing slime by means of compressed air.

Ger., 283,513, May 8, 1914. NORMAN E. MACCALLUM. Furnace for the manufacture of steel, comprizing a plurality of metallic containers, built up to form the furnace, and containing cores of a basic or neutral material, or a mixt. of both. Magnesite, dolomite, and lime are mentioned, magnesite being preferred. Also, chromite, bauxite, and C can be used. The magnesite is burned, the resulting oxide is ground to a powder, rendered plastic with H_2O , and applied in that state. Cf. C. A. 8, 3286.

Ger., 283,548, July 26, 1913. I. A. LOSNER GEB. DIETSCH. Detinning tin-plate with the aid of oxide salt solns. Heretofore such processes have proved unsatisfactory, inasmuch as most of the salts used act upon the Fe as well as upon the Sn, and therefore the sepn. is rendered difficult. To overcome this objection, satd. aq. solns., instead of dil. solns., of such salts are employed. These satd. aq. solns. of oxide salts (sulfate or chloride of Fe, $SnCl_2$, $CuCl_2$, $SnSO_4$, or solns. of Fe_2O_3 or SnO_2 in satd. aq. solns. of Fe or Sn oxide salts), have the property of hardly attacking the Fe while almost instantly dissolving the Sn. The same action is secured when the active oxide solns. are satd. with indifferent salts, such as Na_2SO_4 , $CaCl_2$, and the like. The cleaned tin-plate is immersed in a satd. aq. soln. of $SnCl_4$, whereupon the detinning process sets in immediately. The detinning soln. is somewhat dild. by the H_2O from the wet scrap, but dissolved Sn is added at the same time, so that the soln. remains almost constant as to concn. The $SnCl_2$ formed is converted, from time to time, by means of Cl or HCl and air, into $SnCl_4$. An excess of free Cl and HCl is to be avoided.

Ger., 283,614, Sept. 6, 1913. A. GUTMANN, AKT.-GES. FÜR MASCHINENBAU. Interchangeable double blast for cupola furnaces.

Ger., 283,636, July 6, 1912. T. GOLDSCHMIDT. Increasing the yield of chromium in the aluminothermic production of C-free ferro-chrome from chromite. Cf. Fr., 453,205 (C. A. 8, 56).

Ger., 283,683, Jan. 14, 1914. C. HEITMANN. App. for producing uniformly thick metal coatings on Fe, steel and other articles, by means of a gas blast. Suitable construction is shown.

Ger., 283,684, Feb. 8, 1914. F. RASMUSSEN & SÖNNER. App. for use in controlling the burner in autogenous welding and cutting of metals.

Ger., 283,872, Feb. 22, 1912. F. MEYER. Agglomerating flue dust, friable ores, and the like, by blowing a mixt. of these substances with a fuel. The friable ore is mixed with sulfide ores, moistened, ignited, and blown, while stirring, and then allowed to agglomerate while cooling. The amt. of sulfide ore is apportioned so that the mass does not melt, adding sufficient, however, to effect the agglomeration of the mass and yield SO_2 suitable for manuf. to H_2SO_4 .

Ger., 283,922, May 6, 1914. F. JÜNGST. Working slimes with the aid of a roll grating with gradually diminishing interspaces, and a washing liquid, whereby the solid matter is collected in different receptacles according to the size of the particles.

Ger., 283,965, Feb. 6, 1914. Addition to 254,029 (C. A. 7, 1142). H. SPECKETER. Constructional details of a zinc furnace, with 2 or more reducing chambers.

Ger., 284,067, Aug. 29, 1911. Addition to 282,899 (C. A. 9, 2378). E. FRITSCH. In coating sheet metal with aluminium, the welding paste specified in the principal patent is prepd. with the aid of the low m. alloys of Bi. Mn powder may be added to the powdered alloy. Wax or copal may be used as binders, but especially

organic substances whose vaporization point is higher than that of the metal alloy, but lower than that of Al. About 10-15 parts Bi or Bi alloy are used to 100 parts Al. The flux consists, e. g., of Al 100, Bi 25, Sn 2, Pb 0.5, Mn 1.5 parts, with copal soln. as binder.

10. ORGANIC CHEMISTRY.

C. A. ROULLER.

Leuco derivatives of indigo dyes and their etherification. M. CHILIKIN. *J. Russ. Phys. Chem. Soc.* 47, 539-52 (1915).—In continuation of his work on indigo (C. A. 8, 912) C. made the following compds.: Methylquinolindigo, $\text{HO} \text{CMe} \cdot \text{C}_6\text{H}_4 \cdot \text{NH} \cdot \text{C} \text{:-}$

C.NH.C₆H₄.CO, prepd. by the action of Me_2SO_4 on the Na salt of leucoindigo

in a H atm., cryst., transparent in transmitted and almost black in reflected light, m. about 209° , decomp. 235° , colored olive-green by H_2SO_4 , difficultly sol. in all solvents, volatile, giving indigo-like vapors. Ethylquinolindigo (not perfectly pure) made with EtI instead of Me_2SO_4 , light powder of a dark color, m. about 216° (decompn.), forms a bright yellow zinc salt which gives with MeOH containing some H_2SO_4 a dark soln. from which H_2O ppts. a black powder. Amylquinolindigo, made with AmBr, bluish green powder, m. $160-2^\circ$, dissolves in MeOH with reddish and in H_2SO_4 with bluish green color. Benzylquinolthioindigo, $\text{PhCH}_2\text{C}(\text{OH}) \cdot \text{C}_6\text{H}_4 \cdot \text{S} \cdot \text{C} \text{:-}$

C.S.C₆H₄.CO, made by the action of $\text{Me}_2\text{Ph}(\text{PhCH}_2)\text{NCl}$ on the Na salt of leucothio-

indigo (a), microcryst. reddish powder, m. $56-7^\circ$. Ethylquinolthioindigo ethyl ether, made by the action of EtI on (a), crystals, m. $145-6^\circ$, is colored dark orange by H_2SO_4 . Benzyl ether, made with PhCH_2I instead of EtI, very small rose-colored crystals, m. $211-1.5^\circ$. By the interaction of EtI with the Na salt of leucothioindigo-scarlet R (b) a compound was obtained whose formula is either $\text{EtOCEt} \cdot \text{C}_6\text{H}_4 \cdot \text{S} \cdot \text{C} \text{:-}$ $\text{C} \cdot \text{C}_6\text{H}_4 \cdot \text{NH} \cdot \text{CO}$

or $\text{CO} \cdot \text{C}_6\text{H}_4 \cdot \text{S} \cdot \text{C} \text{:-}$ $\text{C} \cdot \text{C}_6\text{H}_4 \cdot \text{NH} \cdot \text{CEtOEt}$, colorless crystals, m. 166.5° , while PhCH_2Cl

gave with (b) a compound of similar structure, microcryst., bright yellow powder, m. $198.5-200^\circ$. The Na salt of leucothioindigo-scarlet 2G gave with EtI the compound $\text{EtOCEt} \cdot \text{C}_6\text{H}_4 \cdot \text{S} \cdot \text{C} \text{:-}$ $\text{C} \cdot \text{C}_{10}\text{H}_6 \cdot \text{CO}$, microcryst. orange powder, m. $194-5^\circ$.

H. M. GORDIN.

Halogen derivatives of the hydrocarbons of the diphenylmethane group. A. M. NASTYUKOV AND V. F. ANDREEV. *J. Russ. Phys. Chem. Soc.* 47, 552-8 (1915).—Using N.'s method (C. A. 3, 637), 3,3-dichlorodiphenylmethane, $\text{CH}_2(\text{C}_6\text{H}_4\text{Cl})_2$, was prepd. by treating PhCl with HCHO in presence of H_2SO_4 and decomp. the resulting formolite by heat (yield 15%), heavy, almost colorless, slightly fluorescent liquid, b. $317-8^\circ$, d_{21}^{21} 1.2336, $n_{19.4}^{19.4}$ 1.5948, solidifies in a freezing mixt. and then m. 8° , gives upon oxidation with CrO_2Cl_2 a dichlorobenzophenone m. $126-7^\circ$, whose oxime m. $132-3^\circ$. By the same method o- and p-MeC₆H₄Cl gave the corresponding dichloroditolylmethanes, the compd. from the o-isomer being a liquid, b. $340-3^\circ$, not solidifying upon cooling, d_{20}^{20} 1.2232, $n_{19.7}^{19.7}$ 1.59, and giving upon oxidation a dichlorotoluphenone m. $132-3^\circ$, while the compd. from the p-isomer b. 205° and solidifies on cooling to needles m. 42° . With p-C₆H₄Cl₂ the reaction did not go, even in presence of much H_2SO_4 . H. M. G.

Isomerization of cyclic compounds. N. A. ROZANOV. *J. Russ. Phys. Chem. Soc.* 47, 591-610 (1915).—With a view to detg. the regularities of isomerization of cyclic compds., cyclopentanol (a) was subjected to several reactions. When treated

with HI (a) was not isomerized, the product being cyclopentyl iodide (b). With AgNO_2 the latter gave NO, HCN (whose formation is difficult to explain), cyclopentyl nitrite, small amts. of what seemed to be $\text{CH}_3\text{CH}_2\text{CH}_2\text{C}:\text{CH}_2$ (c) (not examd. as such but as

the dibromide $\text{C}_5\text{H}_8\text{Br}_2$) and $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHNO}_2$, and considerable amts. of

$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}(\text{NO})\text{NO}_2$ and 1,1-methylnitrosotetramethylene $\text{CH}_3\text{CH}_2\text{CH}_2\text{CMeNO}_2$

(d), b_{10} 80–2°, d_4^{20} 1.0795, n_D^{20} 1.4589. Attempts to reduce (d) to an amine, in order to change the latter to the corresponding alc., failed, the reduction (with Sn + HCl) completely destroying the ring with formation of NH_4Cl and volatile hydrocarbons. By Grignard's method (b) was converted into cyclopentylcarbinol (e), and this by means of HI into $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHCH}_2\text{I}$. The latter, upon treatment with AgNO_2 ,

gave a small amt. of $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CHNO}_2$ (f), and considerable amts. of

$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CMeNO}_2$ and cyclopentylnitromethane, $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHNO}_2$,

liquid, b_{10} 110°, d_4^{20} 1.0713, n_D^{20} 1.4587. When (e) is treated with $(\text{CO}_2\text{H})_2$ the product is not $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}:\text{CH}_2$, but its isomer $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}:\text{CH}$ (g) which

upon oxidation gives $(\text{CH}_2\text{CH}_2\text{CO}_2\text{H})_2$. The formation of (c), (d), (f) and (g) shows that, contrary to Baeyer's opinion, the 5-membered ring is as capable of isomerization as other rings, and that isomerization may be produced not only by acids, but even by such mild reagents as AgNO_2 . The isomerization of the 5-membered ring is subject to the same regularities as that of other rings, namely, in the presence of a side-chain the resulting ring contains the 1 C atom more, while in the absence of a side-chain it contains 1 C atom less than the original ring. Raising the reaction temp. facilitates isomerization, while lowering the temp. retards it. Several of the compds. isolated in this work were examd. spectroscopically.

H. M. GORDIN.

Condensation of β -diketones with diamines. Preliminary communication. N. A. ROZANOV. *J. Russ. Phys. Chem. Soc.* 47, 611–3 (1915).—Treated with $(\text{CH}_2\text{NH}_2)_2$, CH_3Ac_2 yields a cryst. compound m. 112–3°, while MeCHAc_2 yields a cryst. compound m. 154–5°. Both are easily sol. in H_2O , difficultly sol. in alc. or Et_2O . Assuming the above diketones to react in the enol form, the constitutions of the 2 compds. are supposed to be resp. $\text{MeC}:\text{CH.CMe}:\text{N.CH}_2\text{CH}_2\text{NH}$, and $\text{MeC}:\text{CMe.CMe}:\text{N.CH}_2\text{CH}_2\text{NH}$.

Further exam. of these and similar reaction products of diketones with diamines are under way.

H. M. GORDIN.

Interaction of dehydrobenzoylacetic acid with ammonia, amines and other nitrogen bases. IV. SHETTLÉ. *J. Russ. Phys. Chem. Soc.* 47, 645–79 (1915).—When $\text{PhC}:\text{CH.CO.CHBz.CO.O}$ (a) interacts in the cold with NH_3 or its derivs. RNH_2 , the

anhydride O of (a) is replaced by NR (R = H when NH_3 is used), and the general formula of the resulting products is $\text{PhC}:\text{CH.CO.CHBz.CO.NR}$ (b). This formula,

better than any other, accounts for the fact that both concd. HCl and concd. KOH convert the reaction product of (a) and NH_3 into $\text{PhC}:\text{CH.CO.CH}:\text{CPh.NH}$ (c).

In the case of concd. HCl this conversion is direct, while with concd. KOH the acid $\text{PhC}:\text{CH.CO.C}(\text{CO}_2\text{H}):\text{CPh.NH}$ (d) is formed intermediately, this by the action of heat

losing CO_2 and changing to (c). When R in (b) is not H, the reaction with concd.

HCl or concd. KOH is slightly different, the latter completely decomp. (b), while the former gives (c) instead of the expected NR compd., the R being eliminated as ROH. Entirely different is the reaction of (b) with very dil. HCl or KOH. In these cases (a) is regenerated. It is supposed that with dil. acid or alk. $\text{PhC(OH):CHCOCHBz-CONHR}$ appears as intermediate product. The mutual displacement of NH_3 and its derivs. (according to which of them is in excess), previously observed for those compds. of formula (b) in which R is either H or Me (C. A. 6, 1602), was found to hold good for all the compds. of formula (b) described in this work, except that in which R is $\text{NH}_2\text{-CONH}$, obtained by the interaction of (a) with $\text{NH}_2\text{CONHNH}_2$. While the latter is capable of driving out NH_3 and all of its derivs. from (b), it is itself not displaceable by these, with the exception of PhNHNH_2 and NH_4OH . This mutual displacement of NH_3 and its derivs. in heterocyclic N compds. does not seem to be a perfectly general reaction. Thus it does not take place with $\text{MeC:CH.CO.CHAc.CO.NPh}$

(Tzonev and Petrenko-Kritchenko, C. A. 7, 3966) or with the esters of $\text{PhC:C(CO}_2\text{H).CO.C(CO}_2\text{H):CPh.NH}$ (unpublished work by V. Iv. Shtvan). When

the interaction of (a) with NH_3 or its derivs. takes place in sealed tubes at an elevated temp., entirely different substances result. Thus while with a large excess of NH_3 (a) gives a (b) in which R is H, with a limited amt. of it there is elimination of BzOH and formation of the compound $\text{PhC:CH.CO.CH}_2\text{.CO.NH}$

(e), while MeNH_2 gives the compound $\text{MeNHCPh:CHCOC(:CPhNHMe)-C(NHMe)_2OH}$ (f), and EtNH_2 gives the compound $\text{EtNHCPh:CHCOC(:CPhNHEt)-C(NHEt)_2OH}$ (g). With PrNH_2 and PhCH_2NH_2 at a high temp. (a) also enters into reaction, but no definite compds. could be isolated from these reaction products. The latter are rich in N, and will be examd. later. With secondary amines in the cold (a) or (b) did not react. At a high temp. they reacted with Me_2NH to form the compound $\text{Me}_2\text{NCPH:CHCOC(:CPhNMe}_2\text{)CONMe}_2$ (h), while with Et_2NH the reaction product yielded nothing definite. When Et_2NH was used in limited amts. and the reaction temp. not permitted to rise above $110\text{--}20^\circ$, its reaction product with the (b) in which R is H yielded a small amt. of (a). Evidently Et_2NH reacts in this case like very dil. KOH. With Ph_2NH (a) could not be made to react under any conditions. The new compounds (b) described in this work are as follows: *Ethyl* (R = Et), m. $172\text{--}3^\circ$, gives some diphenylpyrone when heated with concd. HCl. *Propyl*, m. $147\text{--}7.5^\circ$. *Isopropyl*, m. 180° . *Butyl*, m. 114° . *sec-Butyl*, m. 167° . *Isobutyl*, m. 167° . *Amyl*, m. 118° . *Isoamyl*, m. $125\text{--}6^\circ$. *Heptyl*, m. $83\text{--}4^\circ$. *Allyl*, m. $143\text{--}4^\circ$. All of the above compds. are not colored by FeCl_3 . *Phenyl*, m. $203\text{--}4^\circ$, is colored red by alc. KOH or by standing in contact with FeCl_3 . *Benzyl*, m. $172\text{--}3^\circ$. *Phenylethyl*, (R = PhCH_2CH_2), m. $150\text{--}0.5^\circ$. *o-Tolyl*, m. $200\text{--}1^\circ$. *m-Tolyl*, m. $212\text{--}4^\circ$. *p-Tolyl*, m. $202\text{--}3^\circ$. *α-Naphthyl*, m. $215\text{--}6^\circ$. *β-Naphthyl*, m. $243\text{--}4^\circ$. *Diphenylamino* (R = Ph_2N), golden yellow crystals, m. $160\text{--}1^\circ$, turning red. *Carbamino* (R = $\text{NH}_2\text{-CONH}$), m. 180° , and has acid properties. This compd. differs from the preceding ones in 2 points. With concd. KOH it gives, with elimination of $\text{NH}_2\text{CO}_2\text{H}$, the salt $\text{PhC:CH.CO.C(CO}_2\text{K):CPh.NNH}_2$ which is decompd. by acids with formation of the

lactam $\text{PhC:CH.CO.C:CPh.N.NH}$, m. $160\text{--}1^\circ$, while with very dil. KOH it yields a

very small amt. of this lactam, most of it remaining unchanged. The compound $\text{PhC:CH.CO.CH(CPh:NOH).CO.NOH}$, from free NH_4OH and either (a) or (b), m. 151--

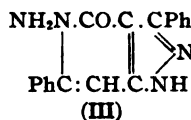
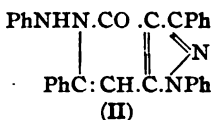
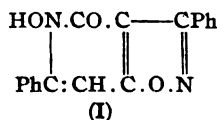
2° , is colored violet-red by FeCl_3 , has acid properties, being sol. in KOH and in NH_4OH ,

forms a *silver salt*, $C_{18}H_{15}O_4N_2Ag_2$, is not affected by hot HCl under ordinary pressure, but is completely decompd. by it in a sealed tube. With $NH_2OH.HCl$ (a) and (b)

interact to form 2 substances: (x) the compound $PhC:CH.CO.C:CPh.O.N.CO$,

needles, m. 218° , insol. in aq. alkalis, not colored by $FeCl_3$, is completely decompd. by heating with HCl in a sealed tube, and is converted by concd. alc. KOH, with elimination of BzOH, into the compound $PhC:CH.CO.CH_2.CO.NOH$, m. $182-3^\circ$, gives a

slight coloration with $FeCl_3$, and forms a *silver salt*, $C_{17}H_{13}O_3NAg$, and an unstable *acetate*. (2) The compound (I), m. 193° , is colored dark blue by $FeCl_3$, gives a *potas-*



sium salt, m. $232-3^\circ$, a *silver salt*, $C_{18}H_{11}O_3N_2Ag$, and an *acetate*, $C_{20}H_{14}O_4N_2$, m. 178° , and yields with HCl at 170° α -phenazyl- γ -phenylisoxazole, $BzCH_2C:CH.CPh:N.O$

(i), cryst., m. 90° , is not colored by $FeCl_3$, gives an *oxime*, m. 148° , but no hydration. Instead of the latter (i), when treated with $PhNHNH_2$, changes to the corresponding *pyrazole derivative* $BzCH_2C:CH.CPh:N.NPh$, m. 169° . Upon oxidation

(i) yields BzOH and γ -phenylisoxazole- α -carboxylic acid, $HO_2C.C:CH.CPh:N.O$, m.

$177-8^\circ$. With either $PhNHNH_2$ or $PhNHNH_2.HCl$ (a) and (b) react to form the compound (II), m. $268-9^\circ$, is colored by alc. KOH, but not by $FeCl_3$, is not affected by heating to nearly 200° with HCl or KOH. With N_2H_4 (I) and (II) react to form the compound (III), m. $280-1^\circ$, is colored dark brown by $FeCl_3$, and withstands heating with HCl or KOH. Contrary to the statement of Rotenburg (*Ber.* 27, 790), no trace of phenylpyrazolone is produced in his reaction. (d) m. $243-5^\circ$, is insol. in all solvents, except AcOH or alkali or alk. carbonates. The (d) described by Feist (*Ber.* 23, 3734) must have been impure. (e) m. $244-5^\circ$, is not colored by $FeCl_3$, withstands heating with acids or alkalis, and does not react with NH_2OH , $PhNHNH_2$, or amines, showing that with the disappearance of a side-chain from (b) the mol. acquires greater stability, so that no displacement of NH_2 by amines can take place. (b) m. $116-8^\circ$, gives a dark blue color with $FeCl_3$, and reacts with NH_2OH with elimination of $MeNH_2$ and formation of the compound $PhC:CH.CO.CH(CPh:NOH).CO.NOH$, m. $151-2^\circ$, and gives a dark

red color with $FeCl_3$. With $PhNHNH_2$ (b) reacts to form the compound $PhC:CH.CO.CH(CPh:N.NHPh).CO.N.NHPh$, m. $137-8^\circ$, is colored reddish by alc.

KOH. (g) m. $92-4^\circ$, gives a dark color with $FeCl_3$, and behaves with NH_2OH and $PhNHNH_2$ like (f). (h) m. $218-9^\circ$, is not colored by $FeCl_3$, gives a *hydrochloride*, m. $228-30^\circ$, and a *chloroplatinate*, $(C_{24}H_{21}O_2N_3)_2.4HCl.2PtCl_6$, and does not react with NH_2OH , $PhNHNH_2$, or amines. Heated with HCl in a sealed tube (h) changes, with elimination of BzOH, to the compound $Me_2NCPh:CHCOCH_2CONMe_2$, m. $208-10^\circ$; *chloroplatinate*, $(C_{18}H_{20}O_2N_3)_2.2HCl.PtCl_6$.

H. M. GORDIN.

Addition of hydrogen to acetylene derivatives. V. Hydrogenation of tetraethylbutindiol. YU. S. ZAL'KIND AND N. K. BUISTRYAKOV. *J. Russ. Phys. Chem. Soc.* 47, 680-8 (1915).—Tetraethylbutindiol, $[Et_3C(OH)C:]_2$ (a), was made by acting with Et_3CO on $(BrMgC:)_2$ and decomp. the product with dil. H_2SO_4 . Solns. of (a)

in Et_2O were hydrogenated in presence of Pd black or Pt black as catalyzers, and the amts. of H consumed after definite time intervals detd. By varying the amts. of catalyzer and the concn. of the solns. the influence of these factors for each of the catalyzers on the value of the velocity const. (k) of the reaction of addition of H to (a) was studied. For calcg. (k) the usual equation for monomol. reactions was used. The diagrammatic and profusely tabulated results may thus be summarized: Both with Pd and Pt the hydrogenation of (a) is a slow process, and is slower with the former than with the latter. With Pt the values of (k), within wide limits, are almost proportional to the amts. of catalyzer used, while with Pd, down to a certain limit, its amt. has no influence on the value of (k). With a very small amt. of Pd (0.005 g.), however, the value of (k) becomes very small. With larger amts. of Pd (k) continually increases until 90% of the required amt. of H (4 atoms) has been added, while with 0.005 g. (k) begins to decrease after 50% of the required H has been consumed. With Pt (k) is comparatively large until 50% of the required H has been added, and then gradually drops until 90% of it has been consumed. This is ascribed to a reduction of the OH of (a) which, being very slow, does not effect (k) before the addition reaction approaches completion. The following compds. were obtained in the course of the work: *Tetraethylbutanediol*, $[\text{Et}_4\text{C}(\text{OH})\text{CH}_2]_2$, crystals, m. $66-7.5^\circ$, gives a liquid acetate of an agreeable odor, and is converted by H_2SO_4 into the oxide $\text{C}_{12}\text{H}_{24}\text{O}$, liquid of agreeable odor, b. $204-6^\circ$, b₁ $89-90^\circ$. *Tetraethylbutenediol*, $[\text{Et}_4\text{C}(\text{OH})\text{CH}]_2$, odorless crystals, m. $77-8.5^\circ$, is not appreciably colored by H_2SO_4 . VI. Hydrogenation of dimethyldiphenylbutindiol. YU. S. ZAL'KIND AND K. V. KVAPISHEVSKII. *J. Russ. Phys. Chem. Soc.* 47, 688-703 (1915).—Expts. similar to those recorded above were made with the 2 inactive stereoisomers (a), m. 163° , and (b), m. $125-7^\circ$, of $[\text{MePhC}(\text{OH})\text{C}]_2$ (Dupont, *Compt. rend.* 155, 1121). The results, given in the tables and curves, may thus be summarized: With colloidal Pd (a) is less readily hydrogenated than (b), while with Pt black the reverse is the case. With a given amt. of catalyzer the value of the velocity const. (k) is fairly const. for (b) while for (a) it gradually decreases as the hydrogenation progresses. With certain amts. of catalyzer (k) was not const. at all. While acknowledging their inability to explain the inconstancy of (k), Z. and K. are nevertheless reluctant to admit the applicability of Orlov's insufficiently tested modified equations (Khar'kov, "Kinetics of Chem. Reactions and Catalysis," 1913), which he claims (in private correspondence) would give more const. values of (k) than the equation used by them. Within certain limits the values of (k) are nearly proportional to the amts. of catalyzer used, particularly in the first stages of hydrogenation. With both Pd and Pt the hydrogenation slackens after H_2 has been added for 1 mol. of (a) or (b), and this slackening is more pronounced with Pd than with Pt. The compds. obtained in this work are as follows: *Dimethyldiphenylbutenediol*, $[\text{MePhC}(\text{OH})\text{CH}]_2$ (c), from either (a) or (b). The (c) from (a) m. $97-102^\circ$, colors H_2SO_4 yellowish, and gives upon bromination in CHCl_3 the bromide $\text{C}_{18}\text{H}_{18}\text{BrO}_2$, m. 161° , as sole product, showing this (c) to consist of only 1 of its 2 possible stereoisomers. Other attempts to resolve this (c) into optical antipodes also failed. Prolonged boiling with 15% H_2SO_4 failed to convert this (c) into an oxide. The (c) from (b) m. 110° , gives the same color with H_2SO_4 as the other (c), but is much more readily sol. in Et_2O , and is easily changed by dil. H_2SO_4 to the oxide $\text{C}_{10}\text{H}_{18}\text{O}$, liquid of agreeable odor. The fact that the latter is the sole product in this reaction shows that this (c), too, wholly consists of only 1 of its 2 possible stereoisomers. Expts. proved that hydrogenation of (b), even without using any catalyzer, also yields the (c) m. 110° . *Dimethyldiphenylbutanediol*, $[\text{MePhC}(\text{OH})\text{CH}_2]_2$ (d), from either (a) or (b). The (d) from (a) m. 142° , while that from (b) m. 154° . The (d) from (b) gave, upon boiling with dil. H_2SO_4 , the oxide $\text{C}_{18}\text{H}_{20}\text{O}$, m. 72° .

H. M. GORDIN.

Syntheses with the aid of acetylene. Preliminary communication. A. E. CHICHIBABIN. *J. Russ. Phys. Chem. Soc.* 47, 703-13(1915).—With a view to studying the condensation of hydrocarbons of the C_2H_2 and the C_2H_4 series and their union with nonmetals and their compds., C. examd. the reaction of C_2H_2 and C_2H_4 with NH_3 , H_2O , H_2S or S at high temps. in presence of Al_2O_3 , Cr_2O_3 , Fe_2O_3 , Fe , ZnO , NiO , TiO_2 , ThO_2 , SiO_2 , kaolin and $AlPO_4$, as catalyzers. The condensation of C_2H_2 alone under these conditions was also studied. The results were as follows: The reaction between C_2H_2 and NH_3 in presence of catalyzers takes place at a comparatively low temp. (300°). The product consists of pyrrole, α - and γ -picolines, the collidines $AcH \cdot NH_3$, and H. Pyridine itself or its homologs with an uneven number of C atoms in the mol. are not formed in this reaction. Under the same conditions, C_2H_4 gives with NH_3 the same products as C_2H_2 , but the temp. must be higher. It is possible that the high temp. changes first the C_2H_4 to C_2H_2 . With H_2S or S, C_2H_2 gives at a comparatively low temp. thiophene as chief product, together with its homologs containing an even number of C atoms in the mol. The reaction is suitable for making thiophene on a large scale, and it gives a purer product than that of Steinkopf and Kirchoff (*C. A.* 7, 538). Expts. with AcH showed that under the same conditions it gives the same products as C_2H_2 . Hence it may be assumed that either the AcH first loses H_2O , changing to C_2H_2 , or that the latter, in the unavoidable presence of traces of H_2O , changes first to AcH . With BzH and NH_3 , AcH gave α - and γ - PhC_2H_4N . The formation of AcH from C_2H_2 was discovered long ago by Kuchеров, though Gruenstein lately was given a patent for the method. (Cf. *C. A.* 8, 790.)

H. M. GORDIN.

Cryoscopic investigation of the combinations of dimethylpyrone with acids. V. A. PLOTNIKOV. *J. Russ. Phys. Chem. Soc.* 47, 730-7(1915).—In order to det. with how many mols. of acid 1 mol. of dimethylpyrone (a) is able to form salts, f.-p. detns. were made on (a) in C_6H_6 to which varying amts. of either CCl_3CO_2H or CBu_3CO_2H were added. The results showed that (a) forms 3 types of salts with these acids: (a).(b) (b = acid), (a).2 (b), 2(a).(b). The salts of the 1st type dissolve without decompn.; those of the 2nd are partly dissociated into (a) and salts of the 1st type; those of the 3rd are dissociated to a considerable extent.

H. M. GORDIN.

Dihydroresorcinols and their reduction. A. E. USPENSII. *J. Russ. Phys. Chem. Soc.* 47, 738-51(1915).—The following reduction products of $CH_3.CO.CH_2.CH_2.CO$

(a) and its derivs. are described: Cyclohexane-1,3-diol, $CH_3.CH(OH).CH_2.CH_2.CH_2.CH_2OH$

(by Zelinskii and Chervyakov, private communication), b_{11} $138-41^\circ$, gives an *acetate*, b_{11} $127-8^\circ$; 1,1,2-trimethylcyclohexane-1,3-diol, from $Me_3C.CHMe.CO.CH_2.CO.CH_3$

(b), crystals of a bitter-sweet taste, m. 149° ; 5-phenylcyclohexane-1,3-diol, from $PhCH.CH_2.CH(OH).CH_2.CH(OH).CH_2$ (c), crystals of a bitter-sweet taste, m.

160° . If yields be taken as criterion of facility of reduction, the following arrangement will represent a descending series in respect to this facility: 1,1-dimethylcyclohexane-1,3-diol (Zelinskii and Uspenskii, *C. A.* 7, 3600), (c), (a), (b). Attempts to reduce $MeCH.CH_2.CO.CH_2.CO.CH_2$ were not successful, chiefly because it could not be

obtained in sufficient amt. The above arrangement shows that no relation exists between facility of reduction and number of Me groups. Some relation can be noticed between reducibility and hydrolyzability, the more readily reducible compds. in this series being the least hydrolyzable. This rule fails, however, in the case of (c).

H. M. GORDIN.

Racemization of phenyl-*p*-tolylacetic acid. ALEXANDER MCKENZIE AND SYBIL T. WIDDOWS. Univ. Coll., Dundee, and Birkbeck Coll., London. *J. Chem. Soc.* 107, 702-15 (1915).—A modification of Gyr's method (*C. A.* 3, 650) was used for the prepn. of *dl*-4-MeC₆H₄CHPhCO₂H (*A*), which, when crystd. from dil. AcOH, m. 115-6°. One mol. (*A*) in boiling EtOH was heated with 1 mol. cinchonidine. The mixt. when allowed to cryst. in an ice chest yielded the *cinchonidine d*-phenyl-*p*-tolylacetate, needles (after 6 recrystns. from EtOH), m. 204-5° (decompn.), $[\alpha]_D^{16}$ in CHCl₃ -35°; this, when shaken with an excess of dil. H₂SO₄ and extd. with Et₂O, yielded *d*-phenyl-*p*-tolylacetic acid (*B*), feathery needles from dil. AcOH, m. 83-4°, $[\alpha]_D$ in acetone 14.6° (the influence of temp. between 12° and 33° being very slight). The *l*-rotatory mother liquors from the 1st crystns. of the (*B*) cinchonidine salt were acidified, the products united, dissolved in EtOH and treated with quinine. The *quinine salt* of the *l*-acid after a long series of crystns. finally yielded a fairly pure *l*-phenyl-*p*-tolylacetic acid (*C*), $[\alpha]_D$ -13.9°, the difficulty in purification being probably due to the formation of mixed crystals of the quinine salts of (*B*) and (*C*). (*B*) when heated at 100° with an excess of aq. KOH undergoes partial racemization, yielding upon acidification a mixt. of acids, $[\alpha]_D$ in acetone 9.1°. 1 mol. of (*A*) when heated at 150° for 3 hrs. with 4.5 mols. *l*-menthol in the presence of H₂SO₄ yielded a mixt. of *d*- and *l*-menthyl esters, the *l*-ester being slightly in excess, as shown by the polarimetric exam. of the residual unesterified acid, which instead of, being the inactive (*A*) showed a slight *d*-rotation. A 75% yield of *l*-menthyl *dl*-phenyl-*p*-tolylacetate (*D*), b₁₂ 250°, rectangular needles from aq. alc., m. 54-5°, $[\alpha]_D^{16}$ in acetone -59.2°, was obtained by converting (*A*) into the acid chloride and treating the latter with *l*-menthol in the presence of PhH and C₆H₅N. On submitting (*D*) to fractional sapon. 3 different fractions, all feebly *l*-rotatory, were obtained. The *l*-menthyl ester of (*B*), needles, m. 53-4°, $[\alpha]_D^{14}$ in acetone -53°, incompletely sapond. when boiled for 1.3 hrs. with a slight excess of alc. KOH, the fraction of ester remaining unsapond. having a somewhat higher $[\alpha]_D$ than the original ester, indicating that the ester had suffered catalytic racemization prior to sapon. The sapond. portion yielded the *dl*-acid (*A*). Similarly the *l*-menthyl ester of (*C*), m. 57-8°, $[\alpha]_D$ not given, yielded (*A*) upon sapon. *l*-Bornyl ester of (*A*), bright blue oil when freshly distd., b₁₂ 249°, on fractional sapon. yielded (practically inactive) (*A*). *l*-Bornyl ester of (*B*), b₁₂ 240°, when heated with a slight excess of alc. KOH yielded (*A*). If the sapon. was carried out at room temp. during 7 days, the recovered acid was very slightly *d*-rotatory. *d*-4-MeC₆H₄CHPhCO₂Et, m. 39-40° (cf. Zincke, *Ber.* 10, 997), also yields (*A*) on sapon. (*A*) when submitted to the Friedel-Crafts reaction with PhH and AlCl₃ yielded *dl*-phenyl-*p*-tolylacetophenone, C₇H₇CHPhBz (*E*), hexagonal plates from light petr., m. 159-60°, and an unidentified compound b₁₂ 120°, m. 28-9°. Under similar conditions (*B*) also yielded (*E*). The above expts. indicate that (*B*) and (*C*) are much more readily racemized than is the corresponding PhCH(OH)CO₂H under similar conditions. M. and W. give a critical review of the literature dealing with desmotropic changes during racemization and conclude that the occurrence of desmotropism appears to be the most satisfactory interpretation of racemization of active compds. under the influence of alkali. The mechanism of the reactions involved in the racemization of (*B*) or (*C*) may be represented by some such scheme as the following:

$$\begin{array}{ccccc}
 \text{C}_7\text{H}_7\text{CHPhCO}_2\text{H} & \longrightarrow & \text{C}_7\text{H}_7\text{CHPhC.OH} & \longrightarrow & \text{C}_7\text{H}_7\text{CPh:C.OH} \\
 \text{(active)} & & \text{(active)} & & \text{(inactive)} \\
 & & \begin{array}{c} \parallel \\ \text{O} \\ \diagup \quad \diagdown \\ \text{K} \quad \text{OH} \end{array} & & \begin{array}{c} \diagup \quad \diagdown \\ \text{O}-\text{H} \\ \text{K} \quad \text{OH} \end{array}
 \end{array}$$

→ C₇H₇CHPhCO₂K + H₂O, emphasizing that addition precedes desmotropism.

LOUIS E. WISE.

Constitution of carbamides. II. Relation of cyanamide to urea. Constitution of cyanamide and the mechanism of its polymerization. EMIL A. WERNER. Trinity Coll., Dublin. *J. Chem. Soc.* 107, 715-28(1915); cf. *C. A.* 8, 2342.—Although a number of expts. dealing with the mechanism of polymerization of cyanamide (*A*) have been published (cf. Grube and Krüger, *C. A.* 8, 876; Morrell and Burgen, *C. A.* 8, 2590), the primary question of the constitution of (*A*) has not been discussed and the structural formula NCNH_2 has been considered to represent all of the properties of (*A*). In pure, neutral solns. of (*A*), which are exceedingly stable, W. assumes the existence of an electrostatic equil. which may be represented by the scheme: $\text{C}(\text{:NH})_2$ (*a*) $\rightleftharpoons$ NCNH_2 (*b*).
(acidic form) (basic form)

The addition of either an acid or a base to this neutral soln. will disturb the equil. and polymerization will begin as the result of an effort to maintain equil., *e. g.*, the addition of a strong acid will neutralize the *basic form* (*b*), causing the conversion of (*a*) into (*b*) and polymerization with the formation of dicyanodiamide (*B*), $\text{H}_2\text{NC:N.C}(\text{NH}_2)\text{:N}$

(Hoffman's formula). On the other hand, if a base is added to the soln. of (*A*), (*b*) passes into (*a*) which is polymerized with the formation of (*B*), $\text{HN:C.NH.C}(\text{:NH})\text{:NH}$

(Baumann's formula). G. and K.'s ionic theory, which throws little light upon the mechanism of polymerization, is unsound since polymerization of (*A*) has been shown to take place in non-ionizing solvents, such as dry Et_2O . W.'s equil. theory, however, is in complete agreement with all facts observed by G. and K. and by M. and B. Although (*A*) furnishes a neutral soln., its acidic character, as far as the production of metallic derivs. is concerned, is more pronounced than are its basic properties. W. shows experimentally that a weak base like NH_4OH has a greater disturbing effect on the equil. (*a*) $\rightleftharpoons$ (*b*) and therefore a greater accelerating influence on polymerization than a correspondingly weak acid like AcOH . Even traces of alkali extd. from glass vessels cause decided polymerization. The polymerization of (*A*) by heat alone is also satisfactorily explained by W.'s hypothesis. (*A*) and HNO_2 (liberated by the action of AcOH on NaNO_2) showed no signs of interaction even after an hr., a result which could not be expected, provided (*A*) were wholly present in the (*b*) form. In the presence of H_2SO_4 , (*A*) reacted instantaneously with HNO_3 with the evolution of N, the vol. of which after 2 min. amounted to 50% of the theoretical vol. demanded by the equation $\text{NCNH}_2 + \text{ONOH} \rightarrow \text{N}_2 + \text{H}_2\text{O} + \text{NCOH}$. This reaction was followed by a very slow continuous evolution of gas composed largely of CO_2 and due mainly to the gradual hydrolysis of NCOH . After an hr. over 0.5 of (*A*) was still unchanged and much free HNO_3 was present. Even when the reaction was allowed to continue for 20 hrs. nearly 13% of (*A*) still remained undecompd. These results are in harmony with W.'s equil. theory. Apparently (*b*) is rapidly decompd. at the outset by HNO_3 and (*a*) passes gradually into (*b*) in an effort to maintain the equil. The expts. show that in a normal soln. of (*A*), the equil. mixt. contains about 60% (*a*) and 40% (*b*). W. shows experimentally that the general impression that (*A*) is readily hydrolyzed with the formation of urea is erroneous. Even on heating in a sealed tube with H_2O alone for several hrs. at $120-30^\circ$, (*A*) yielded no urea, in fact the production of urea in the free state from (*A*) was never accomplished. Baumann's expts. (*Ber.* 6, 1373) in which urea nitrate was formed from (*A*) in moist Et_2O by means of HNO_3 (d. 1.42) were repeated and studied quant. W. shows that the amt. of urea nitrate formed is detd. by the quantity of HNO_3 present. When insufficient HNO_3 was added to completely convert (*A*), the residual (*A*) remained unpolymersed in soln., since the NHO_2 was always quant. removed by the urea formed. Provided sufficient H_2O was originally present in the (*A*) soln. to theoretically bring about complete dissociation of the urea nitrate if formed, no urea was generated, and the presence of HNO_3 only caused the gradual polymerization of (*A*).

These results are in harmony with the contention that urea in the static condition has the structure $\text{HN}:\text{C}(\text{NH}_2)_2$. The older view that (A) is the nitrile of urea renders the

exptl. facts unintelligible. The reaction between (A) and HNO_3 may be represented by the following equation: $\text{NCNH}_2 + \text{H}^+ + \text{OH}^- + \text{HNO}_3 \longrightarrow \text{HOC}(\text{:NH})\text{NH}_2 \cdot \text{HNO}_3$.

(isocarbamide form)

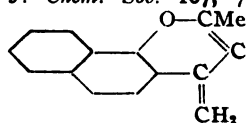
The isocarbamide structure is apparently only retained in the salt form, in the presence of little H_2O .

LOUIS E. WISE.

Steric influence, static and dynamic. II. OLIVER C. M. DAVIS AND FREDERIC W. RIXON. Bristol Univ. *J. Chem. Soc.* 107, 728-36(1915).—The interaction between HCO_2H and PhNH_2 and other aromatic amines leading to the formation of anilide was studied. The following were the parent amines used: *o*-, *m*- and *p*-methyl-, methoxy-, chloro-, and -bromoanilines, and α - and β - $\text{C}_{10}\text{H}_7\text{NH}_2$. The velocities of formation and of decompn. of the anilides and the position of equil. obtained by a direct method were detd. with a view of comparing their relative values as applied to steric hindrance. In detg. rates of formation 1 g. mol. per l. of PhNH_2 (or its congeners, RNH_2) was weighed into a measuring flask, a weighed amt. of standardized HCO_2H (1.1 g. mol. per l.) in $\text{C}_6\text{H}_5\text{N}-\text{H}_2\text{O}$ soln. (2 vols. $\text{C}_6\text{H}_5\text{N}$ and 1 vol. H_2O) was added, and the required vol. made up with $\text{C}_6\text{H}_5\text{N}-\text{H}_2\text{O}$. An aliquot portion was immediately weighed and titrated with 0.1 *N* NaOH, and 6 other portions were placed in previously steamed Jena glass tubes, which were loosely stoppered and heated in a H_2O bath. At intervals of 15 min. a tube was removed, rapidly cooled and its weighed contents titrated. The following formula was used in the calcn. of the const.: $k = [1.4/t(b-a)(b-x)] \log [a(b-x)/b(a-x)]$, where t = time in min., a = concn. of $\text{RNH}_2 = 1$, b = concn. of $\text{HCO}_2\text{H} = 1.1$ and x = amt. of anilide formed. In detg. the rate of decompn. a soln. of the following compn. was used: PhNHCHO (or other anilide RNHCHO), 1 g.-mol. per l.; HCO_2H , 0.1 g.-mol. per l.; H_2O , 1 g.-mol. per l. (in addition to the H_2O present in the $\text{C}_6\text{H}_5\text{N}-\text{H}_2\text{O}$ solvent). After a portion of the soln. had been titrated, the remainder was heated in a Jena flask fitted with a ground glass reflux condenser. Portions of the soln. were removed by pipet every hour, cooled, weighed and titrated. The formula used in computing the const. was: $k_2 = [1/t(a-b)] \log [a(b+x)/b(a-x)]$, where a = concn. of anilide or $\text{RNHCHO} = 1$, b = concn. of $\text{HCO}_2\text{H} = 0.1$, x = amt. of anilide formed in t min. The equil. method has been previously described (cf. Davis, *C. A.* 6, 567), the formula in this case being $K_w = a/(b+c)$, where a , b and c are the concns. of RNHCHO , RNH_2 and HCO_2H , resp. Tabulated data of av. values for k , k_2 and k_w and k_1/k_2 are given, together with max. differences of any const. from the average (in the case of k_1 and k_2) and the % anilide present in soln. at the equil. pt. A comparative table is also given in which the values k_1 and k_2 for PhNHCHO and the % PhNHCHO formed are taken as unity and the proportional values for the congeners, RNHCHO , are computed. From this the effects of different substituted groups and of the positions of a single substituent may be directly compared. Rates of formation and % RNHCO formed run approx. parallel, the values in the case of *o*-, *m*- and *p*-isomers increasing in the order mentioned. No regularity was noted in the rates of decompn. The effects of various groups substituted in similar positions may be listed in the following order of influence: (*o*-position) β -ring > OMe > Me > α -ring > Br > Cl ; (*m*-position) Me > Cl > (?) Br ; (*p*-position) OMe > Me > Cl > (?) Br . Very slight differences in the numbers for Br and Cl make the order of influence questionable; in fact the similar results obtained in the case of the halogens point to the conclusion that the greater wt. of Br is counterbalanced by the chem. activity of Cl . R. also gives a table of factors (for substituted groups and positions), which have been compounded of the steric influence and the chem. effect of the substituents.

LOUIS E. WISE.

Synthesis of α -naphthapyranols. BROJENDRA N. GHOSH. Univ. Coll., London. *J. Chem. Soc.* 107, 739-44(1915).—2-Methyl-4-methylene-1,4- α -naphthapyranol (A),



, pale, buff-colored needles with 0.5 H₂O from acetone, m.

166° (decompn.), was formed by heating a mixt. of 7 g. α -C₁₀H₇OH, 5 g. Ac₂CH₃ and 2-3 cc. POCl₃ for 0.25 hr. at 100-5°, dissolving the product in EtOH and treating the soln. with an excess of aq. AcONa. In concd. H₂SO₄, (A) dissolves with a brown color, and develops a green fluorescence. The following derivs. of (A) were prepd.: *Picrate*, yellowish green needles, m. 159° (decompn.); *chloromercurate*, yellowish brown; *perchlorate* (2 H₂O), explodes on heating; *chloroplatinate*, (2 H₂O), yellow crystals; *chloroaurate* (3 H₂O), brown microcrystals; *hydrochloride* (1 H₂O), yellow crystals, decomp. 96°. By substituting BzCH₂Ac for Ac₂CH₃ in the above reaction, G. prepd. 2-phenyl-4-methylene-1,4- α -naphthapyranol (1 H₂O), m. 125° (decompn.); *picrate*, yellowish green needles, m. 165°; *chloromercurate*, brown, amorphous; *perchlorate* (1 H₂O), green needles deflagrating with explosive violence; *chloroplatinate*, brown needles. L. E. W.

Syntheses with the aid of monochloromethyl ether. III. Action of monochloromethyl ether on sodium derivatives of ethyl ethane- α,β,β -tricarboxylate, ethyl butane- $\alpha,\alpha,\delta,\delta$ -tetracarboxylate and ethyl pentane- $\alpha,\alpha,\epsilon,\epsilon$ -tetracarboxylate. JOHN L. SIMONSEN. Presidency Coll., Madras. *J. Chem. Soc.* 107, 783-92(1915).—Ethyl γ -methoxypropane- α,β,β -tricarboxylate (A), MeOCH₂C(CO₂Et)₂CH₂CO₂Et, b₇ 161°, was formed by condensing EtO₂CCH₂CNa(CO₂Et)₂ with MeOCH₂Cl in PhH. When heated under reflux on a sandbath for 5 hrs. with 50% HCl, (A) was converted into itaconic acid, m. 161-2°. When heated with alc. KOH for 1 hr., (A) formed a gelatinous *potassium γ -methoxypropane- α,β,β -tricarboxylate*, which readily yielded the corresponding *free acid* (B), chalky crusts of microneedles from PhH-Et₂O, decomp. 145-5°; *silver salt*, flocculent ppt. When heated to 150°, (B) loses CO₂, giving rise to *γ -methoxypropane- α,β -dicarboxylic acid* (C), needles, m. 102° (*silver salt*, microscopic plates), identified by its conversion into CH₂ICH(CO₂H)CH₂CO₂H, m. 139-40° (cf. Swarts, *Jahresb.* 1866, 722, who gives 135°) and CH₂BrCH(CO₂H)CH₂CO₂H (D), m. 137° (cf. Beer, *Ann.* 216, 79). On distn. (C) yielded citraconic anhydride, b₇₄₄ 215-7° (Anschütz, *Ber.* 13, 1542, gives 213-4°). AcCl reacting with (C) at 150-60° gave rise to CH₂ClCH(CO₂H)CH₂CO₂H, m. 140-1°. When heated with alc. KOH (D) formed mesaconic acid, m. 199°, apparently the sole reaction product. By a reaction analogous to that used in the synthesis of (A), using [CH₂CH(CO₂Et)₂]₂ (E), instead of CH₂(CO₂Et)CH(CO₂Et)₂, S. obtained an inseparable mixt. of (E) and *ethyl α,δ -dimethoxyhexane- $\beta,\beta,\epsilon,\epsilon$ -tetracarboxylate* (F) which even after repeated distn. b₁₃ 225°, together with only a small amt. of pure (F), prisms from alc., m. 92-3°. (F), when boiled with concd. HCl, yielded $\Delta^{\alpha,\epsilon}$ -hexadiene- β,ϵ -dicarboxylic acid (G), [CH₂:C(CO₂H).CH₂]₂, woolly needles, m. 180-1°, *silver salt*, caseous ppt. The mixt. of (E) and (F), b₁₃ 225°, when subjected to hydrolysis yielded what was probably a eutectic mixt. of [(G) and adipic acid], needles, m. 112°, even after repeated recrystn., rather than the expected pentenedicarboxylic acid, C₇H₁₀O₄, since on oxidation with KMnO₄, followed by CrO₃, it yielded a mixt. of adipic acid and (CH₂CO₂H)₂ and when reduced with H in the presence of Pd formed only adipic acid. Condensation of [(EtO₂C).CHCH₂]₂CH₂ (H) with MeOCH₂Cl in the presence of Na gave rise to a similar mixt. of [(H) and *ethyl β -methoxyhexane- $\alpha,\alpha,\epsilon,\epsilon$ -tetracarboxylate*], b₆ 220-2°, which on hydrolysis with HCl yielded pimelic acid and Δ^{α} -hexene- β,δ -dicarboxylic acid, CH₂:C(CO₂H)CH₂(CH₂)₂CH₂CO₂H, platelets (from Et₂O-petroleum), m. 77-9°. The latter on oxidation with KMnO₄ yielded adipic acid. LOUIS E. WISE.

Condensation of ethyl cyanoacetate and acetylacetone. JOHN L. SIMONSEN AND MUDLAGIRI NAYAK. Presidency Coll., Madras. *J. Chem. Soc.* 107, 792-8 (1915).—The research was undertaken with the object of obtaining an allene deriv. of the type $RMeC:C(CMeR)$ (where $R = [CH(CN)CO_2Et]$) by the interaction of $NCCH_2CO_2Et$ and Ac_2CH_2 in the presence of Et_3NH . The principal condensation product, however, proved to be $MeC:C(CO_2Et).CO.NH.CMe:CH$ (A), needles, m. $135-6^\circ$ (cf. Knoe-

venagel and Cremer, *Ber.* 35, 2393), which on hydrolysis with KOH yielded the corresponding free acid (B), needles, decomp. 247° (K. and C. give 254°). When hydrolyzed with HCl (A) gave rise to ψ -lutedocarbostyryl hydrochloride $C_7H_9ON.HCl.H_2O$ (C), prisms, m. 127° (cf. Hantzsch, *Ber.* 17, 2904, who describes a similar compd. containing 2 H_2O). The free base formed by shaking (C) with Ag_2O , m. 180° ; its *picrate*, yellow prisms, m. $155-6^\circ$. Bromination of (A) in $CHCl_3$ gave rise to *ethyl 5-bromo-4,6-dimethyl-2-pyridone-3-carboxylate*, silky needles, m. 199° , readily converted into the corresponding *free acid*, leaflets, m. $255-6^\circ$, also formed by direct bromination of (B) in $AcOH$. Methylation of (A) followed by hydrolysis of the resulting Et-Me ester mixt. yielded *1,4,6-trimethyl-2-pyridone-3-carboxylic acid*, iridescent needles from alc., m. 210° , forming a sparingly sol. *copper salt*, pale blue needles, and an insol. *lead salt*, prisms, yielding no MeI when heated with HI in the Zeisel app. and forming $MeC:CH.CO.NMe.CMe:CH$

when heated at 270° . A small amt. of by-product obtained in the synthesis of (A) and isolated from the mother liquors, a *compound*, $C_{12}H_{14}O_2N_2$ (D), needles from alc., m. $190-1^\circ$, was possibly *ethyl α,ϵ -dicyano- β,δ -dimethyl- $\Delta^{6,8}$ -hexadienoate*, $NC.CH:-CMeCH:CMeCH(CN)CO_2Et$. A *monobromo derivative* of (D), $C_{12}H_{13}O_2N_2Br$, yellow needles, m. 196° . On sapon. with KOH (D) evolves NH_3 and apparently undergoes complete disintegration, since no other products except a trace of oil could be isolated.

LOUIS E. WISE.

Resolution of externally compensated *p*-toluenesulfonylalanine into its optically active components. CHARLES S. GIBSON AND JOHN L. SIMONSEN. Maha Rajah's Coll., Travancore, and Presidency Coll., Madras. *J. Chem. Soc.* 107, 798-803 (1915).—*dl*-4- $MeC_6H_4SO_2NHCHMeCO_2H$ (cf. Pope and G., *C. A.* 7, 66) was resolved by treating 2 mols. of the acid in 1 mol. of N NaOH with 1 mol. brucine, sepg. *brucine l-p-toluenesulfonylalanine* (A), brittle plates, with 3 H_2O , m. $148-9^\circ$, $[M]_{546}^{29-30} -266.2^\circ$, pptg. the crude *d*-acid from the mother liquor by means of HCl and purifying it by conversion into the *strychnine d,p-toluenesulfonylalanine* (B), prisms with 2 H_2O from H_2O , m. $188-9^\circ$, $[M]_{546}^{29-30} -68.7^\circ$. The order of removal of active components may be advantageously reversed, (B) being first formed and removed from soln. prior to the formation of (A). On acidification (A) yields the free *l*-acid, needles from aq. alc., m. $131-2^\circ$, $[M]_{546}^{29-30}$ (0.202 g. of Na salt in 30 cc. of aq. soln.) -82.1° , optical activity increasing markedly with increase in conc. Similarly (B) yields the free *d*-acid, long needles, m. $131-2^\circ$; $[M]_{546}^{29-30}$ 81.7° (0.202 g. of Na salt in 30 cc. of aq. soln.).

LOUIS E. WISE.

Condensation of acid chlorides with the ethyl ester of (a) cyanoacetic acid, (b) malonic acid, and (c) acetoacetic acid. II. Experiments on ethyl γ -ethoxyacetoacetate. JOHN BRADSHAW, HENRY STEPHEN AND CHARLES WEIZMANN. Manchester. *J. Chem. Soc.* 107, 803-13 (1915); cf. *C. A.* 8, 904.— $NaCH(CO_2Et)_2$ reacting with $o-C_6H_4(CO)_2NHCH_2COCl$ gave rise to *ethyl bisphthaliminoacetylmalonate* (A), $[o-C_6H_4(CO)_2NCH_2CO]_2C(CO_2Et)_2$, needles, m. 176° . *1-Phenyl-3-phthaliminomethyl-5-pyrazolone*, $o-C_6H_4(CO)_2NCH_2C:N.NPh.CO.CH_3$, microcrystals, m. 192° (decompn.), prepd. from $PhNHNH_2$ and Et phthaliminoacetoacetate, when hydrolyzed with alc. KOH yielded *1-phenyl-3-phthalaminomethyl-5-pyrazolone* (B), yellow powder,

m. 164° (decompn.). Et phthaliminoacetylmalonate (C) and PhNHNH_2 condensed to form *ethyl 1-phenyl-3-phthaliminomethyl-5-pyrazolone-4-carboxylate* (D), $\text{o-C}_6\text{H}_4(\text{CO})_2\text{NHCH}_2\text{C:N.NPh.CO.CHCO}_2\text{Et}$, yellow powder, m. 215° , from which the

corresponding (impure) phthalimino deriv. was obtained. On fusion, the latter evolved CO_2 and yielded (B). By warming an excess of PhNHNH_2 with (A) in 50% AcOH , a mixt. of (D) and *phthaliminoacetylphenylhydrazide* (E), $\text{o-C}_6\text{H}_4(\text{CO})_2\text{NCH}_2\text{CONHNHPh}$, needles from MeOH , m. 199° , was obtained. (E) was readily formed by condensing $\text{o-C}_6\text{H}_4(\text{CO})_2\text{NCH}_2\text{COCl}$ with PhNHNH_2 . By treating (C) in KOH with NaNO_2 and subsequently adding dil. H_2SO_4 , α -hydroxyimino- γ -phthaliminoacelone, $\text{o-C}_6\text{H}_4(\text{CO})_2\text{NCH}_2\text{CO.CH:NOH}$, prisms from PhH , m. 156° (decompn.), was obtained. When Et_2NH was gradually added to an ice-cold mixt. of 2 mols. $\text{EtOCH}_2\text{COCH}_2\text{CO}_2\text{Et}$ and 1 mol. AcH , *ethyl ethylidenebis- γ -ethoxyacetoacetate*, needles (from MeOH), m. 96° , was formed, which when heated for 20 hrs. with aq. H_2SO_4 , or preferably when dissolved in an equal vol. of PhH and satd. with HCl , yielded *1-ethoxy-4-methyl-2-ethoxymethylcyclohexen-6-one*, b_{18} 157° , possessing a terpene-like odor; *semicarbazone*, plates, m. 232° (decompn.). $\text{EtOCH}_2\text{COCHMeCO}_2\text{Et}$ (F), b_{18} 115° , and $\text{EtOCH}_2\text{COCHEtCO}_2\text{Et}$ (G), b_{18} 124° (cf. Johnson, *J. Chem. Soc.* 35, 582), were formed by treating 1 mol. $\text{EtOCH}_2\text{COCHNaCO}_2\text{Et}$ in EtOH with 1 mol. of MeI and EtI , resp. Similar reactions led to the formation of *ethyl γ -ethoxy- α -propylacetoacetate*, b_{18} 137° ; the corresponding α -isopropylacetoacetate, b_{18} 131° , and α -isobutylacetoacetate, b_{18} 128° , $\text{MeCH}_2\text{COCH}_2\text{OEt}$, b. 146° , and $\text{EtCH}_2\text{COCH}_2\text{OEt}$, b. 167° (cf. Béhal and Sommelet, *Compt. rend.* 138, 89), were obtained in poor yield from (F) and (G), resp., by heating the esters with H_2O in sealed tubes at 210° for 1 hr. The other alkylacetoacetates were hydrolyzed in the same way, "acid hydrolysis" being the principal reaction as shown by the titration of the acid formed during the reaction. $\text{EtOCH}_2\text{COCl}$ and NH_3 in dry Et_2O yielded $\text{EtOCH}_2\text{CONH}_2$, needles from PhH , m. $80-2^{\circ}$ (cf. Sommelet, *Ann. chim. phys.* [8] 9, 493). One mol. of $\text{EtOCH}_2\text{COCH:NOH}$ reacting with 1 mol. of $\text{o-C}_6\text{H}_4(\text{NH}_2)_2$ in 2 mols. of glacial AcOH gave rise to *2-ethoxymethylquinoxaline* (H), $\text{CH:N.C}_6\text{H}_4\text{N:CCH}_2\text{OEt}$, b_{18} 144° , neutral to litmus in aq. soln.; *chloro-*

platinate, microcrystals, decomp. 250° ; *picrate*, yellow powder, m. 216° . Upon gradual oxidation with alk. KMnO_4 , (A) yielded *pyrasine-2,5,6-tricarboxylic acid*, $\text{HO}_2\text{CC:C(CO}_2\text{H).N:CH.C(CO}_2\text{H):N}$, silky needles, m. 191° (decompn.), isolated

as the barium salt. The normal copper salt forms green microcrystals from aq. MeOH .

LOUIS E. WISE.

Rotation of isobutyl diacetyl-d-tartrate. THOMAS S. PATTERSON AND DONALD N. MCARTHUR. *J. Chem. Soc.* 107, 814-5 (1915).—The $[\alpha]_D$ and d. of *isobutyl diacetyl-d-tartrate* (A), b_{11} 183° , prepd. from *iso-Bu d-tartrate* and AcCl , were detd. at temps. ranging from 15.3° to 179° and the $[M]_D$ calcd. The following are the values of $[M]_D$, the temps. being given in parentheses: (15.3°) 55.01; (36.8°) 52.66; (65.5°) 51.59; (80.3°) 51.77; (93.6°) 52.17; (103.3°) 52.89; (131°) 55.34; (144.5°) 56.09; (160°) 57.54; (179°) 60.61. The $[M]_D$ of (A) in PhNO_2 ($p = 9.6\%$) were as follows: (-4.2°) -5.88 ; ($+0.8^{\circ}$) -4.73° ; (18.3°) -1.2 ; (36.2°) 3.24 ; (54.6°) 7.83 ; (80.1°) 14.3 ; (93.2°) 16.61 ; (110°) 22.04 ; (117.5°) 23.93 ; (125°) 25.8 ; (141°) 30.21 . The rotation of (A) closely resembles those of Et and *iso-Bu* ditrichloroacetyl tartrate (cf. *C. A.* 6, 2064; 7, 3705).

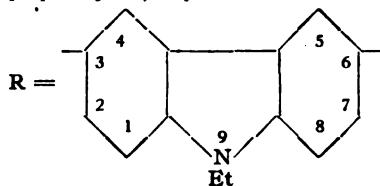
LOUIS E. WISE.

Nitration of 3-acetyl-amino-2-methoxytoluene. JOHN L. SIMONSEN AND MUDLAGIRI NAYAK. Presidency Coll., Madras. *J. Chem. Soc.* 107, 828-34 (1915).—3-Acetyl-amino-2-methoxytoluene (37 g.), needles, m. $100-1^{\circ}$, when gradually added to ice-cold fuming HNO_3 , yielded 48 g. of mixed NO_2 derivs. which were sep'd. as follows:

Monatsh. **25**, 475, 1177, etc.) and of other investigators. In the prepn. of *di-o-xylylphthalide*, $(3,4\text{-Me}_2\text{C}_6\text{H}_3)_2\text{C}_6\text{H}_4\text{CO}_2\text{O}$, powder, m. $107\text{--}8^\circ$, the by-product was *o*-

xylylphthalolylic acid, prisms, m. $161\text{--}2^\circ$ (cf. M.). *Di-1-ethoxynaphthylphthalide* (A), β -(α -EtOC₁₀H₇)₂C₆H₄CO₂O, m. 159° . The by-product, *o*-1-ethoxynaphthyl-

benzoic acid, HO₂CC₆H₄COC₁₀H₆OEt, plates from EtOH, m. $155\text{--}6^\circ$, forming an ammonium salt, plates, and yielding *o*-HO₂CC₆H₄COC₁₀H₆OH, m. $185\text{--}6^\circ$, when heated with AlCl₃ in CS₂ (cf. Deichler and W., *Ber.* **36**, 556). Similarly by the displacement of Et groups in (A) by H, α -naphthaphthalein, brownish yellow crystals, m. $209\text{--}10^\circ$, was formed (cf. Grabowski, *Ber.* **4**, 725), which on heating at 290° passed into α -naphthafuorane, m. 300° (also prepd. by G.). [In the formulas of the following compds,



the substituent groups are in positions 3 and 6.] 9-Ethylcarbazole, on treatment with phthalyl chloride and AlCl₃, yielded as the minor reaction products *9-ethylcarbazole-3-phthaloylic acid*, HRCOC₆H₄CO₂H, needles, m. $188\text{--}9^\circ$, sol. in PhH, and *9-ethylcarbazole-3,6-diphthaloylic acid* (B), R(COC₆H₄CO₂H)₂, rhombs, m. $266\text{--}8^\circ$, insol. in PhH; the silver salts of both acids were white ppts., stable to light. The main products of the above reaction were *di-9-ethylcarbasyphthalide*, (HR)₂C₆H₄CO₂O, yellow, sol. in EtOH, decomp. above 155° , a *tri-9-ethylcarbasyldiphthalide*, O.CO.C₆H₄C(RH).R.C(RH).C₆H₄CO₂O, pale yellow, decomp. above

235° , insol. in EtOH. When heated with 25 parts of H₂SO₄ for 5 hrs. at 99° , (B) yielded 2,3,6,7-diphthaloyl-9-ethylcarbazole, C₆H₄(CO)₂C₆H₂—C₆H₂(CO)₂C₆H₄,



monoclinic needles, does not m. below 300° . The phthalides all give marked colorations when treated with concd. H₂SO₄.

LOUIS E. WISE.

Walden inversion. II. Kinetics and dissociation constant of phenylchloroacetic acid. G. SENTER. *J. Chem. Soc.* **107**, 908-15(1915); cf. C. A. **9**, 2227.—The mechanism of hydrolysis of PhCHClCO₂H to PhCH(OH)CO₂H was studied with the view of detg. whether the ionized or un-ionized portion of the acid is the main factor in the reaction. The dissociation const. K of PhCHClCO₂H at 25° was found to be 0.0046 (Λ_∞ for PhCHClCO₂H = 377). S. finds that in contrast to CH₂ClCO₂H, the rate of hydrolysis of non-ionized PhCHClCO₂H is negligible when compared with that of the PhCHClCO₂⁻ ion. This was shown by a quant. study of the retarding action of HCl upon PhCHClCO₂H hydrolysis since HCl diminishes the PhCHClCO₂⁻ concn. The mechanism of the reaction was further detd. by means of expt. which no HCl was initially added, using the method of formulation (for "analysis") proposed by S. and Porter (C. A. **5**, 3053) in which all mathematical assumptions were justified by the initial assumption that only the anion PhCHClCO₂⁻ goes on hydrolysis. In the case of PhCHClCO₂Na, similar results were obtained, the anion undergoing hydrolysis. The temp. coeff. for 1 M. PhCHClCO₂Na has a slight accelerating influence upon the reaction, the activation energy which tends to disprove the suggestion of V.

are in equil. with a certain amount of the hydrolysis of PhCH(OH)COOH is the same as in the case of 0.1 N and 0.5 N NaOH solutions, that the effect of the OH^- ion in the main reaction in the hydrolysis of PhCH(OH)COOH is in each case the same, $\text{PhCH(OH)COOH} + \text{H}_2\text{O} \rightarrow \text{PhCH(OH)COO}^- + \text{H}^+$ the adequacy of the orthodox mechanism involved in the Walden inversion.

Glucosidification of glycerol

QUELOT, M. BRIDEL AND A. BRIDEL. Each containing 150 g. glucose. The mixture at lab. temp. for about 8 months. Five g. of emulsin were then added. The mixture showed $[\alpha]_D^{20} -0.20'$. The mixture after 0.5 hr., cooled, treated with 5 g. of yeast added to destroy unchanged glucose. The mixture heated to boiling, refiltered and the residue was extd. with a mixt. of CH_2Cl_2 and CHCl_3 . The residue after removal of glycerol and repptg. by means of 500 cc. of EtOH and 200 cc. of boiling EtOH , reprecipitated was obtained. The amorphous residue on hydrolysis with dil. H_2SO_4 gave a monoglyceryl glucoside, but from the study by detg. the α and the β anomers believe that (A) is a mixt. of at least two in their resistance towards the hydrolysis.

Ketodilactone of benzophenone

Jesus Coll. Proc. Cambridge Phil. Soc. with 9% HNO_3 for 70 hrs. is converted to phenonedicarboxylic acids predominately. KMnO_4 gives an excellent yield of benzophenone on warming with strong HCl for a few minutes. $\text{O.O.C.C}_6\text{H}_4(\text{CO.H})\text{C.C.H}_3$ is the dilactone.

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of *d*-ethylisopropylmalonic monoamide into *inactive* ethylisopropylmalonic acid by the action of HNO_2 (cf. *C. A.* 8, 1102) is proof of the equivalence of the bonds holding the 2 CO_2H groups, while the conversion of *d*-allylpropylcyanoacetic acid (a) into *inactive* dipropylcyanoacetic acid (b) proves the equivalence of the bonds to the alkyl rests. The proof that the members of one pair are equal to those of the other, i. e., that the bond of an alkyl and that of a CO_2H are of equal value, remains for a future investigation. $\text{PrCH}(\text{CN})\text{CO}_2\text{Et}$ (c), previously prepd. by Henry (cf. *Jahresber.* 1889, 638), was a mixt. of the mono- and di-Pr esters. These may be sepd. by sapon. of the crude mixt. with 2.0 *N* NaOH at room temp., which leaves the di-Pr ester unaltered. Propylcyanoacetic acid (d), $b_{0.2}$ 125–30°, forms a silver salt from which (c) may be prepd. pure by the action of EtI . (c) b_{16} 105–10°, b_{716} 222–3°. (b) $b_{0.2}$ 135–40°; d_4^{18} 0.988; dissolved in hot H_2O , it seps. as an oil which slowly forms a *monohydrate*, rhombic or hexagonal tables which shrivel at 45° and m. 49–50°; dried under 0.5 mm. at 36° over P_2O_5 , it forms a hard cryst. mass, m. 33–4°; the ammonium salt and silver salt are both cryst. *dl*-Allylpropylcyanoacetic acid (f), obtained by sapon. of the Et ester with alc. KOH for 4 hrs., $b_{0.16}$ 129–30, d_4^{18} 1.102 and crystals in needles on long standing, m. 25–35°; yield 74%. Lead, ammonium and silver salts all sep. in needles; (f) gives a cryst. ppt. with CaCl_2 , a reddish brown soln. with FeCl_3 and decolorizes KMnO_4 . Ethyl ester, from (c), Na and $\text{C}_3\text{H}_5\text{I}$, b_{16-20} 125–30°, b_{716} 241–2°; yield 83%. (f) is split into its optical components by conversion into its *brucine* salt, the salt of the *d*-form (a) sepg. first in needles. This was purified through the *morphine* salt, stout prisms containing H_2O . (a) seps. from Et_2O in microscopic needles or prisms, m. 42°, and sublimates slowly even at 36°; $[\alpha]_D^{18}$ in *N* NaOH 16.74°; $[\alpha]_D^{25}$ in neutral soln. 18.47°; $[\alpha]_D^{22}$ in glacial AcOH 7.97°. *l*-Allylpropylcyanoacetic acid seps. as the *brucine* salt in large tables from the mother liquor from (a). Reduced with Pt black in glacial AcOH or in alk. soln. (a) is converted into (b). 20.0 g. (f) heated with 100 cc. concd. H_2SO_4 for 4 hrs. gives the propyloxypropylmalonic monoamide lactone, $\text{C}_3\text{H}_7\text{C}(\text{CONH}_2)\text{C}_3\text{H}_5\text{OC}_2\text{O}$, 6-sided plates from H_2O , m. 96–7°. The H_2O soln.

is weakly acid to litmus and when warmed with alkali evolves NH_3 ; when the alk. soln. is satd. cold with HCl , the propyloxypropylmalonic lactone seps. as an oil which was identified through its calcium salt, $(\text{C}_3\text{H}_{13}\text{O}_4)_2\text{Ca} \cdot 2\text{H}_2\text{O}$, tables. 5.0 g. (f) in Na_2CO_3 treated with 16 g. KMnO_4 in 400 cc. H_2O is converted into a dibasic acid which is probably α,α -propylcyanosuccinic acid, $\text{HO}_2\text{CCH}_2\text{C}(\text{CN})\text{PrCO}_2\text{H}$; purified by pptn. from Et_2O by petrol. ether, it m. 123° with effervescence to a clear oil; warmed with CaCl_2 , it seps. a calcium salt. When (a) is oxidized under the same conditions as (f) it gives a similar product m. 123° with effervescence, but which seps. in fine needles or prisms and is optically active, $[\alpha]_D^{19}$ –32.0. Its calcium salt is more sol. than that of the *dl*-form. The yields of both acids were small.

NORMAN A. SHEPARD.

Reaction of nopic acid (a reaction characteristic of oxalic acid). BERNABÉ DORRONSORO AND OBDULIO FERNÁNDEZ. *Anales soc. españ. fis. quim.* 11, 441–3 (1913).—D. and F. correct a misinterpretation of data in a previous paper (*Anales soc. españ. fis. quim.* 8, 323) in which a green coloration obtained with resorcinol (in H_2SO_4 soln.) was attributed to the presence of nopic acid. The product obtained by oxidizing the pinene of Spanish oil of turpentine with alk. (NaOH) KMnO_4 soln. was very slightly sol. in H_2O , decolorized KMnO_4 in slightly acid (H_2SO_4) soln. and decompd. PbO_2 ; this product was, therefore, supposed to be Na nopate. It was impossible, however, to sep. nopinone (by distn. with steam and formation of the semicarbazone) after oxidizing with acid KMnO_4 the salt obtained as above; the compd. which was supposed to be Na nopate gave a ppt. (sol. in dil. HCl) with CaCl_2 , while nopic acid gives (according to Baeyer) a very sol. Ca salt. The acid of the above salt was isolated

by treatment with dil. H_2SO_4 and extn. with Et_2O ; the m. p. was nearly that of pinonic acid, but identity with the latter was excluded because the ketone reaction was negative. Crystals, m. 90° , were obtained when the Ca salt (insol. in AcOH) was treated with H_2SO_4 and extd. with Et_2O ; the aq. soln. yielded crystals which showed the comp. $\text{H}_3\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$. Repeated expts. with samples of pinene of varying origin showed that the salt obtained by oxidation with alk. KMnO_4 is $(\text{CO}_2\text{Na})_2$. The previously described color reaction with resorcinol and H_2SO_4 is, therefore, characteristic of $(\text{CO}_2\text{H})_2$.

H. S. PAINE.

Oxidation of nopinene of Spanish oil of turpentine. ANTONIO MADINAVEITIA. *Anales soc. españ. fis. quim.* 12, 259-64(1914).—In view of the contradiction of the statements of Dorransoro and Fernández (cf. preceding abstr.) to the results of Baeyer and Wallach, M. has reinvestigated the subject in order to ascertain if the discrepancy might be due to difference in comp. between Spanish oil of turpentine and the French and American oils of turpentine examd. by W. The $155-6^\circ$ fraction from the distn. of Spanish oil of turpentine was oxidized according to the W. procedure; 1.3% Na nopate was obtained as compared with 2.5-5% obtained by W. from American and French oils of turpentine. This yield was increased somewhat and the operation facilitated by means of a slight modification of the W. method. The soln. obtained after oxidation was concd. to $1/6$ (instead of $1/3$) its original vol.; the crystd. mixt. of Na nopate and $(\text{CO}_2\text{Na})_2$, thus obtained was recrystd. from a little H_2O and the impure Na nopate was dissolved in 40 times its wt. of H_2O . The oxalate in this soln. was pptd. by CaCl_2 ; the filtrate was acidified and extd. with Et_2O and the residue from evapn. of the latter was crystd. from C_6H_6 as in the original method. The nopic acid thus obtained, when crystd. from cold C_6H_6 , formed beautiful crystals which effloresced at ordinary temp. with loss of C_6H_6 of crystn. The crystals m. $125-6^\circ$ after being dried over H_2SO_4 and were sol. in alkalis and very slightly sol. in H_2O ; Na nopate was pptd. when the Et_2O soln. was shaken with satd. NaHCO_3 . Nopic acid was not affected by KMnO_4 in neutral or alk. soln.; it was oxidized by KMnO_4 in acid soln. with formation of nopinone. CaCl_2 did not produce a ppt. with nopic acid in NH_4OH ; the Et_2O soln. was slightly *l*-rotatory. Nopic acid identical with that obtained by Baeyer and Wallach from other turpentines may, therefore, be obtained by oxidation of Spanish oil of turpentine.

H. S. PAINE.

Existence of nopinene in Spanish oils of turpentine. B. DORRANSORO AND O. FERNÁNDEZ. *Anales soc. españ. fis. quim.* 12, 424-6(1914).—D. and F. reply to the comments of Madinaveitia (cf. preceding abstr.) on a previous paper by them. Repetition of their previous expts. with observance of the technic indicated by M. failed to show the presence of nopic acid after oxidation of oil of turpentine with alk. KMnO_4 ; the sample of turpentine employed had a max. b. p. $154-5^\circ$ and rotatory power $+1^\circ$ (another sample was optically inactive) and was obtained from *Pinus halepensis* (grown in Andalucía near the sea). In connection with the above positive rotation it is recalled that nopinene is usually described as being *l*-rotatory and contributing to the *l*-rotation of turpentine; furthermore, the pinene which was not oxidized by alk. KMnO_4 showed practically the same rotation (after distn. with steam) as the original sample before oxidation.

H. S. PAINE.

A reaction of aldehydes with diphenylcarbazine. A new method for preparing substituted hydroxytriazoles. BERNARDO ODDO AND E. FERRARI. Univ. Pavia. *Gazz. chim. ital.* 45, I, 238-62(1915).—In the last ten years the use of $\text{CO}(\text{NHNHPh})_2$ (a) in volumetric analysis has been studied. The present paper is a first report on the condensation of (a) with $\text{C}:\text{O}$ compds. and deals with the aldehydes. Aldehydes easily condense in AcOH , in the presence of dry NaOAc , with (a) to give derivs. of

1-phenyl-1,2,4-triazolone (b), PhN.NH.CO.N:CR , or its tautomer *1-phenyl-3-hydroxy-1,2,4-triazole* (c), PhN.N:C(OH)N:CR . PhNH_2 is regularly formed as a by-product of

the reaction. The reaction may be formulated in 2 ways: (1) $(a) + \text{O:CHR} \longrightarrow \text{H}_2\text{O} + \text{PhNHN.CO.NH.NPh.CHR}$ and the latter gives $\text{PhNH}_2 + (b)$ or (c) ; (2) $(a) +$

$\text{O:CHR} \longrightarrow \text{PhNH}_2 + \text{O:CR.NH.CO.NH.NHPh}$ and the latter gives $\text{H}_2\text{O} + (b)$ or (c) . In (1) the pentaatomic nucleus is first formed and PhNH_2 is eliminated later through the lability of the methinic grouping: RCH-N-NHPh . In (2) PhNH_2 is first

eliminated and H_2O subsequently. Of these the first is considered most probable. PhNH_2 is only formed when aldehydes are used. With ketones a substituted aniline would have to be formed, so that the detection of PhNH_2 offers a delicate means of recognizing the aldehyde function of a compd. For this purpose O. and F. made special expts. to det. whether (a) treated alone under the conditions of the condensation does not give some PhNH_2 . On boiling (a) with glacial $\text{AcOH} + \text{NaOAc}$ only very small traces of PhNH_2 are formed. Even on distg. with steam PhNH_2 is only formed when the expts. are done in strongly alk. soln. which is not necessary for the distn. since PhNH_2 passes over in solns. acid with AcOH , neutral or faintly alk. The velocities of reaction of the various aldehydes are not equal. An OH or NO_2 in the *o*-position has a retarding effect. In the case of furfural and glucose the fact that the reaction takes place was detd. by the fact that PhNH_2 was detected, but the condensation product could not be isolated in the pure form. 2.4 g. (a) in 20 cc. glacial AcOH treated with the mol. amt. of NaOAc and heated under a reversed condenser 2 hrs. gave *1,5-diphenyl-3-hydroxy-1,2,4-triazole* (d), $\text{C}_{14}\text{H}_{11}\text{ON}_3$ (i. e., (c) in which $\text{R} = \text{Ph}$), white needles from AcOEt , m. 288° , sol. in dil. alks., does not react with Cu salts like (a), gives a colorless soln. in concd. HCl or H_2SO_4 , does not react with PhNHNH_2 , mol. wt. in AcOH $218 \pm$ (calcd. 237.11). The manner of its formation does not leave any doubt about its constitution. It gives an *acetyl derivative*, m. 133° , which on sapon. gives (d), m. 288° . The *hydrochloride* seps. from the HCl soln. as small needles that lose all HCl in the air gradually. The hydrochloride mother liquors give no turbidity with PtCl_4 but with $\text{HgI}_2\text{-KI}$ a white ppt., with phosphotungstic acid a white ppt., with $\text{BiI}_3\text{-KI}$ a brick-red ppt. and finally reduction, with phosphomolybdic acid a citron-yellow ppt., with Br_2 in KBr an orange ppt. and with AuCl_3 a yellow ppt. The *dihydrochloride*, $\text{C}_{14}\text{H}_{11}\text{ON}_3 \cdot 2\text{HCl}$, was obtained by passing HCl through (d) into Et_2O as a white cryst. powder, blackens near 200° , m. 288° . Similarly to (d) *5-p-tolyl-1-phenyl-3-hydroxy-1,2,4-triazole* was obtained from *p*- $\text{MeC}_6\text{H}_4\text{CHO}$ as white needles from AcOEt or EtOH , m. $275\text{--}6^\circ$, sol. in alks. and strong HCl . The *acetyl derivative*, $\text{C}_{15}\text{H}_{13}\text{N}_3\text{OAc}$, was obtained by boiling the compd. with $\text{Ac}_2\text{O} + \text{AcONa}$ for 8 hrs., minute needles, m. 107° ; sapond. it gives the parent compd., m. $275\text{--}6^\circ$. The *hydrochloride*, $\text{C}_{14}\text{H}_{13}\text{N}_3\text{O.HCl} \cdot 2\text{H}_2\text{O}$, seps. from concd. HCl as crystals, m. 275° ; *chloroaurate*, $\text{C}_{14}\text{H}_{13}\text{ON}_3 \cdot \text{HAuCl}_4 \cdot \text{H}_2\text{O}$, was pptd. as a yellow cryst. ppt., contracts 83° , m. 133° with previous softening. The hydrochloride gives a yellow-white ppt. with K_2CdI_4 , a white cheesy ppt. with $\text{HgI}_2\text{-KI}$ and a brick-red ppt. with $\text{BiI}_3\text{-KI}$. With salicylaldehyde (a) gave *5-o-hydroxyphenyl-1-phenyl-3-hydroxy-1,2,4-triazole*, needles from AcOEt , m. 297° (decompn.), little sol. in org. solvents, sol. in alkalies, gives a yellow ppt. with AuCl_3 , gives ppts. with the reagents for alkaloids. The *acetyl derivative*, $\text{C}_{15}\text{H}_9\text{O}_2\text{N}_3\text{Ac}$, was obtained as white needles from ligroin + C_6H_6 , m. 100° ; sapond. it gives the parent compd. *5-o-Methoxyphenyl-1-phenyl-3-hydroxy-1,2,4-triazole* was obtained similarly from *o*-anisaldehyde as needles from EtOH , m. 300° , sol. in alkalies, gives ppts. with the alkaloid reagents; *acetyl derivative*, $\text{C}_{15}\text{H}_{11}\text{O}_2\text{N}_3\text{Ac}$, prismatic needles from ligroin, m. 112° ; *hydrochloride*, $\text{C}_{14}\text{H}_{11}\text{-}$

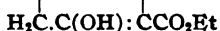
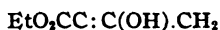
$O_2N_1.HCl$, sepd. from Et_2O with HCl gas as needles. *5-o-Nitrophenyl-1-phenyl-3-hydroxy-1,2,4-triazole* was obtained similarly with $o-O_2NC_6H_4CHO$ as yellow prisms, m. $243-4^\circ$, gives a yellow soln. in alkalis and is repptd. with acids, gives ppts. with $AuCl_3$ and the alkaloid reagents; the *acetyl derivative* could not be crystd.; *hydrochloride*, prismatic needles. With $m-O_2NC_6H_4CHO$ *5-m-nitrophenyl-1-phenyl-3-hydroxy-1,2,4-triazole* was obtained as needles from C_6H_6 , m. $276-7^\circ$; *acetyl derivative*, m. 118° . With cinnamaldehyde *5- β -phenylethylphenyl-1-phenyl-3-hydroxy-1,2,4-triazole* was obtained as leaves, m. 286° ; *acetyl derivative*, $C_{18}H_{15}ON_3Ac$, prisms from ligroin. With piperonal *5-methylenedihydroxyphenyl-1-phenyl-3-hydroxy-1,2,4-triazole* was obtained as needles from $EtOH$, m. 274° ; *hydrochloride*, $C_{18}H_{15}O_2N_3.HCl$, aggregates of prisms from strong HCl , m. 274° ; *dihydrochloride*, $C_{18}H_{15}O_2N_3.2HCl$, sepd. from Et_2O with HCl gas as pale rose-colored needles, m. 274° ; the *acetyl derivative*, $C_{18}H_{15}O_2N_3Ac$, was obtained as a white cryst. powder from ligroin, m. 123° . With vanillin *5-p-hydroxy-m-methoxyphenyl-1-phenyl-3-hydroxy-1,2,4-triazole* was sepd. as prismatic needles from $EtOH$, m. $299-301^\circ$; *hydrochloride*, $C_{18}H_{15}O_2N_3.HCl.H_2O$, crystals, lose HCl at 100° and m. $299-301^\circ$; *acetyl derivative*, $C_{18}H_{15}O_2N_3Ac$, gave white needles from $AcOH$ or C_6H_6 , m. 149° .

E. J. WITZEMANN.

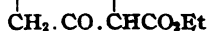
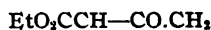
Phenylhydrazine. IV. Cryoscopic measurements on its capacity for forming phenylhydrazones. BERNARDO ODDO. Univ. Pavia. *Gazz. chim. ital.* **45**, I, 262-82 (1915); cf. *C. A.* **8**, 667.—By studying anhydrous $PhNHNH_2$ as a cryoscopic solvent, O. has found that while it acts normally with certain classes of substances like hydrocarbons, alcs., phenols, acids and bases, with aldehydes and ketones the well-known condensation takes place and causes a lowering of the f. p. from which the mol. wts. of the $C:O$ compds. may be calcd. and found to be one-half of the theoretical value. O. has made expts. to det. whether criteria for a comparison of the aldehyde or ketone function of a given compd. will be obtained if the lowering of the f. p. for the different substances in equimol. amts. of $PhNHNH_2$ is detd. for certain time intervals. The f. p. of anhydrous $PhNHNH_2$ is 19.35° . Three very different ketones ($AcMe$, $AcPh$ and $BzPh$) were studied in this way and showed marked differences in the time necessary to form phenylhydrazones as shown by the time rate of fall in the f. p. The results are plotted in curves with the times as abscissa and the temps. as ordinate. O. detd. whether the method could be used in establishing small differences in the reaction velocity.. For this purpose aliphatic ketones with and without Me groups adjacent to the $C:O$, ketones with aliphatic and aromatic radicals and ketones of the cyclohexane series were compared with ordinary acetone. The cyclohexanones were studied with especial care because under ordinary conditions they yield phenylhydrazones but also under certain conditions they give tertiary alcs. through a mol. rearrangement, as in Ac_2O in which the corresponding ester is obtained. Some aliphatic and aromatic aldehydes were also investigated. The following compds. were studied: $AcMe$, $AcPr$, $iso-PrAc$, $AcBu$, $iso-BuAc$, AcC_6H_{13} , Et_2CO , Pr_2CO , $(iso-Bu)_2CO$, $(C_6H_{11})_2CO$, $BzMe$, $BzEt$, $BzPr$, cyclohexanone, *o*-, *m*- and *p*-methylcyclohexanone, acetic, isobutyric, caproic and nonylic aldehydes, BzH , *p*- MeC_6H_4CHO , salicylaldehyde and piperonal. The % of the ketones used varied from 1.12 to 3.55 and the $PhNHNH_2$ from 98.88 to 96.45, by wt. In mol. % they varied from 1.29 to 2.76 for the ketone and 98.61 to 97.23 for the $PhNHNH_2$. With the aldehydes because of their smaller solubility the ratios used were about 99.50 mol. % $PhNHNH_2$ and 0.50 mol. % aldehyde. The results of the individual expts. are given in tables and curves and cannot be briefly abstracted. The main results are as follows: In the homologous series of methyl aryl ketones there is a progressive increase in the time necessary to produce a definite lowering of the f. p. due to the condensation which increases each time with the addition of CH_2 . The isomer with the branched chain (the *iso* deriv.) always required more time than the

corresponding straight chain deriv., *i. e.*, reacts more slowly. A similar serial progression was found with the ketones which do not have a Me adjacent to the CO. Moreover there were marked differences between the behavior of the methyl aryl ketones and the corresponding sym. ketones of the same mol. wt. The Me aryl ketones showed a marked difference in comparison with (iso-Bu)₂CO which shows a sharply diminished reaction velocity. The other ketones show a small but definite difference in the reaction velocities for the homologous ketones, MeBz, EtBz and PrBz, but the difference is more sharp in the case of the pure aliphatic ketones. The difference is very marked in comparison with cyclohexanones, the reaction velocity of which is greater than that of the ketones with 2 aliphatic radicals regardless of whether the latter have a Me group adjacent to the CO or not. Only in *o*-methylcyclohexanone was a noticeably slower reaction velocity noticed and this was no doubt due to the Me group being in the *o*-position. With aldehydes the greater reaction velocity of the aromatic aldehydes as compared with the aliphatic ones is notable. In the homologous series of aliphatic aldehydes there is a marked diminution in the velocity of reaction as the number of CH₂ groups is increased. The aldehydes in general react somewhat more easily than the ketones; the cyclohexanones are an exception. The latter stand next to the aromatic aldehydes as far as velocity of reaction is concerned. V. The behavior of phenylhydrazine semihydrate as a cryoscopic solvent. *Ibid* 283-92.—In an earlier paper (*C. A.* 8, 667), O. detd. the equil. point on the binary system PhNHNH₂ + H₂O and found a eutectic f. p. at 16° for the system PhNHNH₂ + phenylhydrazine hydrate and a max. in the mol. ratio of 66.38 of PhNHNH₂ for 33.62 of H₂O, which led to a hydrate with the formula (PhNHNH₂)₂.H₂O, of which the m. p. is 25.2° and which was called phenylhydrazine semihydrate. Expts. are described in which the behavior of this semihydrate as a cryoscopic solvent was studied in order to det. the effect of H₂O on the condensation and addition reactions described in part in the preceding abstract. The cryoscopic const. of the semihydrate was previously detd., with Ph₂, C₁₀H₈ and veratrole, to be $K \times 44.15$, but new detns. were made with dibenzyl (av. of 5 detns. 44.27) and safrole (av. from 6 detns. 42.81) and the mean value 43.54 was found. O. has used the old value, however, because only safrole and not the hydrocarbon caused marked variations from it. The latent heat of fusion of the semihydrate was calcd. from van't Hoff's formula as 40.28. Using the semihydrate as the solvent the following compds. were studied: C₆H₆, PhMe, *p*-xylene, cymene, Et, Pr and iso-Bu alcs., glycol, Ph₂COH, phenol, *p*-cresol, β -naphthol, resorcinol, eugenol, BzOH, salicylic acid, pyridine, piperidine, PhNH₂, PhNMe₂ and quinoline. From the results which are recorded in tables it is shown that all these compds. behave in a normal way. The values are, therefore, directly comparable with those obtained with dry PhNHNH₂. With the hydrocarbons there is a progressive increase in the mol. wt. with increase in the concn. The alcs. show the same characteristic, only less markedly. With the phenols, acids and bases values are obtained for the mol. wts. which are very close to the normal calcd. values. E. J. W.

Diethyl succinosuccinate. A study of its constitution, some derivatives, and absorption spectra. H. D. GIBBS AND H. C. BRILL. Bureau Sci., Manila, P. I. *Philippine J. Sci.* 10A, 51-65 (1915).—When the mother liquor from which a considerable quantity of Et succinosuccinate (I) has been obtained is concd., a small amt.



(I)



(II)

of a yellow cryst. substance (II) seps. (I) is but slightly colored, m. 127°, and analyzes (Meyer's method) for 90% enol form, while (II) is yellow, m. 123°, and is practically all in the *keto* form. (I) treated in alc. with concd. HCl and Zn dust, gives a cryst.

reduction product (a), pptd. from PhMe by alc., m. 120° ; the soln. in alkali turns brown in the air. *Acetyl derivative of (a)*, m. 167° and becomes yellow on heating. *Methyl acetylsalicylate (b)*, from $\text{HOC}_6\text{H}_4\text{CO}_2\text{Me}$ and AcCl in the presence of $\text{C}_6\text{H}_5\text{N}$, b. 265° , b₇ 122° . The absorption spectra of (I), (II), the diacetate, diimide, and (b) are given.

NORMAN A. SHEPARD.

Basic mercuric salicylate and methylsalicylate. Mercuric anisate. Mercuric m- and p-hydroxybenzoates. H. LAJOUX. *J. pharm. chim.* 11, 279-86(1915).—Neutral $(\text{HOC}_6\text{H}_4\text{CO}_2)_2\text{Hg}$ upon boiling with H_2O forms $\text{HOC}_6\text{H}_4\text{CO}_2\text{H}$ and stable, basic Hg salicylate which does not give the Hg^{++} tests. L. adopts for it the formula of Buroi (1902) $\text{HOC}_6\text{H}_4\text{CO.O.Hg}$ in the place of $\text{C}_6\text{H}_4\text{CO.O.Hg.O}$ held by him pre-

viously, and gives exptl. proof, showing that when the OH group is blocked by Me, Hg will not affect the OH group, but enters the nucleus. Mix equal amts. of $\text{MeOC}_6\text{H}_4\text{CO}_2\text{H}$ and $\text{Hg}(\text{OAc})_2$ with H_2O to a firm paste; after some hrs. dry on a H_2O bath. When treated with boiling H_2O basic mercuric methylsalicylate, $\text{MeOC}_6\text{H}_4\text{CO.O.Hg}$,

seps. as a pasty, adhesive mass, sol. in CHCl_3 , insol. in NaOH , which does not form yellow HgO . The place where Hg enters the nucleus was found to be in the *p*-position, since anisic acid yielded Hg anisate, but no basic salt upon boiling with H_2O . At 140 – 50° , however, basic salts were formed, probably in the *m*-position (cf. $\text{Hg}(\text{OBz})_2$; Dimroth, 1902). Analogous basic salts form readily with *m*- and *p*- $\text{HOC}_6\text{H}_4\text{CO}_2\text{H}$, but the reactions are more complex, owing to the more pronounced acid character of the OH group.

S. WALDBOTT.

Derivatives of phenyl ether. ALFRED N. COOK AND FRANK F. SHERWOOD. *J. Am. Chem. Soc.* 37, 1835-9(1915).— $2,4\text{'-O}_2\text{NC}_6\text{H}_4\text{OC}_6\text{H}_4\text{Me}$ (a) has been obtained in better yield than formerly (*Am. Chem. J.* 24, 525 (1900)) by heating *o*- $\text{O}_2\text{NC}_6\text{H}_4\text{Br}$ and *p*- $\text{KOC}_6\text{H}_4\text{Me}$ at 125° until reaction ceases and then gradually to 160° . With concd. HNO_3 on the H_2O bath it slowly gives a hexanitromethyldiphenyl ether, $\text{Me}(\text{O}_2\text{N})_6\text{C}_{12}\text{H}_2\text{O}$, m. 103 – 5° , probably identical with the compd. obtained by nitrating $4,4\text{'-O}_2\text{NC}_6\text{H}_4\text{OC}_6\text{H}_4\text{Me}$ (*J. Am. Chem. Soc.* 25, 64 (1903)). *Bromo-2-nitro-4'-methyl-diphenyl ether*, from (a) in CS_2 with a large excess of Br and a trace of I allowed to stand 2-3 days, yellow, m. 23° , reduced by Sn and alc. HCl on the H_2O bath to the stable 2-amino ether, whose chloroplatinate forms yellowish cryst. grains. "2-Nitro-4'-methylphenyl ether sulfonic acid" (sulfo-2-nitro-4'-methyldiphenyl ether) (b), from the Pb salt with H_2S , yellow, fumes on the H_2O bath even when dissolved in considerable H_2O , gives dense fumes with NH_3 vapors, is appreciably carried over when air is drawn through its aq. soln. or over the dry solid; all of its salts are anhydrous; with Sn and HCl on the H_2O bath its Cu salt gives the 2-amino acid. *Lead 2-nitro-4'-methylphenyl ether carbonate*, from the "mother substance" in dil. H_2SO_4 containing a little SO_2 with PbCO_3 ; *barium salt*, similarly obtained with BaCO_3 , slightly yellow radial aggregates; *strontium salt*, light yellow; *copper salt*, from the Ba salt and CuSO_4 , nearly white when moist, greenish when dry, easily reduced by Sn and HCl to a stable base; *cadmium salt*, yellowish white radial aggregates from H_2O ; *sodium salt*, light yellow. "2-Nitro-4'-methylphenyl ether sulfonyl chloride" (sulfonylchloro-2-nitro-4'-methyldiphenyl ether), from the Na salt of (b) with PCl_5 , light yellow plates from alc., m. 69° .

C. A. ROULLER.

Phenols. III. Preparation of some new substituted cresols. ARTHUR J. HILL AND LOUIS E. GRAF. *J. Am. Chem. Soc.* 37, 1839-46(1915); cf. Johnson and Hodge, *C. A.* 7, 3507.—5,2-Me(HO) $\text{C}_6\text{H}_3\text{Ac}$ (Betteridge, *Diss. Breslau*, 1898), obtained in 16 g. yield from 35 cc. AcCl slowly added to 30 g. *p*- $\text{MeC}_6\text{H}_4\text{OMe}$ in 200 cc. petr. ether and heated 30 hrs. with 25 g. AlCl_3 on the H_2O bath, light yellow needles from 80% alc.,

m. 50° ; 37 g. in 300 cc. HCl boiled 18 hrs. with 120 g. Zn-Hg gives 15 g. of *2-ethyl-4-methylphenol*, light yellow oil, b. $216-8^{\circ}$, darkens in the air; 5 g. heated 16 hrs. in a NaCl bath with 2.5 g. PhNCO and a little AlCl_3 gives 2 g. of the *phenylurethan*, $\text{PhN-HCO}_2\text{C}_6\text{H}_4\text{MeEt}$, square plates from alc., m. 101° . 5,2-Me(HO) $\text{C}_6\text{H}_3\text{COEt}$, obtained in 25 g. yield from 65 g. *p*-Me $\text{C}_6\text{H}_4\text{OMe}$, 72 g. AlCl_3 and 55 g. EtCOCl in 250 cc. petr. ether heated 30 hrs. on the H_2O bath, m. 2° , b. $153-4^{\circ}$, gives the Millon reaction; 32 g. digested 18 hrs. with 150 g. Zn-Hg and 250 cc. HCl gives 19 g. of *2-propyl-4-methylphenol*, light yellow, b. $128-30^{\circ}$, also obtained in 26 g. yield from 33 g. 5,2-Me(HO)- $\text{C}_6\text{H}_3\text{CH:CHMe}$ (a) (Claisen, C. A. 8, 64) and 38 g. Na in 300 cc. boiling alc.; *phenylurethan*, needles from alc. The allyl isomer of (a), on the other hand, could not be reduced with Zn-Hg in HCl, HI and P, or Na or Na-Hg in alc.; its *phenylurethan*, from PhNCO and AlCl_3 after 14 hrs. at 104° , thin needles from alc., m. 68° . 3-Ethyl-4-methylaniline is obtained by heating 19 g. 6,3-Me(AcNH) $\text{C}_6\text{H}_3\text{COCH}_2\text{Cl}$ 16 hrs. with 70 g. Zn-Hg in 300 cc. HCl; it is isolated as the *sulfate*, plates from dil. alc., m. 178° ; yield, 4 g. 2,4-EtMe $\text{C}_6\text{H}_3\text{NH}_2$, similarly obtained from 5,2-Me(AcNH) $\text{C}_6\text{H}_3\text{COCH}_2\text{Cl}$, b. $217-20^{\circ}$ (cf. Willgerodt and Brandt, *J. prakt. Chem.* 69, 436 (1904)).

CHAS. A. ROUILLER.

Hydantoina. XXXI. New synthesis of *o*-tyrosine. TREAT B. JOHNSON AND WALTER M. SCOTT. *J. Am. Chem. Soc.* 37, 1846-56(1915).—Having found that hydantoin does not condense smoothly with *o*-HO $\text{C}_6\text{H}_4\text{CHO}$ (a), J. and S. used 2-thiohydantoin (b) as the starting point; 37.5 g. (a), 30 g. (b) and 90 g. NaOAc heated 4 hrs. at $140-50^{\circ}$ in 230 cc. AcOH gave almost quant. 2-thio-4-*o*-hydroxybenzylhydantoin (c), radiating needles from AcOH, m. 248° ; heated 2 hrs. at $140-50^{\circ}$ with 3 parts $\text{CH}_2\text{ClCO}_2\text{H}$ and 8 parts H_2O , it gives 80% of 4-*o*-hydroxybenzylhydantoin (d), needles from alc., m. 271° (decompn.). 2-Thio-4-*o*-hydroxybenzylhydantoin, from 4 g. (c) in 45 cc. of 5% NaOH treated slowly at 75° with 150 g. of 3% Na-Hg, rosets of needles from H_2O , m. 107° , converted by 30% $\text{CH}_2\text{ClCO}_2\text{H}$ after 1 hr. at 130° into *o*-tyrosine-hydantoin, prisms from H_2O , m. $205-6^{\circ}$, better obtained (85% yield) from (d) in 1% NaOH at 80° with 3% Na-Hg. Long digestion with concd. Ba(OH)_2 (48 hrs. required for 7 g.) hydrolyzes it to *o*-tyrosine, decomp. $232-3^{\circ}$ on slow heating with formation of an oil which solidifies and m. again 270° ; on rapid heating it decomp. $247-50^{\circ}$; its *hydrochloride* seps. from dil. HCl in prisms, decomp. 180° . 2-Thio-4-*o*-methoxybenzylhydantoin (e), obtained in 20.5 g. yield from 10.3 g. (b), 12 g. *o*-MeOC $\text{C}_6\text{H}_4\text{CHO}$ and 30 g. NaOAc in 75 cc. AcOH heated 6 hrs. at $140-50^{\circ}$, needles from alc., m. 227° ; heated 4 hrs. at $130-40^{\circ}$ with 30% $\text{CH}_2\text{ClCO}_2\text{H}$ it gives 75% of 4-*o*-methoxybenzylhydantoin, prisms or needles from 95% alc., m. 178° . This is also obtained, but only in 2.2 g. yield, from 2.5 g. hydantoin, 3.5 g. MeOC $\text{C}_6\text{H}_4\text{CHO}$, 7.5 g. NaOAc and 25 cc. AcOH heated 4 hrs. at $130-40^{\circ}$. From 30 g. in 175 cc. of 10% NaOH and 300 cc. H_2O slowly treated at $80-90^{\circ}$ with 600 g. of 3% Na-Hg and warmed 3-4 hrs. is obtained 29 g. *o*-methoxybenzylhydantoic acid, rectangular prisms from alc., m. 189° (effervescence), quant. converted by hot dil. HCl into the *hydantoin*, prisms from alc., m. 186° . With concd. Ba(OH)_2 the hydantoic acid or the hydantoin give *o*-methoxyphenylalanine (4 g. from 7.5 g. acid), needles from H_2O , m. 206° (effervescence), 1.5 g. of which, heated 30 min. at 100° with 0.7 g. NH_4NCS , 8 cc. Ac_2O and 1 cc. AcOH, gives 2-thio-3-acetyl-4-*o*-methoxybenzylhydantoin, m. 168° , quant. hydrolyzed by HCl to 2-thio-4-*o*-methoxybenzylhydantoin, m. 190° , also obtained from (e) and Na-Hg in dil. alkali at $70-80^{\circ}$. XXXII. Synthesis of the hydantoin of 2-hydroxy-5-aminophenylalanine. *Ibid* 1856-63; cf. C. A. 6, 3089.—2-Thio-4-[2,5-dihydroxybenzyl]hydantoin, from (b), 2,5-(HO) $\text{C}_6\text{H}_3\text{CHO}$, NaOAc and AcOH heated 2 hrs. at $130-40^{\circ}$, prisms from dil. AcOH, decomp. about 270° , converted by $\text{CH}_2\text{ClCO}_2\text{H}$ into 4-[2,5-dihydroxybenzyl]hydantoin, decomp. above 300° , extremely unstable in alk. soln. and could not be reduced to the

PhCH₂ deriv. with Na-Hg. *2-Thio-4-[2-hydroxy-5-nitrobenzyl]hydantoin* (f), obtained in 22 g. yield from 15 g. 2,5-HO(O₂N)C₆H₃CHO, 9.7 g. (b), 29 g. NaOAc and 95 cc. AcOH heated 4 hrs. at 140°, does not m. below 300°, converted by CH₃ClCO₂H into *4-[2-hydroxy-5-nitrobenzyl]hydantoin*, needles from alc., m. 286° (yield 18 g. from 22 g. thio compd.); 14 g. boiled in 250 cc. concd. HCl with 28 g. Sn gave 11 g. of *4-[2-hydroxy-5-aminobenzyl]hydantoin hydrochloride*, corpuscular crystals from HCl, decomp. 242–3°, leaving a solid which does not m. 290°; 11 g. of this in 40 cc. H₂O at 5° slowly treated with 3 g. NaNO₂ in 10 cc. H₂O gives the diazonium salt as a light green powder which, after standing 30 min., is heated to about 60°, giving *4-[2,5-dihydroxybenzyl]hydantoin* as a red powder, slowly oxidizing and dissolving in NaOH with a dark color, sol. in HCl and H₂SO₄ with characteristic purple color, darkens on heating, partially decomp. about 170° but does not m. below 290°. Attempts to obtain with Ba(OH)₂ the corresponding NH₂ acid, which is probably an intermediate product in the formation of 2,5-(HO)₂C₆H₃CO₂H in alcaptonuria, failed; the hydantoin is extremely unstable in acid and alk. solns., apparently oxidizing and hydrolyzing to a dark amorphous product. *1-Methyl-4-[2-methoxy-5-nitrobenzyl]hydantoin*, obtained in 6 g. yield from 5 g. (f), 2 g. Na and 10 g. MeI heated 6 hrs. at 100° in 50 cc. MeOH, m. 265° (effervescence), reduced by Sn and HCl to *1-methyl-4-[2-methoxy-5-aminobenzyl]hydantoin hydrochloride*, light colored cryst. powder from H₂O, gradually decomp. above 170°, does not give a red color with Millon reagent.

CHAS. A. ROUILLER.

Nitrated proteins. I. Determination of the structure of nitrotyrosine. TREAT B. JOHNSON AND EDWARD F. KOHMANN. *J. Am. Chem. Soc.* 37, 1863–84 (1915).—As a preliminary to a projected investigation of the chem. of nitrated proteins, it became necessary to det. what compds. are formed on nitration of the aromatic NH₂ acid constituents of proteins. J. and K. find that on nitration tyrosine forms 2 isomeric NO₂ derivs., the chief product being that in which the NO₂ is in the *o*-position to the HO group. The nitration was carried out according to Städeler's directions (*Ann.* 116, 77 (1860)). When 5.7 g. of the crude product (a) in 150 cc. MeOH is gently digested 18.9 hrs. with 7 g. KOH and 34 g. MeI, it gives *o*-nitrotyrosinetrimethylammonium iodide (b), 4,3-HO(O₂N)C₆H₃CH₂CH(CO₂H)NMe₃I, yellow prisms with 2 H₂O from alc., m. 119°, decomp. 121°, gives the Millon reaction; and the more sol. *diquaternary salt* (c), provisionally assigned the structure RCH(NMe₃I)CO₂NMe₃CHRCO₂H (R = HO-(O₂N)C₆H₃CH₂), stout prisms from 95% alc., m. 220–1° (decompn.), gives the Millon reaction. Yields, 10 g. (b) and 6 g. (c) from 16 g. (a). When boiled with 10% NaOH (a) gives NMe₃ and 92% of 4,3-HO(O₂N)C₆H₃CH:CHCO₂H (*C. A.* 9, 596); no evidence was obtained of the formation of any other acid. The acid is also obtained in 79% yield from (c). With Sn and HCl on the H₂O bath it yields *3-amino-4-hydroxycinnamic acid hydrochloride*, needles from dil. HCl, begins to change 225°, decomp. 240°. With NH₄CNS and Ac₂O, (a) yields various products, depending on the conditions. In 1 expt. 12 g. (a), 6.3 g. NH₄CNS and 60 cc. Ac₂O were heated 20 min. on the H₂O bath, cooled and poured into 400 cc. cold H₂O; there sepd. 14.5 g. of a red oil which finally solidified; when dissolved in 100 cc. AcOH, digested with charcoal and cooled, there sepd. 0.2 g. of *2-thio-1,3-diacetyl-4-[3-nitro-4-acetoxybenzyl]hydantoin*, yellow needles with 1 AcOH, m. 174°. The AcOH filtrate on concn. to 20 cc. deposited 2.7 g. of *2-thio-3-acetyl-4-[3-nitro-4-acetoxybenzyl]hydantoin*, yellow rectangular plates from AcOH, m. 173–5°. The combined AcOH filtrates, evapd. to dryness and digested with excess of concd. HCl for 1.5 hrs., gave *2-thio-4-[3-nitro-4-hydroxybenzyl]hydantoin* (d), yellow hexagonal plates from AcOH, m. 239–42° (decompn.), and about 0.1 g. of the *o*-nitro isomer (e), yellow needles with 1 AcOH which it loses at 110°, becoming brick-red; it begins to char at 270° and

slowly decomp. further when heated higher. Its formation shows that the crude (a) contains, besides much 4,3-HO(O₂N)C₆H₄CH₂CH(NH₂)CO₂H, a little of the 4,2-compd. More (e) in the yellow and red forms is obtained when the H₂O from which the red oily condensation product seps. (see above) is evapd. to dryness with HCl and the residue is crystd. from AcOH. When the condensation was repeated with 12.7 g. (a), 6.5 g. NH₄CNS and 64 cc. Ac₂O and the 16 g. oil sepg. from H₂O was crystd. from 95% alc. instead of AcOH, no di- and tri-Ac derivs. were obtained, but, instead, flat prisms, m. 176–8°, consisting chiefly of 2-thio-3-acetyl-4-[3-nitro-4-hydroxybenzyl]-hydantoin, hydrolyzed by hot concd. HCl to (d); the alc. filtrate on concn. yielded 0.5 g. of the 2 forms of (e). 4-[3-Nitro-4-hydroxybenzyl]hydantoin (f), obtained quant. from (d) with 30% CH₂ClCO₂H, yellow needles with 1 AcOH, m. 225–6°, gives the Millon reaction; it is also obtained in 0.5 g. yield from 3 g. 4-[3-nitro-4-methoxybenzyl]-hydantoin heated at 100° for 3 hrs. with AcOH satd. at 0° with HBr. 2-Thio-4-[3-nitro-4-methoxybenzyl]hydantoin, obtained in 10 g. yield from 10 g. 2-thio-3-benzoylhydantoin, 8.2 g. 4-3-MeO(O₂N)C₆H₄CHO and 16 g. NaOAc heated 2.5 hrs. at 155° in 50 cc. AcOH, stellar crystals from dil. alc., flat prisms from dil. AcOH, begins to darken 240°, decomp. 255°, converted by CH₂ClCO₂H into 4-[3-nitro-4-methoxybenzyl]-hydantoin which with HI and red P and subsequent treatment with AgCl gives the aminohydantoin-HCl, sepg. from HCl in anhydrous prisms, decomp. about 285°, also obtained when the hydantoin prepd. from (a) is similarly treated. 1-Methyl-4-[3-nitro-4-hydroxybenzyl]hydantoin, from (f), KOH and 1 mol. MeI in MeOH heated 2 hrs. at 150–5°, minute yellow prisms, m. 202°, gives a red color with Millon's reagent; with 3 mols. KOH and 4 of MeI is obtained the 1,3-dimethyl compound, microcrystals, m. 180–5°, gives a positive Millon test. 2-Thio-4-anisalhydantoin is obtained in 45 g. yield from 23 g. 2-thiohydantoin, anisaldehyde and NaOAc in AcOH; 5 g. in dil. NaOH slowly treated at 75° with 100 g. of 3% Na-Hg gives 4.5 g. 2-thio-4-anisylhydantoin, plates from AcOH, m. 215°.

C. A. ROULLER.

Use of cyanic acid in glacial acetic acid solution and in mixtures of glacial acetic acid with certain organic solvents. Derivatives of 1-isobutyric acid amino-5-dimethylhydantoin. J. R. BAILEY AND W. T. READ. *J. Am. Chem. Soc.* 37, 1884–93 (1915).—[In the following R = Me₂C.CO.NH.CO.N.] Whereas HCNO does not

react with (NHCMe₂CO₂Et)₂ (a) in H₂O, when 35 g. (a) in 70 cc. AcOH is treated below 40° in the course of 45 min. with 18 g. KCNO and after 1 hr. is heated 30 min. at 60°, there is obtained 80% of ethyl-1-isobutyrate amino-5-dimethylhydantoin ([1-isobutyroxyamino]-5,5-dimethylhydantoin) (b), RNHCMe₂CO₂Et, plates like rhombic prisms from 50% alc., m. 104–5°, insol. in cold dil. acids, slowly dissolves, with loss of the CMe₂CO₂Et group, in hot 50% H₂SO₄, reduces cold Br-H₂O instantaneously, KMnO₄ slowly. In its prepn. mixts. of AcOH with various org. solvents can be used within certain limits without materially affecting the yield, and the reaction also takes place, but with diminished yield, in aq. AcOH containing more than 30% acid. The free (NHCMe₂CO₂H)₂ or its nitrile instead of (a) could not be condensed with HCNO. With Br in dil. alc. or 50% AcOH (b) gives what is probably the bis compound (NRCMe₂CO₂Et)₂, non-volatile oil, d. 1.0524, decomp. about 110° in vacuo with gas evolution and sublimation of what is probably RH. With NaNO₂ in AcOH, (b) gives the nitroso derivative RN(NO)CMe₂CO₂Et, thin, faintly yellow plates from H₂O, m. 104°, gives the Liebermann reaction, hydrolyzed by warming for 30 min. with a slight excess of concd. KOH to the free nitroso acid, minute rhombic plates from H₂O, m. 165° (decompn.). 1-Isobutyroxyamino-5,5-dimethylhydantoin, similarly obtained from (b), slender, prismatic plates from H₂O, m. 192.5°, decomp. above 200°. 1-Amino-5,5-dimethylhydantoin, from (b) heated 4 hrs. at 110° in 50% H₂SO₄, slender prisms from

AcOEt, m. 170° , reduces cold Br-H₂O, KMnO₄ and HgO, depositing a very small amt. of an oxidation product, probably a tetrazene; boiled 1 hr. in AcOEt with 1 mol. BzCl it forms the 1-benzoylamino derivative, m. 241° ; while in H₂O with the calcd. amt. of BzH it gives quant. the 1-benzylideneamino compound, needles from alc., m. $191-2^{\circ}$; the latter can also be obtained in 4.6 g. yield from KCNO in 50 cc. AcOH and 5 g. PhCH:NNHCHMe₂CO₂H which is obtained in 42% yield from 20 g. N₂H₄·H₂SO₄ and 21.2 g. K₂CO₃ in 50 cc. cold H₂O treated with 17.8 g. acetone and 1 mol. concd. NaHSO₄, then, after 2 hrs., with 10 g. KCN, allowed to stand 24 hrs. with 2 vols. concd. HCl, boiled 1 hr., concd. *in vacuo*, dissolved in a little H₂O, treated with excess of NaOAc and then in the usual way with BzH. Its Et ester with HCl and KCNO gives no hydantoin but NH₂CONHNHCHMe₂CO₂Et.

CHAS. A. ROUILLER.

Reactions of sodium malonic ester. II. C. LORING JACKSON AND F. C. WHITMORE. *J. Am. Chem. Soc.* 37, 1915-34(1915); cf. *C. A.* 9, 2089.—In this paper is proven the 2nd part of J.'s theory of malonic ester reactions, *viz.*, that the course of the reaction depends in great measure on the relative attractions of the 2 parts of the substance added for the C attached to the Na. A list is given of 29 well-established cases in which the halogen of an org. compd. is replaced by H or Na under the influence of a Na ester; all have 1 thing in common—the compds. contain strongly negative radicals, the negativity being produced in a great variety of ways (nitrohalogenphenyl, O compds. of S, S alone, or reinforced by O₂NC₆H₄, PhC:C, CO₂R, Ph ketones or imides of dibasic acids). Ten cases are also discussed in which the radical combined with the halogen is negative but perhaps not enough so to be preferred to the halogen by the positive C. Only 1 does not harmonize with the theory; CNCl and CHNa(CO₂Et)₂ (a) give NCCH(CO₂Et)₂ while CNBr gives HCN and [CH(CO₂Et)₂]₂ (b) although Br is certainly more negative than CN and therefore NCCH(CO₂Et)₂ should be formed instead of HCN. This may be due to the intervention of other conditions, such as differences in solubility of the products or of constitution of the CN compds. The (a) from 3.5 g. Na and 28 cc. CH₂(CO₂Et)₂ in several vols. Et₂O was treated with PhSO₂Cl in 20 cc. each of C₆H₆ and Et₂O and the heavy white ppt. which at once formed was allowed to stand in the cold 10 days, during the course of which NaOEt from 3.5 g. Na was slowly added; the ppt. was then filtered and washed with Et₂O; the washings yielded (b), while the insol. residue, when exhd. with hot alc., gave PhSO₂Na and a salt sol. in cold alc. and having the comp. of diethyl sodiophenylsulfomalonate, PhSO₂CNa(CO₂Et)₂ (c). Equiv. amts. of CHCl(CO₂Et)₂ and PhSO₂Na in MeOH at once gave a ppt. of NaCl and the filtrate, when made barely alk. to phenolph. with NaOH in MeOH and evapd., gave (c). [2,4-(O₂N)₂C₆H₃S]₂ and 1 mol. Br₂ in CCl₄ gave a ppt. insol. in org. solvents (containing 21.94% Br instead of the 28.67% calcd. for the compound (O₂N)₂C₆H₃SBr, showing it contained some unchanged disulfide), blackens about 120° , gives HBr when boiled with H₂O. With 2 mols. (a) in C₆H₆, it turned red and almost completely dissolved; after 2 days the soln. turned pale yellow and deposited a heavy ppt., the filtrate from which, after shaking with dil. H₂SO₄, yielded on evapn. a small amt. of (O₂N)₂C₆H₃SH. Extn. of the ppt. with various solvents yielded noncrystallizable oils and the undissolved portion was probably mostly the disulfide, although it m. around 260° (decompn.) instead of 280° . BzI and (a) give chiefly BzCH(CO₂Et)₂ but if the oil containing it is shaken with warm H₂O and the ext. is mixed with an equal vol. of AcOH and treated with PhNHNH₂, there is formed a small amt. of a solid m. 163° after crystn. from alc.; when mixed with PhCH:NNHPh, m. 158° (prepd. from BzH and PhNHNH₂), it m. 160° , while with BzNHNHPh, m. 168° (from BzI and PhNHNH₂), it m. $135-40^{\circ}$. This indicates, but does not prove definitely, that the product of the reaction of BzI with (a) contains some BzH. From *p*-O₂NC₆H₄COCl, CH₂(CO₂Et)₂, in Et₂O and Na in alc. allowed to stand 4 days is obtained diethyl *p*-nitro-

benzoylmalonate, needles from MeOH, m. 93° . $\text{BrC}(\text{CO}_2\text{Et})_2$ and (a) allowed to stand 9 weeks in $\text{Et}_2\text{O}-\text{C}_6\text{H}_6$ gave 67% of (b) and, apparently, $\text{CH}(\text{CO}_2\text{Et})_2$, b₄ $170-5^{\circ}$. From $\text{Ph}_2\text{CHCHBrBz}$ in C_6H_6 and 2 mols. (a) are obtained 76% $\text{Ph}_2\text{CHCH}_2\text{Bz}$, 54% (a) and apparently $\text{CHBr}(\text{CO}_2\text{Et})_2$. Bischoff's work (*Ber.* 29, 1510, 1515 (1896)) has been repeated with the Br and Me compds. in the cold; 5 g. $\text{MeCBr}(\text{CO}_2\text{Et})_2$ in 1 vol. C_6H_6 were added to 15.8 g. $\text{CH}_2(\text{CO}_2\text{Et})_2$ in C_6H_6 , previously treated with the NaOEt from 2.2 g. Na, and allowed to stand 3 weeks in the cold; there was then obtained 4.3 g. (68%) of (b); no $[(\text{EtO}_2\text{C})\text{C}]_2$ (d) was detected although some may have been present in the oil. In another expt. 0.9 g. (b) was obtained from 5 g. $\text{CHMe}(\text{CO}_2\text{Et})_2$ and the NaOEt from 0.66 g. Na in C_6H_6 slowly added to 34.3 g. $\text{CHBr}(\text{CO}_2\text{Et})_2$ in C_6H_6 and allowed to stand 3 weeks. The fact that B. obtained (d) was therefore due to his working with boiling solvents. Picryl chloride and $\text{MeCNa}(\text{CO}_2\text{Et})_2$ gave flat, straw-colored needles, m. $78-9^{\circ}$, which were undoubtedly *diethyl trinitrophenylmethylmalonate*, but they were so explosive that no good analyses could be obtained. (a) and nitro- and dinitrobenzyl iodides and the corresponding thiocyanates, triiodoresorcinol and tetrabromo-o-quinone yielded unmanageable oils. $(\text{IC} \cdot)_2$ did not react either in alc., Et_2O or C_6H_6 . $p\text{-O}_2\text{NC}_6\text{H}_4\text{CH}_2\text{SCN}$ (Henry, *Ber.* 2, 638 (1869)), pale yellowish needles or slender prisms from alc., m. $85-6^{\circ}$. *2,4-Dinitrobenzyl thiocyanate*, pale yellow prisms, m. $86-7^{\circ}$. Both thiocyanates have an irritating action on the skin and may produce serious poisoning.

CHAS. A. ROUILLER.

Esterification. VI. Esterification of benzoic acid by mercaptans. L. S. PRATT AND E. EMMET REID. *J. Am. Chem. Soc.* 37, 1934-48(1915); cf. *C. A.* 4, 2270.—The BzSMe used, b₂₈ 134° ; d₂₈ 1.1381 (Obermeyer, *Ber.* 20, 2922 (1887), gives b₇₆₀ $231-2^{\circ}$), was prepd. from Me_2SO_4 and BzSH nearly neutralized with KOH. The BzSEt , b₂₁ 146° , d₂₆²⁵ 1.0977, and BzSPr , b₁₁ 144° , d₂₆²⁵ 1.0724, were made by Wheeler's method (*Am. Chem. J.* 24, 69 (1900)). An electric furnace, described in detail, was constructed, whereby temps. ranging from 200° to 300° could be maintained const. to within 4° . The reaction tubes, containing $\text{BzOH} + \text{mercaptan}$ or $\text{thiol ester} + \text{H}_2\text{O}$, after being heated and then cooled with ice-NaCl were broken and dropped into a flask, covered with alc. (distd. from KOH), freed of mercaptan with a current of CO_2 -free air at 50° and the BzOH titrated with $\text{Ba}(\text{OH})_2$ and phenolph. From the results of the numerous measurements, P. and R. find that while very concordant results are obtained in the acid + mercaptan series, the ester + H_2O series, for some reason which has not yet been discovered, show wide variations. In all the expts. the heating was so long (100-400 hrs.) that the reaction nearly reached the limit, the values from the acid and ester series differing in most cases by less than 2%. In the case of the Me ester no decompn. was noted at 243° ; in that of the Et ester there was slight decompn. at 243° but none at 220° ; in that of the Pr ester, slight decompn. occurred at 220° . Only slight traces of H_2S were found in expts. at 270° but at this temp. the decompn. in the case of the Et ester was so great as to completely vitiate the results. The following are the % limits of esterification (calcd. for equimol. mixts.) obtained with the various mercaptans at 220° and 243° , resp.: Me, 18.7, 19.6; Et, 14.7, 15.4*; Pr, 14.1*, 15.1* (14.3 at 193°); iso-Bu, —, 12.7*; iso-Am, —, 10.8* (slight decompn. in the cases marked*). Apparently, rise in temp. slightly raises the limit. The proportions of acid and mercaptan or of ester and H_2O have no appreciable influence on the limit.

CHAS. A. ROUILLER.

Phenolquinolinein, a heterocyclic analog of phenolphthalein. ARTHUR W. DOX. *J. Am. Chem. Soc.* 37, 1948-9(1915).—From 10 g. quinolinic anhydride (obtained quant. by gently warming the acid with 2 parts Ac_2O until dissolved and then boiling 5. min.), 20 g. PhOH and 8 g. concd. H_2SO_4 heated 10 hrs. at 120° , poured into H_2O and freed from excess of PhOH by boiling is obtained a yellow granular ppt. which,

after boiling in alc. with charcoal, gives an almost colorless soln. turning milky on evapn. and diln. with H_2O and depositing a yellowish granular sediment containing 4.50% N (calcd. for $C_{12}H_{11}O_4N$, 4.56%), gives with alkalis an intense pink color at once discharged by acids.

CHAS. A. ROUILLER.

Constitution of the 4,4'-dichlorodinitro- and 4,4'-dibromodinitrobenzophenones obtained by nitration of 4,4'-dichloro- and 4,4'-dibromobenzophenones. P. J. MONTAGNE. Univ. Leyden. *Ber.* 48, 1027-37(1915); cf. *Rec. trav. chim.* 21, 26 (1902); Consonno, *Gazz. chim. ital.* 34, 374(1904); Maron and Fox, *C. A.* 9, 307; Schöpf, *Ber.* 24, 3774(1891).—M. shows that the 2 compds. are 4,4'-dichloro- (a) and 4,4'-dibromo-3,3'-dinitrobenzophenone (b). (a), m. 132.5° (C. gives 120°, M. and F. 132-3°), is reduced by $SnCl_2$ and HCl to the 3,3'-diamino compound, light yellow needles from alc., m. 167.5°. 4,3'-Br(O_2N) C_6H_3 (4-Br C_6H_4)CO, from $PhBr$, $AlCl_3$ and 4,3-Br(O_2N) C_6H_3 COCl (which, contrary to Grohmann, *Ber.* 23, 3446 (1890), b₁₀ 178° without decompn.), m. 119.5°, b₁₀ 287°, seps. from $AcOEt$ in wine-yellow, monoclinic, apparently sphenoidic crystals, $a:b:c = 2.6352:1:4.4498$, β 89° 10' 45", c (001), s (101), r (10 $\bar{1}$), q (0 $\bar{1}$ 1), k (011), o' ($2\bar{1}$ 3). (b), m. 157.5°, boiled 1.5 days with $SnCl_2$, HCl and alc., gives the 3,3'-diamino compound (c), m. 178.5-9.8° (yield, over 80%). 4,4'-Diamino-3,3'-dinitrobenzophenone (d), from (a) or (b) and alc. NH_3 heated 1-2 days at 150°, red needles from alc., m. 293.5° (C. gives 121°, M. and F. 287-9°). 4,4'-Di-anilino compound, from (a) or (b) and alc. $PhNH_2$ after 1 day at 150°, yellow-brown, m. 226.5° (C., 212°). 3,4,3',4'-Tetraaminobenzophenone, from (d), $SnCl_2$, HCl and alc., long, yellow needles, sepg. from H_2O in anhydrous or hydrated form, depending on the concn. and temp., m. (anhydrous) 217° (C., 155°); with phenanthraquinone in boiling $AcOH$ it gives di[phenanthrophenazine] ketone, generally m. 378-80°, sometimes lower (C., 160°). ($m-O_2NC_6H_4$) CH_2 (Thorpe and Wildman, *C. A.* 9, 1067), m. 175.5°, gives on oxidation ($m-O_2NC_6H_4$) $_2$ CO, m. 155°, also obtained by nitration of Ph_2CO ; reduced by Baeyer's method (*C. A.* 1, 2697) it gives the di- NH_2 compd., m. 150.5° (B., 173°), which with $Na-Hg$ in boiling alc. (Staedel, *Ann.* 218, 351) yields ($m-H_2NC_6H_4$) $_2$ CHOH, m. 128.5°, identical with the product obtained from (c) and $Na-Hg$.

CHAS. A. ROUILLER.

Isatin. A. BINZ AND R. HUETER. Berlin. *Ber.* 48, 1038-41(1915).—Isatin (a) reacts with $p-C_6H_4(NH_2)_2$ (b) in 2 ways, depending on the exptl. conditions. Thus, 7.5 g. (a) and 5 g. (b) in 100 cc. of 80% alc. boiled a short time and allowed to stand 24 hrs. quant. give p -aminophenylisatin (c), $H_2NC_6H_4N:C.CO.NH.C_6H_4$, ruby-red

needles from alc., m. 239-41° (decompn.), gives with BzH a yellow benzylidene derivative which could not be recrystd. without decompn.; with $NaOEt$ in alc. with a little Et_2O is formed, without change in color, a sodium salt, $C_{14}H_{10}ON_2Na$, which with 5% $AgNO_3$ yields the dark silver salt; with $NaOH$ and hydrosulfite is formed a vat imparting to cotton only a faint and not fast color; with 10 parts of com. H_2O_2 (carefully neutralized with $NaOH$) is obtained aminophenylisatoic anhydride, black microscopic needles which cannot be recrystd., m. around 232°, gives a sulfonation product insol. in H_2O . p -Aminophenyldibromoisatin, from equimol. amts. of dibromoisatin and (b) in aq. alc., red-violet, m. above 300°. If 16 g. (a) and only 5 g. (b) are boiled a short time in 150 cc. of 80% alc. or if (c) is warmed with $AcOH$ or with (a) in alc., the product is di-[p -aminophenylisatyl]imesatin (d), $(CO.NH.C_6H_4.C:NC_6H_4NH)_2C.CO.NH.C_6H_4$, yellow-red scales from C_6H_5N , m. 310° (decompn.), converted into (c) by warming with (b). (d) is also obtained from equimol. amts. of (a), (b)- HCl and $NaOAc$ (Möhlau and Litter, *J. prakt. Chem.* 73, 471(1906), assigned to this compd. the structure (c), probably owing to a faulty analysis).

CHAS. A. ROUILLER.

Salting out of amino acids and the separation of amino acids with the aid of neutral salts. P. PREIFFER AND FR. WITTKA. Univ. Zurich. *Ber.* 48, 1041-8(1915); cf.

C. A. 7, 1025, 3764.—Glycocoll, tyrosine and asparaginic acid are not salted out of their satd. solns. by satg. with the chlorides, bromides, sulfates of the alkalis, alk. earths and NH_4AlCl_4 , $\text{Al}_2(\text{SO}_4)_3$, KOAc , NaOAc and $(\text{CO}_2\text{K})_2$; alanine is salted out to the extent of 19% by $(\text{NH}_4)_2\text{SO}_4$. *dl*-Leucine and *dl*-phenylalanine, however, are pptd. to the following % extents, resp., at room temp.: $(\text{NH}_4)_2\text{SO}_4$, 78.2, 80.8; NaCl , 60.8, 57.4; KCl , 48.9, 38.4; Na_2SO_4 , 34.3, 31.4; MgSO_4 , 31.9, 66.4; AcONa , 31.4, 36.9; AcOK , 13.6, 25.8; $(\text{CO}_2\text{K})_2$, 39.2, 67.0. When to 70 cc. of a satd. phenylalanine soln. (about 0.976 g. NH_2 acid) is added 2 g. glycocoll and 49 g. $(\text{NH}_4)_2\text{SO}_4$, drained and dried at 90° , the ppt. is found to contain 0.8161 g. NH_2 acid which, by treatment with CuSO_4 and $\text{Ba}(\text{OH})_2$, was shown to consist almost entirely of phenylalanine. Similarly from 0.097 g. of *l*-leucine ($[\alpha] 8.2^\circ$) in 10 cc., treated with 0.1 g. glycocoll and 7 g. $(\text{NH}_4)_2\text{SO}_4$, was obtained a ppt. containing 0.0588 g. of NH_2 acid with $[\alpha] 8.5^\circ$; when 0.2 g. glycocoll was used, the pptd. NH_2 acid weighed 0.0575 g. and showed $[\alpha] 7.8^\circ$; from solns. free from glycocoll, about 61% of the *l*-leucine is pptd. As pointed out before, NH_2 acids form with neutral salts (especially CaCl_2) well-characterized compds., with resulting differences in solubility. The CaCl_2 compds. of glycocoll and *dl*-alanine differ markedly in their solubility in aq. alc.; 0.5 g. glycocoll and 10 g. $\text{CaCl}_2 \cdot 10\text{H}_2\text{O}$ in 8 cc. H_2O dild. with 120 cc. alc. and allowed to stand in the ice chest deposited 76.9% of the NH_2 acid as its CaCl_2 compd. while under the same conditions *d*-alanine gave no deposit. On the other hand, solns. identical to the above except that they contained no CaCl_2 deposited 92 and 82%, resp., of the two NH_2 acids. A mixt. of 0.5 g. each of the acids with 10 g. $\text{CaCl}_2 \cdot 10\text{H}_2\text{O}$ in 8 cc. H_2O and 120 cc. alc. gave 84.2% of almost pure glycocoll as the CaCl_2 compd. (the ppt. contained 25.08% of H_2O and, after dehydration, 27.17% Cl ; calcd. for $\text{CaCl}_2 \cdot 2\text{NH}_2\text{CH}_2\text{CO}_2\text{H}$, 27.01%), while the filtrate gave $[\alpha] 13.5^\circ$; calcd. value on the assumption that all the alanine had remained in soln., 14.0° . From the ppt. and the filtrate the 2 acids were isolated as the Cu salts by treating with Ag_2O or PbO , filtering, pptg. with H_2S , boiling to expel the excess of H_2S , treating with excess of NH_3 and $(\text{NH}_4)_2\text{CO}_3$, allowing to stand 24 hrs., filtering from the CaCO_3 , evapg. to dryness and boiling in H_2O with excess of $\text{Cu}(\text{OH})_2$. As $\text{Cu}(\text{O}_2\text{CCH}_2\text{NH}_2)_2$ forms with CaCl_2 a cryst., deep blue compd., $\text{CaCl}_2 \cdot (\text{NH}_2\text{CH}_2\text{CO}_2)_2\text{Cu} \cdot 3\text{H}_2\text{O}$, $\text{Cu}(\text{O}_2\text{CCH}_2\text{NH}_2)_2$ cannot be obtained directly from a soln. containing CaCl_2 . CHAS. A. ROUILLER.

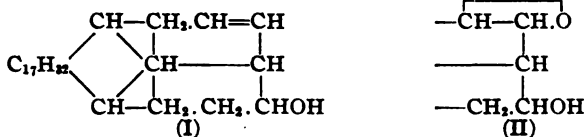
Differences in reaction of stereoisomeric ethylene halides. II. P. PFRIFER with K. v. SWIDZINSKI. Univ. Zurich. Ber. 48, 1048-58(1915).—Just as with $(\text{PhCHBr})_2$ and 2,4-(O_2N) $_2\text{C}_6\text{H}_3\text{CHBrCHBrPh}$ (C. A. 6, 2736), so of the 2 stereoisomeric *o*- $\text{O}_2\text{NC}_6\text{H}_4\text{CHBrCHBrPh}$ the higher melting α -form loses Br_2 and the lower melting β -form HBr with $\text{C}_6\text{H}_5\text{N}$. The mixed *o*-nitrostilbene dibromides are obtained in 2.9 g. yield from 2 g. *o*- $\text{O}_2\text{NC}_6\text{H}_4\text{CH:CHPh}$ and 1.5 g. Br allowed to stand overnight in CS_2 ; they are sep'd. by crystn. from MeOH into the α -form, yellowish tables, m. 156° , and the β -form, more compact to prismatic crystals, m. 89° . From 0.5 g. of the α -form heated 6 hrs. on the H_2O bath with 6 g. $\text{C}_6\text{H}_5\text{N}$ is obtained *o*- $\text{O}_2\text{NC}_6\text{H}_4\text{CH:CHPh}$, while 3.2 g. of the β -form with 20 cc. $\text{C}_6\text{H}_5\text{N}$ gives 1.9 g. *o*-nitro- μ -bromostilbene, dark yellow oil. From 1 g. of $\text{PhCHBrCHBrCO}_2\text{H}$, m. 195° , heated 10 hrs. in 5 cc. $\text{C}_6\text{H}_5\text{N}$, is obtained a mixt. of about 62% $\text{PhCH:CHCO}_2\text{H}$ and 38% $\text{PhCH:CBrCO}_2\text{H}$, while the isomer, m. $83-91^\circ$, gives 0.6 g. of practically pure $\text{PhCH:CBrCO}_2\text{H}$. Similarly, the ester $\text{PhCHBrCHBrCO}_2\text{Me}$, m. 117° , gives a mixt. of about 40% $\text{PhCH:CHCO}_2\text{Me}$ and 60% $\text{PhCH:CBrCO}_2\text{Me}$, while the isomer, m. $50-2^\circ$, gives only the Br ester. The two $\text{MeCHBrCHBrCO}_2\text{H}$ behave alike, the form m. $56-60^\circ$ giving $\text{MeCH:CBrCO}_2\text{H}$, just like the isomer m. 87° (C. A. 5, 504). The same is true of the two $(\text{CHBrCO}_2\text{H})_2$, the form m. $160-4^\circ$ giving $\text{HO}_2\text{CC}(\text{:CH}_2)_2\text{C}_6\text{H}_4\text{NBr}$, while the isomer m. 250° gives, together with a little of the above compd., chiefly $\text{HO}_2\text{CCH:C.CO.O.C}_6\text{H}_4\text{N}$

(C. A. 5, 495), $\text{HO}_2\text{CCH}:\text{CBrCO}_2\text{H}$ therefore being an intermediate product in both cases. Coumarin dibromide gives monobromocoumarin. CHAS. A. ROUILLER.

Aromatic arsenic compounds. X. o-Carboxylated diaminodihydroxyarsenobenzene. P. KARRER. Georg-Speyer-Haus, Frankfurt a/M. *Ber.* 48, 1058-64 (1915).—*2-Carboxy-4-nitrophenylarsonic acid*, obtained in 22 g. yield from 18 g. 2,5- $\text{H}_2\text{N}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{CO}_2\text{H}$ in 100 cc. HCl (d. 1.12) and 50 cc. H_2O diazotized at 5° with 50 cc. of 2 *N* NaNO_2 , filtered, slowly treated with 26 g. Na_2AsO_3 in 50 cc. H_2O and then with 10 *N* NaOH until the acid reaction to Congo just disappears, druses and needles from H_2O , reduced by hydrosulfite to an easily sol. substance, probably a sulfaminic acid; 14.5 g. in 98 cc. of 10 *N* NaOH and 180 g. H_2O is poured into 86 g. crystd. FeSO_4 in 200 cc. H_2O at 70° , stirred thoroughly, drained off, extd. twice with 200 cc. boiling H_2O , the combined filtrates concd. until salts begin to sep., made acid to Congo with HCl (d. 1.19), cooled and filtered. The filtrate, containing the NH_2 acid, is dild. with 100 cc. H_2O , neutralized with 10 *N* NaOH , treated with 10 cc. concd. H_2SO_4 , diazotized at 5° with NaNO_2 until KI-starch paper momentarily gives a strong blue color, heated on the H_2O bath, filtered (owing to its solubility, the HO acid cannot be isolated directly), treated with 60 cc. of 35% H_3PO_3 and a little KI and heated on the H_2O bath 20-30 min.; the yellow ppt. of 2,2'-dicarboxy-4,4'-dihydroxyarsenobenzene thus obtained is treated, while still moist, with 3 cc. H_2O and, drop by drop, with 30% H_2O_2 to complete decoloration and soln., quickly filtered and cooled, 2-carboxy-4-hydroxyphenylarsonic acid sepg. in needles; 3.9 g. of this in 20 cc. concd. H_2SO_4 treated below 0° with 1.3 g. HNO_3 (d. 1.42) in 5 cc. H_2O , allowed to warm up to 10° and poured upon 75 g. ice, gives the 5-nitro derivative, needles, decomp. $350-5^\circ$; 2.2 g. of this heated to boiling with 20 cc. of 25% H_3PO_3 and 10 cc. AcOH deposits $[\text{5,4,2-O}_2\text{N}(\text{HO})(\text{HO}_2\text{C})-\text{C}_6\text{H}_3\text{As}]_3$ which on addition of 2-3 g. KI is energetically reduced and on diln. with 30 cc. H_2O and neutralization of the greater part of the acid with concd. NaOH the light yellow 5,5'-diamino-4,4'-dihydroxy-2,2'-dicarboxyarsenobenzene is obtained; it is easily sol. in soda, NaOH , NaHCO_3 and NaOAc , difficultly in dil. and concd. HCl , gives a red condensation product with $\text{Me}_2\text{NC}_6\text{H}_4\text{CHO}$, is easily diazotized; 0.3 g. in 10 cc. hot H_2O and a little NaOAc , heated 10 hrs. in a sealed tube in the H_2O bath, gives 3,4- $\text{HO}(\text{H}_2\text{N})\text{C}_6\text{H}_3\text{CO}_2\text{H}$. The fatal dose is 1/1500 g. per 20 g. mouse wt.

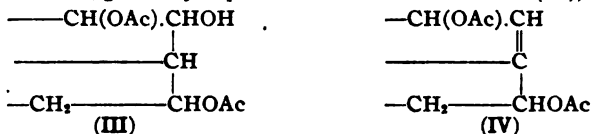
C. A. ROUILLER.

Cholesterol. A. WINDAUS. XXII. Action of benzoyl hydroperoxide on cholesterol. THEODOR WESTPHALEN. Innsbruck. *Ber.* 48, 1064-9 (1915); cf. Prileshaev, C. A. 4, 916.—A soln. of BzO_2H in CHCl_3 prepd. by Baeyer and Villiger's method from 20 g. Bz_2O_2 is heated under a reflux condenser with 10 g. cholesterol (to which, for reasons to be published later, is assigned the formula (I)) in 100 cc. CHCl_3 until the Salkowski



reaction for (I) disappears (about 6 hrs.), shaken with dil. KOH , washed with H_2O and evapd.; the resulting sirup, on treatment with petr. ether and rubbing with a glass rod, yields 5.5 g. of α -cholesterol oxide (II), slender pearly tables from AcOEt , m. $140-1^\circ$, $[\alpha]_D^{20} -37.43^\circ$ in C_6H_6 , gives a cherry-red, then violet color in the Liebermann-Burchard test; 0.5 g. in 50 cc. of 95% alc. and 2 g. digitonin in 200 cc. alc. deposit quickly and almost quant. an addition product, $\text{C}_{27}\text{H}_{48}\text{O}_2\cdot\text{C}_{24}\text{H}_{40}\text{O}_{18}$, needles from MeOH , gradually decomp. above 230° . Acetate (a), from (II) boiled 1 hr. with 10 parts Ac_2O , needles from dil. alc., m. 98° . With CrO_3 (II) yields Mauthner and Suida's oxycholestenone

and oxycholestenediol, while 10 hrs. heating at 115° with 10 parts H_2O gives α -cholestaneetriol, $\text{C}_{27}\text{H}_{48}\text{O}_3$, identical with Pickard and Yates' dehydrocholestaneetriol, to which they assign the comp. $\text{C}_{27}\text{H}_{46}\text{O}_3$ (C. A. 3, 2679). (a) in AcOH treated with a few drops of concd. H_2SO_4 gradually deposits a *cholestaneetriol diacetate* (III), m. 166° , which,



cautiously treated with Ac_2O and a few drops of H_2SO_4 , yields a *cholestenediol diacetate* (IV), leaflets from MeOH, m. 125° . With CrO_3 -AcOH, (a) gives a *cholestanonediol monoacetate*, identical with the product obtained by P. and Y. from their dehydrotriol acetate. The mother liquors from (II) gradually deposit non-homogeneous crystals, m. $100\text{--}10^{\circ}$, consisting chiefly of an isomeric β -cholesterol oxide, for they yield an acetate isomeric with (a), needles, m. 114° ; the oxide regenerated from this differs from the α -form in giving the L.-B. test with the same scale of colors as (I) itself, while with (II) the color remains at the red-violet stage. The β -oxide gives an insol. *digiloin compound*.

CHAS. A. ROUILLER.

Sulfoxyl compounds. IX. Sulfones from rongalite. A. BINZ, O. LIMPACH and W. JANSSEN. Berlin. *Ber.* 48, 1069-77(1915); cf. C. A. 3, 176; 4, 3221.—*p,p'*-Tetramethyldiaminodibenzyl sulfone (a) (formerly assigned the structure $\text{Me}_2\text{NC}_6\text{H}_4\text{CH}_2\text{SO}_2\text{C}_6\text{H}_4\text{NMe}_2$), needles, m. 198° , is obtained in 45 g. yield from 70 g. rongalite, 32 cc. com. HCHO, 100 g. PhNMe_2 , 42 cc. concd. HCl and 100 cc. H_2O heated 3 hrs. on the H_2O bath. *Picrate*, $\text{C}_{18}\text{H}_{14}\text{O}_8\text{N}_2\text{S}_2\text{C}_6\text{H}_4(\text{NO}_2)_2\text{OH}$, yellow crystals, m. 170° . *Dimethosulfate*, $\text{C}_{22}\text{H}_{20}\text{O}_{10}\text{N}_2\text{S}_2$, obtained from 10 g. of the sulfone heated 6 hrs. with 42 g. Me_2SO_4 in 120 cc. CHCl_3 , scales from alc., m. 259° . *Dinitro derivative*, $[\text{O}_2\text{N}(\text{Me}_2\text{N})\text{C}_6\text{H}_4\text{CH}_2]_2\text{SO}_2$, obtained in 3 g. yield [probably a misprint for 30 g., as the crude product, containing some of the mono- NO_2 deriv., weighed 34 g.—ABSTR.] from 33.2 g. (a) in 150 cc. concd. H_2SO_4 introduced in the course of 25 min. into 36 g. concd. HNO_3 and 55 g. H_2SO_4 and allowed to stand 12 hrs., yellow-brown needles from AcOH, m. 191° (that each NO_2 group has entered a different ring is arbitrarily assumed); 3.8 g. heated on the H_2O bath with 20 cc. concd. HCl and 6.5 g. Sn gives 1 g. *tetramethyltetraaminodibenzyl sulfone*, needles from alc., m. 184° . *Monochloro-p,p'*-tetramethyldiaminodibenzyl sulfone, from 4.8 g. (a) allowed to stand overnight in 4.2 cc. concd. HCl and 3 cc. of 30% H_2O_2 , needles from alc., m. $162\text{--}4^{\circ}$. *p,p'*-Tetraethyl-diaminodibenzyl sulfone (b), obtained in 11.5 g. yield from 36 g. rongalite, 16 cc. HCHO, 45 g. PhNEt_2 , 31.5 cc. HCl and 48 cc. H_2O heated 8 hrs., leaflets from alc., m. $162\text{--}3^{\circ}$; with HCl and H_2O_2 , it forms, unlike (a), a *dichloro derivative*, needles from alc., m. $97\text{--}8^{\circ}$ (yield, 2 g. from 3.4 g. (b)). *p,p'*-Diaminodibenzyl sulfone, in 50 g. yield from 35 g. rongalite, 16 cc. HCl, 37 g. PhNH_2 and 100 cc. H_2O at 60° and subsequent warming with 60 cc. dil. HCl, non-crystallizable; *diacetyl derivative*, small crystals from AcOH, m. 281° . *p,p'*-Diaminodi-*o*-tolyl sulfone, in 49 g. yield from 35 g. rongalite and 43 g. *o*- $\text{MeC}_6\text{H}_4\text{NH}_2$; *diacetyl derivative*, silky needles from AcOH, m. 274° . *p,p'*-Diaminodiansyl sulfone, in 11 g. yield from 7 g. rongalite, 3.2 cc. HCHO, 9.2 cc. HCl, 9.8 g. *o*- $\text{MeOC}_6\text{H}_4\text{NH}_2$, and 30 cc. H_2O on the H_2O bath, faintly yellow-green prisms from C_6H_6 , m. $184\text{--}5^{\circ}$, easily sol. in dil. acids. From 15 g. (a) boiled with 27 g. PhNH_2 -HCl and 30 g. PhNH_2 until the evolution of SO_2 ceases (about 7 min.), freed from excess of PhNH_2 with soda and steam, extd. with Et_2O , dried with CaCl_2 and evapd., there is obtained 4.5 g. of $\text{Me}_2\text{NC}_6\text{H}_4\text{CH}_2\text{C}_6\text{H}_4\text{NH}_2$, m. $90\text{--}1^{\circ}$ (Cohn and Fischer, *Ber.* 33, 2590 (1900)), which with BzH in hot alc. gives *benzylidenedimethyldiaminodiphenylmethane*, faintly yellow needles from alc., m. 90° . 3,4-Me(H_2N) $\text{C}_6\text{H}_3\text{CH}_2\text{C}_6\text{H}_4\text{NMe}_2$,

m. 93-4°, is similarly obtained in 57 g. yield from 40 g. (a) and 45 g. *o*-MeC₆H₄NH₂.HCl heated 15 min. with 40 g. Pb(OAc)₂. 3,4-Me(H₂N)C₆H₃CH₂C₆H₄NEt₃, m. 59-60° (Meister Lucius and Brüning, *Ger. pat.* 107,718), is obtained in 4.5 g. yield from 8 g. (b), 6 g. *o*-MeC₆H₄NH₂.HCl, 40 cc. *o*-MeC₆H₄NH₂ and 1 g. Pb(OAc)₂ boiled 10 min. *p*-Dimethylaminophenyl- α -hydroxynaphthylmethane, from (a) and α -naphthol boiled 4.5 hrs. in cumene, flat needles from C₆H₆, m. 149°. β -Hydroxynaphthyl isomer, in 8 g. yield from 15 g. (a) heated 4.5 hrs. with 13.5 g. β -naphthol in 100 cc. cumene, m. 144-5°.

CHAS. A. ROUVILLER.

Ditertiary hydrazines. XIX. New contribution to the knowledge of bivalent nitrogen. HEINRICH WIELAND. Acad. Sci., Munich. *Ber.* 48, 1078-95(1915); cf. C. A. 8, 336.—It has previously been found that negative substituents in the C₆H₅ nuclei of tetraarylhydrazines (NO₂, Ph in PhC₆H₄ derivs., etc.) impede, while Me and MeO favor dissociation at the N. The investigation has now been extended to basic substituted tetraarylhydrazines. [In the following, R = *p*-Me₂NC₆H₄.] R₂NH (Bindschedler, *Ber.* 16, 866(1883)), which is colorless when perfectly pure and m. 121°, is best obtained by alternately introducing, in small portions at a time, 150 g. *p*-ONC₆H₄-NMe₂.HCl (in 400 cc. H₂O at 60-70°) and about 400 g. Zn dust into 1 l. of 30% HCl (toward the end of the reaction concd. HCl must be added, so that an excess of acid is always present); the almost colorless soln. is filtered hot, cooled, treated with 96 g. PhNMe₂, then, drop by drop, with a concd. soln. of 83 g. Na₂Cr₂O₇; 220-50 g. of the dye seps. in green leaflets which, however, are much more sol. in H₂O than, and lack the Cu luster of, the compd. described by B., but, on standing and especially on rubbing, the concd. aq. soln. quickly deposits the red double salt (found Cl, 19.79%; calcd., 19.86%); both salts show the same color in soln. and the green form is either an acid salt or a 2nd modification of the normal Zn double salt. A fresh satd. aq. soln. of 200 g. of the dye at 40° is poured through a folded filter into 200 g. Na₂S₂O₄ in 500 cc. of 20% NaOH, 500 cc. NH₄OH and 1 l. H₂O vigorously stirred or turbined and the pptd. red salt is dissolved by warming; the leuco base which then seps. in colorless cryst. flocks is pressed out, washed free of alkali with cold H₂O, dried on clay *in vacuo* over H₂SO₄ and KOH and recrystd. from much ligroin. It now forms gleaming, often perfectly colorless leaflets (yield, 120 g.). From 5 g. of this in 6 cc. C₃H₅N and 20 cc. Et₂O, shaken 2 hrs. at -15° with 3 g. ignited Na₂SO₄ and 1 g. Ag₂O (1 and 1.8 g. more Ag₂O being added at the end of 0.5 and 1 hr., resp.), drained, washed with cold Et₂O until almost colorless (care being taken that too much (moist) air is not drawn through the ppt.), is obtained 4 g. tetra-(*p*-dimethylamino)tetraphenylhydrazine (a), (R₂N—)₂ (still containing some Ag and Na₂SO₄), purified by suspending in 20 cc. Et₂O, pouring off the lighter (a), filtering, digesting with 8 cc. C₆H₆, washing the insol. portion with Et₂O, treating the clear violet soln. with 10 cc. Et₂O and 5 cc. gasoline and allowing to stand well stoppered 0.5 hr. in a freezing mixt.; there is thus obtained at most 1 g. of colorless microscopic rodlets, unstable even *in vacuo* in the dark, very quickly turned blue by atm. moisture, m. 74-6° to a dark red liquid, easily sol. in C₆H₆, PhNO₂ and alc. (but with rapid alteration); the solns. of the pure (a) in C₆H₆, Et₂O, acetone and C₆H₅N are at first a pure and intense yellow, those in PhNO₂ red; the yellow solns., either in the presence or absence of air, gradually assume a red color; in sunlight the change is almost instantaneous. The dissociation of (a) into the free radicals R₂N is so great that it can be detd. by f. p. detns.; it amounts to 10% in C₆H₆ and 21% in PhNO₂. (a) adds NO instantly to form tetramethyldiaminodiphenylnitrosoamine (b), R₂NNO, and with Ph₃C to give triphenylmethyldiaminodiphenylamine (c), R₂NCPPh₃. Solns. of (a) of equal concn. in Et₂O, C₆H₆ and PhNO₂ contain no more (a) after about 50, 24 and 12 hrs., resp., the products of decompn. being R₂NH and the perazine RN(C₆H₄MeNMe₂)₂NR; at the same time another reaction takes place

to a small extent, accompanied by the appearance of a red color (see above), due to decompn. into Me and trimethylindamine (methyltrimethylaminophenylquinonediimine) (*d*), $\text{MeN}:\text{C}_6\text{H}_4:\text{NR}$ (what becomes of the Me has not been detd.). (*d*) is also obtained by oxidizing (*a*) with Ag_2O . With H_2O (*a*) gives R_2NH and the imonium base $\text{HONMe}_2:\text{C}_6\text{H}_4:\text{NR}$ which quickly (immediately in the presence of alkalis) decomp. into $\text{O}:\text{C}_6\text{H}_4:\text{NR}$ and NHMe_2 , the distinct green color given by all (*a*) solns. on addition of H_2O and the instantaneous change to blue produced by alkalis affording a very sharp test for (*a*). That it is the radical R_2N , not (*a*), that reacts in these cases is shown by dilg. equal vols. of a C_6H_4 soln. of (*a*) with 5 vols. petr. ether and C_6H_6 , resp.; the former becomes practically colorless while the latter is unchanged, and on shaking with H_2O , the former imparts no color to the H_2O while the latter turns it a deep green. Contrary to all tetraarylhydrazines previously studied, (*a*) dissolves in dil. acids, to be sure, but without color, and even in anhydrous acids (HCl in Et_2O , glacial AcOH) forms the normal colorless salts, the salt formation resulting in a great strengthening of the N.N union in (*a*); the salts no longer dissociate like the free (*a*) and the N.N union is destroyed by reducing agents only with difficulty; even a double SnCl_4 salt can be obtained and long treatment with Zn dust in HCl is necessary to split the salt into 2 mols. (with the free (*a*) Pd black and H in Et_2O effect this cleavage instantaneously). If, in the prepn. of (*a*) from R_2NH and Ag_2O in Et_2O , no $\text{C}_6\text{H}_5\text{N}$ (which so increases the oxidizing power of the Ag_2O that the reaction can be carried out at a low temp.) is used, the (*a*) cannot be isolated from the oxidized soln., the only cryst. product ever obtained being (*d*). By passing in NO, however, (*b*) is obtained in 60% yield; it seps. from alc. in fiery yellow needles, begins to decomp. 148° , m. 155° , is not appreciably changed by boiling xylene, is smoothly decompd. into NH_3 and R_2NH by SnCl_4 . It can be obtained directly from R_2NH in cold concd. AcOH soln. with a slight excess of NaNO_2 . PbO_2 , HgO and other oxidizing and dehydrating agents also easily attack R_2NH ; $\text{NH}_3\text{-AgNO}_3$ is at once reduced; Pd black with or without O and quinone instantly redden its colorless Et_2O soln., light accelerating the oxidation extraordinarily; strangely, however, H_2O_2 in Et_2O reacts only slowly. (*c*), obtained almost quant. from (*a*) and Ph_3C in C_6H_6 and crystd. from $\text{C}_6\text{H}_6\text{-EtOH}$, begins to redden 120° , m. 157° , momentarily dissolves in dil. HCl but at once deposits Ph_3COH , dissolves in concd. H_2SO_4 with the yellow color of Ph_3COH and is decolorized by H_2O ; its C_6H_6 and xylene solns. become intensely red after a few hrs. in the cold, at once on heating, with formation of (*d*); light accelerates the change, which, however, is independent of atm. O.

CHAS. A. ROUILLER.

Best method of preparing phenol blue. GUSTAV HELLER. Univ. Leipzig. *Ber.* 48, 1288-9(1915).—Referring to Wieland's statement (preceding abstr.) that absolutely pure phenol blue m. 162° and is best prepd. from Bindschedler's green with alkalis by Möhlman's method (*Ber.* 16, 2855(1883)), (H. points out that this method also is not free from objectionable features, as the dye with hot alkalis again splits off NHMe_2 with formation of a red color, so that even in the cold this reaction cannot be wholly excluded). Subsequent crystn. from ligroin naturally purifies the product. A product m. 167° after crystn. can be obtained by the Gnehm method with perfectly pure reagents (*J. prakt. Chem.* 69, 162(1904)). $p\text{-H}_2\text{NC}_6\text{H}_4\text{NMe}_2$ can be obtained by reduction of aq. $\text{ONC}_6\text{H}_4\text{NMe}_2\text{HCl}$ with Zn dust at 40° without addition of acid; this is a com. method of prepn.

CHAS. A. ROUILLER.

Some notes on triphenylmethyl. HEINRICH WIELAND. *Ber.* 48, 1096-7(1915).—By using ligroin instead of C_6H_6 in the Schmidlin-Schlenk method, C_6Ph_3 is obtained in 60% yield without the tedious evapn. of the solvent; 10 g. Ph_3CCl in the Schmidlin app. in an ordinary distg. flask is boiled under a reflux condenser in 60 cc. ligroin (b. $70\text{-}90^\circ$) with 20 g. Cu bronze in a CO_2 atm. for 45 min., filtered into a distg. flask filled

with CO_2 , and the stoppered flask is cooled in ice 0.5 hr. and then in a freezing mixt. The C_2Ph_4 seps. in faintly yellow rosetts; the side tube of the distg. flask is connected with a CO_2 generator (the connecting rubber tube being filled with Et_2O to displace the air), the ligroin slowly poured off through the top of the flask and replaced by 0.5 its vol. of Et_2O ; the crystals are loosened with a Cu wire, mashed with a broad glass rod, transferred to a filter plate, washed with CO_2 and placed *in vacuo*; so prepd., it is free from detectable amts. of peroxide and dissolves clear in C_6H_6 . C. A. R.

Intermediate occurrence of free radicals in chemical reactions. Decomposition of aromatic hydrazo compounds. HEINRICH WIELAND. Acad. Sci. Munich. *Ber.* 48, 1098-1112 (1915); cf. Stieglitz and Curme, *C. A.* 7, 2397; Curme, *C. A.* 7, 3509. —W. believes that S. and C.'s kinetic measurements agree fully as well with his theory of the decompn. of $(\text{PhNH})_2$, *vis.*: $(\text{PhNH})_2 \longrightarrow (\text{PhN}\cdot)_2 + 2\text{H}$, $(\text{PhNH})_2 + 2\text{H} \longrightarrow 2\text{PhNH}_2$, the 1st reaction being measurably slow, the 2nd immeasurably fast, as with their theory: $(\text{PhNH})_2 \longrightarrow \text{PhN} + \text{H}_2\text{NPh}$, $2\text{PhN} \longrightarrow (\text{PhN}\cdot)_2$ (cf. W., *C. A.* 6, 1296, where with Pd black as catalyst of the 1st stage of the reaction he obtained H at low temps.). A possible method of deciding the question by chem. means is the following: If, instead of $(\text{PhNH})_2$, a non-sym. hydrazo compd. XNHNHY (in which X and Y are different aromatic residues) is used, from S. and C.'s theory it would be expected that the 2 possible bases XNH_2 and YNH_2 would not be formed in equimol. amts., and, moreover, that all 3 of the possible azo compds. $(\text{XN}\cdot)_2$, $(\text{YN}\cdot)_2$ and $\text{XN}\cdot\text{NY}\cdot$, would be formed, while W.'s theory calls for the formation of equimol. amts. of XNH_2 and YNH_2 on the one hand and of $\text{XN}\cdot\text{NY}\cdot$ only on the other. The exptl. facts agree with W.'s views. When 0.708 g. *p*- $\text{MeC}_6\text{H}_4\text{NHNHPh}$ in 20 cc. alc. is heated 12 hrs. at 132° , then dild. with alc. to 50 cc., the unchanged hydrazo compd. oxidized with alc. I, the soln. acidified with H_2SO_4 , the I and azo compd. removed with steam, the soln. made alk., the bases distd. off into HCl (there always remains a small tarry residue with isonitrile-like odor), the distillate treated with 200 cc. concd. HCl, evapd. almost to dryness, made alk. with concd. NaOH, the bases extd. with Et_2O , dried with K_2CO_3 , pptd. in Et_2O as the acid oxalates, then dried *in vacuo* and weighed or titrated with 0.1 N KOH, and finally titrated with Br by C.'s method, it is found that they consist, within 2-3%, of an equimol. mixt. of $\text{MeC}_6\text{H}_4\text{NH}_2$ and PhNH_2 ; the error of C., who found 68 and 32%, resp., of the 2 compds., was due to the fact that he did not take into consideration the by-product formed by rearrangement; he detd. by titration with I the extent of the reaction and assumed that the amt. of I used corresponded by difference to the amt. of bases formed, without taking into account the semidine formed, whereas W. detd. the amt. of bases really formed by pptg. them with $(\text{CO}_2\text{H})_2$, control expts. having shown that while a small amt. of the 2 oxalates remain in soln. in Et_2O , the solubility of each is nearly the same. The steam distillate containing the azo compd., when freed from I with NaHSO_3 , yields light yellow-brown leaflets, m. 69.5° , and, after a 2nd steam distn., m. 70° sharply, showing that only $\text{MeC}_6\text{H}_4\text{N}\cdot\text{NPh}$ is present, since a mixt. of 0.1 g. $\text{MeC}_6\text{H}_4\text{N}\cdot\text{NPh}$ and 0.01 g. $(\text{PhN}\cdot)_2$, distd. with steam gave a product sintering 54° , m. 64° . *p*-Methoxy-*p*-methylazobenzene, from 6 g. *p*- $\text{MeC}_6\text{H}_4\text{NO}$ and 6 g. *p*- $\text{MeOC}_6\text{H}_4\text{NH}_2$ boiled 30 min. with 3 cc. AcOH in 25 cc. alc., orange-yellow prisms from alc., softens 104° , m. $110-1^\circ$, slowly volatile with steam (about 0.1 g. per l.), reduced after a few min. boiling in alc. with concd. aq. NH_3 and Zn dust to the hydrazo compound, needles, sinters and turns yellow 85° , m. 95° , soon turns yellow in the air, is very sensitive to light, both in the solid state and in soln., the autooxidation being markedly accelerated by acids, the colorless compd. dissolving in AcOH with yellow color and addition of a few drops of dil. HCl to an aq. suspension at once producing a deep red-violet color, due to oxidation of the semidine formed by rearrangement. From 3.85 g. heated 12.5 hrs. at 144° in alc. is obtained 0.933 g. of

the azo compd. (steam distn. yielded 0.17 g. with practically the same m. p.) and equimol. amts. of $\text{MeOC}_6\text{H}_4\text{NH}_2$ and $\text{MeC}_6\text{H}_4\text{NH}_2$. *p*-Methyl-*p*-chloroazobenzene, from $\text{MeC}_6\text{H}_4\text{NO}$ and $\text{ClC}_6\text{H}_4\text{NH}_2$, orange-yellow leaves, softens 149° , m. 153° , apparently identical with the compd. m. $149-50^\circ$, obtained by Paganini, *Ber.* 24, 365(1891), from $\text{MeC}_6\text{H}_4\text{N}:\text{NC}_6\text{H}_4\text{OH}$ and PCl_5 . *Hydrazo compound*, needles, m. 124° , becoming faintly yellow, reddens about 150° , more stable towards atm. O than the preceding hydrazo compd.; 3 g. heated 12.5 hrs. at 144° in 25 cc. alc. gives, besides a semidine yielding a blue dye by some change not studied, 0.846 g. of the azo compd. and equimol. amts. of $\text{ClC}_6\text{H}_4\text{NH}_2$ and $\text{MeC}_6\text{H}_4\text{NH}_2$. *p*- $\text{EtO}_2\text{CC}_6\text{H}_4\text{NHNHPh}$ similarly yields only $\text{EtO}_2\text{CC}_6\text{H}_4\text{N}:\text{NPh}$ when heated 14 hrs. in xylene at $160-70^\circ$ (no method could be devised for detg. the relative amts. of the bases formed). CHAS. A. ROUILLER.

Aromatic hydrazines. XX. Dissociation of triphenylhydrazine. HEINRICH WIELAND AND ARNO REVERDY. *Acad. Sci., Munich. Ber.* 48, 1112-6(1915).—Thus far, only ditertiary hydrazines were known to dissociate into free radicals (see preceding abstr. for the proof that $(\text{PhNH})_2$ does not). When, however, 2 g. Ph_2NNHPh is boiled 2 hrs. in 15 cc. xylene (a weak current of CO_2 being passed through the boiling soln.), the soln. gradually darkens and finally becomes red-brown; steam distn. now gives $(\text{PhN})_2$, PhNH_2 and Ph_2NH . The remaining product is *p*- $\text{PhN}:\text{C}_6\text{H}_4:\text{NPh}_2$ (a); for its identification the freshly boiled xylene soln. (before the steam distn.) is dild. with Et_2O , extd. with 0.2 *N* HCl as long as appreciable amts. of the red-violet dye are removed, the combined exts. treated with fresh Et_2O (which, owing to slight hydrolysis of the salt, removes a little of the red-brown base) and the dye is salted out in bronzy flocks with NaCl. W. and A. consider this evidence that the Ph_2NNHPh dissociates into Ph_2NH and PhN , the latter free radical polymerizing to $(\text{PhN})_2$, while another portion, combining with unchanged Ph_2NNHPh , gives $\text{Ph}_2\text{NNHC}_6\text{H}_4\text{NHPh}$, this leuco compd. losing the labile H to form (a), while the H itself with the Ph_2NNHPh gives Ph_2NH and PhNH_2 . In the same way are obtained PhNH_2 , $(\text{PhN})_2$, $(\text{MeC}_6\text{H}_4)_2\text{NH}$ and a violet-red dye (reduced to $\text{MeC}_6\text{H}_4\text{NHPh}$ and $(\text{MeC}_6\text{H}_4)_2\text{NH}$) upon heating in xylene *p*-ditolylphenylhydrazine, which is prepd. by treating 6.2 g. Mg shavings and 40 g. PhBr in 200 cc. Et_2O at -15° with 10 g. $(\text{MeC}_6\text{H}_4)_2\text{NNO}$ in Et_2O ; it seps. from AcOEt-EtOH in long needles (yield, 3-4 g.), begins to turn brown 120° , m. $142-3^\circ$, sol. in H_2SO_4 with yellow color, turning green on warming.

CHAS. A. ROUILLER.

The Grignard reaction with nitroso compounds. HEINRICH WIELAND AND ALEXANDER ROSEBU. *Acad. Sci., Munich. Ber.* 48, 1117-21(1915).—From the analogy in many reactions of the NO to the CO group, it might be expected to give NH_2OH derivs. with Grignard reagents: $\text{RNO} + \text{R}'\text{MgBr} \longrightarrow \text{RNR}'\text{OMgBr} \longrightarrow \text{RNR}'\text{OH}$. This can be done in some cases (cf. *C. A.* 6, 1296) but as a rule the reaction does not stop at this stage; the $\text{RNR}'\text{OMgBr}$ is reduced by a 2nd mol. of $\text{R}'\text{MgBr}$ and the O made available converts the $\text{R}'\text{MgBr}$ into $\text{R}'\text{OMgBr}$: $\text{RNR}'\text{OMgBr} + \text{R}'\text{MgBr} \longrightarrow \text{RNR}'\text{MgBr} + \text{R}'\text{OMgBr}$. From 4.7 g. Mg shavings and 35 g. *p*- $\text{MeC}_6\text{H}_4\text{Br}$ in 200 cc. Et_2O treated at -5° to -10° in the course of 1 hr. with 12 g. *p*- $\text{MeC}_6\text{H}_4\text{NO}$ and allowed to stand overnight is obtained 9 g. of *p*-ditolylhydroxylamine, reddens 80° , m. $91-2^\circ$ (decompn.), sol. in concd. H_2SO_4 with red color soon changing to green, insol. in aq. acids and alkalies. Mineral acids decomp. it in a complicated way; with HCl in Et_2O it gives, among other products, a small amt. of ditolylidihydro-tolazine (*C. A.* 3, 180); on reduction it gives $(\text{MeC}_6\text{H}_4)_2\text{NH}$ quant.; with diphenylhydrazine it condenses to a red-violet dye, but not with *p*-ditolylhydrazine; it is not stable for long, beginning to decomp. in a few days into $(\text{MeC}_6\text{H}_4)_2\text{NH}$ and a red substance, apparently of high mol. wt., sol. in alkalies with red color; oxidizing agents easily attack it. Diarylhydroxylamines cannot be obtained by the action of halogen-

benzenes on PhNHOH in the presence of Cu powder; *o*-IC₆H₄CO₂H, *e. g.*, does not give HO₂CC₆H₄NPhOH, but after 8 hrs. boiling in C₆H₆ is obtained, together with azoxybenzene, considerable *phenylanthranilic acid*, leaflets from benzene-gasoline, m. 181°, sol. in soda. Ph₂NNHPh (Busch and Hobein, *Ber.* 40, 2101(1907)) is also obtained, together with PhOH and Ph₂, from Mg, PhBr and Ph₂NNO in Et₂O at -15°. Similarly, from Mg, PhBr and nitrosocarbazole are obtained carbazole and Ph₂NH; AcNPhNO gives Ph₂NH and AcNHPh.

CHAS. A. ROULLER.

A new synthesis of aromatic ketones. I. Preparation of some phenol ketones.

KURT HOESCH. Charlottenburg. *Ber.* 48, 1122-33(1915).—Equimol. amts. of phenol and nitrile in Et₂O (with the addition of powdered ZnCl₂ when necessary) are treated for several hrs. with dry HCl, whereby the solvent is gradually driven off; after a time the residue, dissolved in cold H₂O, is freed from unchanged phenol and nitrile with Et₂O, neutralized with NH₃ and boiled 15-30 min. In this way resacetophenone is obtained in 70% yield from *m*-C₆H₄(OH)₂ and MeCN; 5 g. *m*-MeOC₆H₄OH gives 1.8 g. each of peonol and *isopeonol*, 4,2-HO(MeO)C₆H₃Ac, lancet-like needles from H₂O, non-volatile with steam, gives no color with FeCl₃, m. 138°. From 6 g. anhydrous orcinol is obtained 5 g. *orcacetophenone*, 2,4,6-Me(HO)₃C₆H₃Ac, silky needles from H₂O, m. 159°, gives a deep red color with FeCl₃ in alc. Instead of neutralizing the reaction mixt. and boiling, it is better to acidify with 30 cc. of 5 N H₂SO₄ and shake with 2 vols. of Et₂O, the intermediate *ketimide*, Me(HO)₂C₆H₃CMc:NH, sepg. as the *sulfate* in needles which, boiled 15 min. with 20 parts H₂O, give the pure ketone almost quant. The latter with 1 mol. Me₂SO₄ gives a *monomethyl ether*, m. 79°, identical with Tambor's *isoorcacetophenone* Me ether (*C. A.* 2, 1710). Owing to its unsym. arrangement corresponding to resacetophenone, orcyraldehyde and orsellinic acid, H. believes his ketone is better entitled to the name *orcacetophenone* than Rasinski's sym. ketone, 4,2,6-Me(OH)₃C₆H₃Ac (*J. prakt. Chem.* 26, 59), for which H. proposes the name *p*-orcacetophenone. From 5 g. 3,5-HO(MeO)C₆H₃Me are obtained 2.1 g. *isoacetoevernone*, 6,3,5-Ac(HO)(MeO)C₆H₃Me, quadratic tables from H₂O, m. 150°, non-volatile with steam, gives no color with FeCl₃, and 1.8 g. of *acetoevernone*, 2,3,5-Ac(HO)(MeO)-C₆H₃Me, volatile with steam, gives a deep red color with FeCl₃, m. 79°. From phloroglucinol is obtained, through the *ketimide sulfate*, slender needles, 80% of *phloracetophenone*, m. 218°, identical with Heller's "monoacetotriketohexamethylene" (*C. A.* 6, 1293; cf. also Leuchs and Sperling, *C. A.* 9, 1060). Benzoorsorcinol is obtained from *m*-C₆H₄(OH)₂ and PhCN through the *ketimide hydrochloride*. From 6 g. anhydrous orcinol and 5 g. PhCN is obtained 6.2 g. of the *ketimide hydrochloride*, yellow needles from dil. HCl (free *ketimide*, yellow prisms from AcOEt-ligroin), of *benzoorsorcinol*, 2,4,6-Me(HO)₃C₆H₃Br, tables from H₂O, m. 141°, gives an intense red-brown color with alc. FeCl₃, sol. in NaOH with red color but without change, even on long heating. *Benzo-phloroglucinol*, needles containing (in cool and not too dry air) 1 H₂O, m. 165°, sol. in 2.5 parts boiling H₂O and 310 parts at 22°, gives a brown-red color with FeCl₃, reduces Fehling and NH₃-AgNO₃ solns., produces coughing and sneezing in the dry state, sol. in alkalis with red color and decompn., after 1 hr.'s boiling, into C₆H₃(OH)₃ and BzOH. It is obtained in 65% yield through the *ketimide sulfate*, yellow prisms from dil. H₂SO₄.

C. A. R.

Acetotriketohexamethylene. GUSTAV HELLER. Univ. Leipzig. *Ber.* 48, 1286-8 (1915); cf. preceding abstr.—Comparison of Heller's product (*a*) with Hoesch's phloracetophenone (*b*) shows that the 2 compds. are indeed identical; even the m. p. of (*a*) can be raised to that of (*b*) by repeated digestion with boiling C₆H₆ before recrystn. (*a*), however, in all its reactions so far studied behaves like a triketohexamethylene deriv. but it is, of course, possible that other reactions may be discovered in which it will react like phloracetophenone.

CHAS. A. ROULLER.

Organic peracids. J. D'ANS AND A. KNEIP. *Ber.* 48, 1136-46(1915); cf. C. A. 6, 2737; C. A. 8, 923.—Basing the method of prepn. on the same principle as before, D'A. has obtained from 20 g. HCO_2H , 25 g. H_2O_2 and 6.5 g. H_2SO_4 allowed to stand 2 hrs. a 10.6 g. fraction with 89.9% HCO_2H (a) and 2.6% H_2O_2 , another of 8.6 g. with 74.9% (a) and 3.3% H_2O_2 , and a residue of 31.6 g. with 20.4% (a) and 31.2% H_2O_2 . The 90% (a) is a colorless liquid with the characteristic peracid odor, miscible with H_2O , Et_2O , EtOH , quite easily sol. in most org. solvents, more easily volatile than HCO_2H , produces painful inflammations on the skin and its vapors violently irritate the mucous membranes. After 24 and 48 hrs. at 0° , it contains only 67.5 and 60.8%, resp., of (a) and the H_2O_2 content simultaneously increases to 6 and 8%, resp. The decompn. may take place according to the equations: (1) $2(a) \longrightarrow 2\text{HCO}_2\text{H} + \text{O}_2$; (2) $(a) \longrightarrow \text{H}_2\text{O} + \text{CO}_2$; (3) $(a) + \text{H}_2\text{O} \longrightarrow \text{HCO}_2\text{H} + \text{H}_2\text{O}_2$, (2) and (3) predominating with concd. (a). (2) may be accelerated to violent explosiveness by certain catalysts, and it is probable that the spontaneous decompn. consists wholly of an isomerization of (a) into H_2CO_3 . The heat of decompn. of the reaction (2), calcd. from the heat of combustion of HCO_2H to CO_2 and H_2O and the heat of decompn. of H_2O_2 (the small negative heat of formation of (a) from HCO_2H and H_2O_2 may be neglected), is about 92 cal. per g.-mol. This great endothermic property is manifested by the fact that certain solids may produce explosions with (a). The expts. were carried out by adding a little of the solid to 2-3 drops of 60% (a) at $8-10^\circ$ in a watch glass. Graphite, purified lampblack, Si, S, I, Sb, Sn, Fe (*ferrum reductum*), Al_2O_3 , pure Cr_2O_3 , anhydrous CuSO_4 , KClO_4 , $(\text{NH}_4)_2\text{S}_2\text{O}_8$, $(\text{NH}_4\text{OH})_2\text{H}_2\text{SO}_4$, boryl phosphate, CS_2 , CHCl_3 , C_{10}H_8 , glycerol, PhOH , tartaric acid, BzOH , camphor, turpentine oil, starch, cellulose have no effect. Decompn. is produced by Mg (strongly, with formation of MgO), Al powder (faintly), Ni powder reduced with H (faintly at first but with increasing violence and formate formation), CaO (with hissing), Cu_2O (energetically, with formation of formate, and, in large amts., with deflagration), CuO (faintly, with formate formation), PbO_2 (strongly, finally with deflagration, and formate formation), MnO_2 (strongly), artificial MnO_2 (with deflagration but no formate formation), IrO_2 (like MnO_2), BaO_2 (with gas evolution and, in large amts., deflagration), CrO_3 (with formation of blue HCrO_4 , followed by reduction), V_2O_5 (with formation of O_3). Red P, HCHO , BzH , PhNH_2 , etc., are energetically oxidized. Deflagration is easily produced by Hg, Tl powder, colloidal Ag, Na_2O_2 , and very energetic explosion by Zn dust, PbO , Pb_2O_4 , NaN_3 . At 20° , all these reactions are markedly more energetic; with 90% (a) they are much more violent, but Zn dust and PbO still produce explosions with 45% (a). The state of subdivision and of purity of the solids also has a marked influence. Most of these reactions are probably due to oxidation of the solid with resulting local heating; substances like Ag, MnO_2 , V_2O_5 , etc., seem to act purely catalytically. 80% (a) explodes on heating to $80-5^\circ$. While pure Fe and Si powder have no action, addition of a trace of MnO_2 produces deflagration in the 1 case and a loud explosion in the other. $\text{Ac}_2\text{O}_2\text{H}$ (b) prepd. by the method formerly used may contain considerable Ac_2O_2 if the conditions are not carefully controlled. A 50% (b) practically free of Ac_2O_2 , is obtained by allowing the calcd. amt. of H_2O_2 and Ac_2O to flow into a small amt. of the (b) prepd. by the old way (the flow being so regulated that H_2O_2 is always present in slight excess) and allowing to stand 0.5 hr. Different preps. of Ac_2O react with varying ease, being apparently the less reactive the purer they are. The 50% (b) so prepd. may be kept 14 days at room temp. without change; impurities (dust, etc.) accelerate its decompn. Solids show none of the catalytic effects on its decompn. which they exhibit towards (a). As an oxidizing agent (b) possesses the advantages of being sol. in a whole series of solvents, of being stable and hydrolyzed only slowly in H_2O and of giving a product (AcOH) which, in most cases, is not harmful.

It smoothly oxidizes aldehydes (HCHO, enanthole, BzH, anisaldehyde, *o*-NCSC₆H₄CHO) to the acids (*p*-HOC₆H₄CHO gives quinol (or quinhedrone and quinone) and HCO₂H). Amines yield the nitros and azoxy compds.; *e. g.*, 3 g. PhNH₂ in 100 cc. cold H₂O and 16.5 g. NaHCO₃ slowly treated with 12.5 g. of 41% (b) in 30 cc. H₂O and allowed to stand 12 hrs. gave 1.7 g. PhNO and 1.1 g. Ph₂N₂O; if the (b) is added quickly the yields are 2.4 and 0.75 g., resp. Similar results were obtained with *p*-MeC₆H₄NH₂, *m*- and *p*-O₂NC₆H₄NH₂ and *o*-H₂NC₆H₄CO₂H. That the azoxy compds. result from the oxidation of azo compds. first formed was confirmed by expt., (PhN:)₂, (*p*-MeC₆H₄N:)₂ and (*m*- and *p*-O₂NC₆H₄N:)₂ giving the corresponding azoxy compds. in practically quant. yield.

CHAS. A. ROUILLER.

A new dibromophenanthrene. Bromination of phenanthrene in glacial acetic acid. HÅKAN SANDQVIST. Univ. Upsala. *Ber.* 48, 1146-9(1915).—When 50 g. Kahlbaum "phenanthrene," m. 95-6°, in 700 cc. glacial AcOH is treated at room temp. with 90 g. Br, drop by drop, filtered after some hrs. from the finely cryst. dibromide and the dibromofluorene, m. 163°, which seps. after the dibromide in leaves, the mother liquor treated with 50 g. more phenanthrene in 300 cc. luke-warm AcOH, again brominated with 75 g. Br and the process repeated 8 times with decreasing amts. of fresh AcOH (300 to 70 cc.) and of Br (90 to 60 g.), 500 g. phenanthrene, 1800 cc. AcOH and 680 g. Br in all being used, there is obtained a good yield of dibromide, yielding 520 g. crude 10-bromophenanthrene on heating; moreover, there are also obtained 87 g. of the dibromofluorene and Hayduck's dark red-brown oil (*Ann.* 167, 182(1873)), which has the comp. of a monobromophenanthrene and yields a mixt. of quinones on oxidation. The AcOH mother liquors after several months deposit a solid, sepd. by crystn. from C₆H₆ into a more sol., very viscous, light red-brown oil having the comp. of a dibromophenanthrene and giving a mixt. of quinones on oxidation, and a few g. of a less sol. 10,7-dibromophenanthrene (a), colorless needles, m. 123°; it is dimorphous, for when the melt solidifies at room temp. and is then placed in a bath at 106° it remelts, but if it is reheated slowly it again m. only at 123°. Fused with KOH at 250°, it forms a Br-free, phenol-like compd.; boiled several hrs. with alc. NH₃ and Zn dust, it yields phenanthrene; it forms no picrate in alc. or C₆H₆; boiled 5-10 min. with CrO₃ in AcOH, it gives 1(or 4)-bromophenanthraquinone (b), golden yellow felted, broad needles or long leaves with metallic luster, m. 233-4°; mono $\ddot{o}$ xime, mosaic, gold-like leaves, m. 213° (decompn.). The formation of (b) shows that 1 of the Br atoms in (a) is in the "bridge" (position 9 or 10). As to the Br in (b), it cannot be in position 2 or 3, for the 2- and 3-Br compds. are known (Schmidt, *Ber.* 37, 3558, 3571) and are different from (b). The same is true of Werner's isomer (*Ann.* 322, 170). If, therefore, one Br atom in (a) is assigned position 10, the other must be at 1, 4, 5 or 8.

CHAS. A. ROUILLER.

***m*-Nitroisothiocyanobenzene and related compounds.** FR. FICHTER AND RUDOLF SCHONLAU. Basel. *Ber.* 48, 1150-4(1915); cf. *C. A.* 6, 757.—*m*-Nitroisothiocyanobenzene, O₂NC₆H₄NCS, prepd. from O₂NC₆H₄NH₂ by the Sandmeyer reaction and purified (but with some decompn.) by distg. *in vacuo* or distg. with steam and salting out with NaCl, felted needles from petr. ether, m. 56°, b₁₈ 180°. When 4.5 g. in 50 cc. of 7 *N* alc. HCl is reduced at a Pb cathode with a current d. 0.044-0.066 amp./sq. cm., and at least twice the amt. of current calcd. for the reaction O₂NC₆H₄NCS + 8H = H₂NC₆H₄SH + 2H₂O + HCN and the filtered soln. is allowed to stand a few days or is oxidized with FeCl₃, (*m*-HCl.H₂NC₆H₄S)₂ is deposited. The same result is obtained with Cu cathodes if the acid concn., current d. and excess of current are sufficiently large, but in only 2 *N* alc. HCl with 0.044 amp./sq. cm., *m*-isothiocyanoazoxybenzene is obtained in yellow flocks, sepg. from alc. in yellow felted needles, m. 96°, slowly gives a red-violet color in concd. H₂SO₄. The explanation previously advanced for the for-

mation of μ -aminobenzothiazole (*a*) in the reduction of o -O₂NC₆H₄NCS at a Pb cathode, viz., that H₂NC₆H₄SH and HCN are first formed and then condense to (*a*) + H₂, is contrary to Hofmann's observation that H₂NC₆H₄SH and HCN give benzothiazole (*b*) + NH₃ (*Ber.* 13, 1238(1880)), but it has now been found that (*o*-H₂NC₆H₄S)₂ and HCN do give (*a*), together with a little (*b*), in the presence of acids, so that in the electrolytic reduction at a Pb cathode the H₂NC₆H₄SH first formed is oxidized, under the influence of unchanged O₂NC₆H₄NCS or its intermediate reduction product, ONC₆H₄NCS, to the disulfide which, with the HCN also first formed, gives (*a*), the acidity of the electrolyte favoring this condensation while it impedes the formation of (*b*) from the mercaptan, as found by expt. The electrolytic oxidation of NCS to SO₂H compds. (*C. A.* 6, 2609) has been extended to MeNCS and CH₃(NCS)₂, but while the resulting acids are remarkably stable towards chem. oxidizing agents (HNO₃, Cl, CrO₃, KMnO₄) they are attacked at a Pt anode and partially decompd. under the conditions of their prepn. With aromatic compds. (PhNCS and *o*-O₂NC₆H₄NCS) the nucleus also is attacked and resinous products are formed. From 7.3 g. MeNCS in 150 cc. of 50% AcOH and 20 cc. concd. HCl at 30–40° with a Pt gauze anode and the calcd. amt. of current is obtained 70% MeSO₂H; CH₃(NCS)₂ similarly gives 50% CH₃(SO₂H)₂.

CHAS. A. ROUILLER.

Methylation of glucosaminic acid (a way from sugar to betaine). HANS PRINGSHEIM. Univ. Berlin. *Ber.* 48, 1158–61(1915).—From 6.5 g. glucosaminic acid (*a*) in 500 cc. H₂O, 28 g. Ba(OH)₂ and 18 g. Me₂SO₄ warmed several hrs. on the H₂O bath, filtered from the small amt. of BaSO₄ formed, decolorized with charcoal, made faintly acid with HCl, boiled with 22 g. BaCl₂ until the (MeSO₄)₂Ba is completely hydrolyzed (several hrs.), filtered, freed quant. from Ba with H₂SO₄, again decolorized with charcoal, concd. *in vacuo* at 50° and finally over H₂SO₄, dried on clay and crystd. from AcOEt-EtOH, is obtained 1 g. betaine-HCl. The other product is a non-crystallizable syrup (tetrose), which reduces Fehling soln. but forms no osazone. The transformation is interesting physiologically in showing one way in which the organism, starting from sugar, may form betaine.

CHAS. A. ROUILLER.

The iodosuccinic acids. A. WESTERLUND. Lund. *Ber.* 48, 1179–83(1915); cf. Holmberg, *C. A.* 8, 1576.—From 4.1 g. *dl*-bromosuccinic acid and 3.1 g. NaI in 70 g. acetone NaBr slowly begins to sep.; it is filtered off the next day and the acetone evapd. at room temp.; the red-brown cryst. residue (5.4 g. after drying over H₂SO₄), after soln. in H₂O, extn. with Et₂O and crystn. from C₆H₅-AcOEt, gives *dl*-iodosuccinic acid (*a*), voluminous mass, m. 135–40°, yields with Pb(OAc)₂ an amorphous white ppt. quickly becoming yellow with formation of PbI₂ on heating alone or suspended in H₂O; on rapid neutralization with KOH and treatment with AgNO₃ (*a*) gives a yellow ppt. partly sol. in HNO₃ but leaving considerable AgI undissolved. Fresh aq. (*a*) gives no ppt. with AgNO₃ but AgI begins to sep. in a few min.; in dil. HNO₃ the same thing occurs but more slowly. Attempts to prep. the *l*-acid in the same way from the *l*-Br acid gave only the *dl*-form. It was found, however, that 1.29 g. *l*-(*a*) prepd. by H.'s method, $[\alpha]_D^{17} -76.9^\circ$, kept with 1.86 g. NaI in 20 cc. H₂O at 25°, is racemized with a velocity whose const. is 0.22. Racemization similarly occurs in acetone in the presence of NaI but not in acetone alone or acetone + I. CHAS. A. ROUILLER.

Anthranil. IX. Constitution of the acylanthranils. GUSTAV HELLER. Univ. Leipzig. *Ber.* 48, 1183–95(1915).—H. shows in this paper that all acylanthranils have the structure C₆H₄.CO.NCOR (*a*), not the metoxazone form, C₆H₄.CO.O.CR:N (*b*).

Benzoylanthranil in 60 parts alc. and 2 parts of 50% N₂H₄.H₂O give 0.9 part 3-phenyl-3-hydrazino-3,4-dihydrobenzoxazone, C₆H₄.CO.O.CPh(NHNH₂).NH (*c*),

needles from AcOEt, m. 187–8° (gas evolution) (from alc. it also seps. in needles which, however, m. 4° higher; on standing the m. p. slowly falls), reduces hot Fehling soln.; 0.5 g., heated on the H₂O bath with 5 g. H₂O and 10 g. of 7% NaOH until just dissolved and at once cooled, seps. unchanged on treatment with AcOH or CO₂, while on heating with dil. HCl it dissolves and after a time *o*-BzNHC₆H₄CO₂H seps.; the reaction is more smoothly effected by rubbing with fuming HCl and allowing to stand 24 hrs. Treated in 100 parts H₂O with concd. HCl until dissolved, cooled with ice and treated with NaNO₂, (c) gives the *3-asido derivative*, needles from alc., m. 111–2° (foaming), yields BzNHC₆H₄CO₂H with hot dil. NaOH. (c) heated 15 min. in 15 parts of 60% AcOH on the H₂O bath and slowly poured into H₂O, also when heated with dil. NaOH, gives *2-phenyl-3-amino-4-quinazolone*, C₆H₄.CO.N(NH₂).CPh:N, needles from C₆H₆, m.

178–9°, easily sol. in dil. HCl. If the structure (b) for benzoylanthranil were correct, the formation of (c) would involve the direct addition of N₂H₄.H₂O to a —N:CR— group, a reaction thus far unknown (quinaldine in alc. is not attacked even on long boiling by N₂H₄.H₂O, while PhCH:NPh and *o*-O₂NC₆H₄CH:NPh give (PhCH:N)₂ and O₂NC₆H₄:NNH₂, resp., in the cold), and moreover a lactone like (b) would be expected to give a hydrazide (cf. Wedel, *Ber.* 33, 766(1900)). On the other hand, the formation of (c) from a compd. of the structure (a) is easily explained thus: (a) + N₂H₄ → C₆H₄.CO.NCR(OH)NHNH₂ → C₆H₄(CO₂H)NHCR(OH)NHNH₂ →

(c). In the same way acetanthranil and N₂H₄.H₂O give *3-methyl-3-hydrazino-3,4-dihydrobenzoxazone*, needles, m. 148° (gas evolution), reduces hot Fehling soln., sol. in dil. NaOH and repptd. by AcOH, rearranges on heating with AcOH into *3-methyl-3-amino-4-quinazolone*. CH₃(NHC₆H₄CO₂H)₂ prepd. by v. Pollack's method (*Monatsh.* 26, 327(1905)) must be purified by stirring with aq. NaOAc, filtering and pptg. hot with AcOH; it can be obtained pure, however, by dropping 4.8 g. CH₃(COCl)₂ into 19 g. *o*-H₂NC₆H₄CO₂H in Et₂O, allowing to stand several hrs., stirring with H₂O and filtering; heated with 15 parts Ac₂O until dissolved it gives 55% of *malonylbisanthranil*, yellow needles from AcOEt, begins to sinter 239°, darkens and m. about 242° (gas evolution), reconverted into the acid slowly by hot dil. H₂SO₄ or soda, quickly by dil. NaOH; with N₂H₄.H₂O it gives *3-methylenebis-[3-hydrazino-3,4-dihydrobenzoxazone]* (d), cannot be recrystd. without change, easily sol. in dil. HCl, sinters about 170°, gradually turns red-brown above 230°, does not m. 295°, soon dissolves in NaOH at room temp. and on standing deposits a violet dye sol. in H₂SO₄ with crimson color; soda dissolves (d) with red color quite rapidly at 60°, dil. NH₄OH in about 2 hrs. at room temp.; Fehling soln. is reduced on heating. When heated until just dissolved with 40 parts H₂O and 1 part soda and acidified with AcOH, (d) is not recovered unchanged but gives *malonylbisanthranilic acid bishydrazone*, [HO₂CC₆H₄NHC(:NNH₂)₂CH₂]₂, fine granules (also seps. from 96% alc. as a faintly reddish cryst. powder mixed with granules), gradually darkens above 250°, m. about 295° (faint gas evolution), quite easily sol. in dil. soda at room temp., reduces hot Fehling soln., easily dissolves in 0.1 N alkali and quickly seps. again on addition of the equiv. amt. of acid. Heated with 50% AcOH it rearranges into *methylene-2-bis-[3-amino-4-quinazolone]*, faintly yellow felted needles from PhNO₂, sol. in dil. acids but not in alkalis, gradually darkens above 250°, does not m. 300°. Oxalylbisanthranil, from (CONHC₆H₄CO₂H)₂ and 30 parts hot Ac₂O or, in 9.5 g. yield, from 10.3 g. H₂NC₆H₄CO₂H in 50 g. cold C₆H₅N and 4.8 g. (COCl)₂, allowed to stand several hrs., m. 350°, sol. in hot dil. NaOH, slowly in soda, with formation of the acid; with N₂H₄.H₂O it gives *3-bis-[3-hydrazino-3,4-dihydrobenzoxazone]*, cannot be recrystd., m. 219–20° (foaming), difficultly sol. in alkalis and mineral acids, reduces hot Fehling soln.; treated in 40 parts H₂O at 70° with NaOH until dissolved, cooled, filtered and acidified with AcOH, it gives on long standing

oxalylbisanthranilic acid bishydrazone, lancet-shaped, faintly lemon-yellow needles from 500 parts of 96% alc., m. 177–8°, sol. in dil. soda. CHAS. A. ROULLER.

Unsaturated hydroaromatic hydrocarbons. K. v. AUWERS and W. TREPPMANN. *Marburg. Ber.* 48, 1207–25 (1915).—In accordance with Wallach's rule that satd. hydroaromatic alcs. on loss of H₂O yield exclusively or chiefly hydrocarbons with an endocyclic double bond, 1-benzylcyclohexanol should give 1-benzylcyclohexene (a). That this is the case has been assumed, but not proved, by Sabatier and Mailhe (*Compt. rend.* 138, 1323 (1904)) and by Klages and Friedemann (F., *Diss. Heidelberg*, 1907), while S. and M. thought they obtained from phenylcyclohexylcarbinol the isomeric benzylidenecyclohexene (b). A. and T. have dehydrated the 2 alcs. with KHSO₄ (the C₆H₁₁CPhOH with (CO₂H)₂ and P₂O₅ also) and a comparison of their data and those of the other investigators indicate that all the products are identical, and, from spectrochem. and chem. evidence, A. and T. conclude that they are (a). 1-Phenylcyclohexanol, b₁₄ 141–4°, m. 61°, heated 0.5 hr. at 150–60° with an equal wt. of KHSO₄ gave 1-phenylcyclohexene (cf. F., and also Bauer, C. A. 8, 3181), 2 samples of which showed the following consts., resp.: b₁₇ 133°, b₁₈ 126–7°; d₄²⁰ 0.985, 0.988; n_D 1.56612, 1.56636; n_D 1.57157, 1.57180; n_B 1.58679, 1.58725, n_γ 1.60026, 1.60093 (at 14.2° for the 1st and 14.7° for the 2nd prepn.); n_D²⁰ 1.5690, 1.5694; av. E_Z, 0.65 for M_α, 0.68 for M_β, 33% for M_β—M_α, 36% for M_γ—M_α (the corresponding E_Z values for the analogously constituted α-methylstyrene are 0.62, 0.68, 31%, 32%); with KMnO₄ in aq. acetone it gives δ-benzoylvaleric acid, m. 77–8°, whose semicarbazone m. 187° (B. gives 183°); *p*-nitrophenylhydrazone, yellow needles from alc., m. 187°. 1-Benzylcyclohexanol, m. 57.5–8.5°, is obtained pure by dropping 12.7 g. PhCH₂Cl and 25 g. Et₂O into 2.4 g. Mg shavings covered with Et₂O, slowly adding the resulting mixt. to 8. g. cyclohexanone in 2 vols. Et₂O, heating about 10 min. on the H₂O bath to complete the reaction and decomp. with ice-cold NH₄Cl soln. Heated 1 hr. with 1.5 parts KHSO₄ at 150–60° it gives (a), b_{11.4} 125°, d₄²⁰ 0.962, n 1.54303, 1.54769, 1.55994, 1.57070 for α, D, β and γ at 13.2°, n_D²⁰ 1.5449, E_Z 0.27, 0.28, 16%, 18% for α, D, β—α and γ—α; with KMnO₄ it gives BzOH and a substance m. 105°, extd. from the alk. soln. by Et₂O and having the comp. of the glycol HOCH.CH₂.CH₂.CH₂.C(OH)CH₂Ph. Cyclohexyl

bromide, from the alc. and PBr₃, b_{7.8} 163°, b_{8.8} 85°, d₄²⁰ 1.325, n 1.49377, 1.49677, 1.50429, 1.51058 for α, D, β and γ at 14.3°, n_D²⁰ 1.4942, E_Z 0.26, 0.27, 7%, 9% for α, D, β—α and γ—α; 10 g. in an equal vol. of Et₂O slowly dropped into 1.5 g. Mg under Et₂O, then treated with 6.5 g. BzH in an equal vol. of Et₂O, gave 70% phenylcyclohexylcarbinol, m. 50–0.5°, b₁₇ 162°. With 1.5 parts KHSO₄ 1 hr. at 150–60° it gives (a), b₁₈ 125°, d₄²⁰ 0.961, n 1.54202, 1.54651, 1.55879, 1.56939 for α, D, β and γ at 13.7°, n_D²⁰ 1.5437. The alc. heated with 1.5 parts (CO₂H)₂ under 50 mm. in CO₂ at such a temp. that the hydrocarbon distd. over gave an (a) b_m 139–41°, d₄²⁰ 0.959, n 1.54327, 1.54774, 1.56043, 1.57093 for α, D, β and γ at 14.6°, n_D²⁰ 1.5453. With 1 part P₂O₅ gradually heated to 160° is obtained an (a) b₁₈ 132–3°, d₄²⁰ 0.964, n 1.54009, 1.54426, 1.55601, 1.56577 for α, D, β and γ at 14.1°, n_D²⁰ 1.5416. Av. E_Z of the above 3 samples of (a), 0.26, 0.26, 15%, 15% for α, D, β—α and γ—α. From 15 cc. (a), 15 cc. AcOH and 11 cc. AmNO₂ in a freezing mixt. slowly treated with 6 cc. crude HCl and 6 cc. AcOH, allowed to stand 0.5 hr. in the cold and dild. with MeOH, is obtained in varying yield (52 g. from a total of 120 g. (a)) the *nitrosochloride*, quite unstable, quickly changing on the H₂O bath to a brown oil, m. 110° when placed in a bath at that temp., m. 105–7° if heated more slowly; 6 g. heated to boiling with 6 g. NaOAc and 24 cc. AcOH, treated with 1 g. H₂SO₄, cooled, neutralized and extd. with Et₂O gives the *oxime* (16 g. from 52 g. nitrosochloride), needles from MeOH, m. 136–8°, of 1-benzyl-5-cyclohexen-2-one, obtained from the oxime by boiling 1 hr. with 30% H₂SO₄ (8 g. from 16 g. oxime); it

b_{118} 174°, d_4^{20} 1.063, n 1.55746, 1.56277, 1.57641, 1.58865 for α , D, β and γ at 21.65°, n_D^{20} 1.5635, E_Z 0.48, 0.52, 25%, 28% for α , D, β — α and γ — α ; semicarbazone, needles from alc., m. 157–61°; with H and colloidal Pd it gives 1-benzylcyclohexan-2-one, oil, whose semicarbazone, needles from MeOH, m. 166–7°. If the hydrocarbon had had the structure (b) instead of (a) the final product in the above reactions would have been benzoylcyclohexane, whose semicarbazone m. 168–9°, but when the latter is mixed with the above semicarbazone the mixt. m. 120°. 1,3-Dimethyl-5-phenylcyclohexan-5-ol, from PhMgBr and 1,3-dimethyl-3-cyclohexen-5-one, m. 110–1° (Lembert, *Diss. Heidelberg*, 1905, gives 104°), deliquesces more or less rapidly in the air or in a desiccator, but is stable for months in sealed tubes; dehydrated by heating with $KHSO_4$ for different lengths of time or by repeated distn. *in vacuo* or, finally, by directly decomp. the Mg compd. with ice-cold 40% H_2SO_4 , the carbinol always gives crude products boiling within quite wide limits, but all give fractions of the 3,5-diene (c) with about the same const., e. g., b_{117} 148°, d_4^{20} 0.970, n 1.56824, 1.57486, 1.59322, 1.61083 for α , D, β and γ at 17.0°, n_D^{20} 1.5735, E_Z 1.24, 1.33, 59%, 67% for α , D, β — α and γ — α ; with Na and boiling alc. it gives the 3-hexene, b_{114} 131°, $d_4^{18.6}$ 0.9460, n 1.53131, 1.53617, 1.54733 1.55799 for α , D, β and γ , E_Z 0.38, 0.42, 20%, 20%. 1,3-Dimethyl-5-methene-3-cyclohexene (C. A. 5, 505) was again prepd. and its properties were found to agree well with those of the earlier preps.; comparison of its E_Z values (0.99, 1.05, 38%, 41% for α , D, β — α and γ — α) with those of 1,1-dimethyl-4-methenecyclohexa-2,5-diene (1.86, 1.95, 54%, 58%; C. A. 5, 3242) shows that the entrance of a new double bond in the ring produces a considerable increase in the exaltation; it is therefore quite probable that (c) and its analogs prepd. by Klages and co-workers (*Ber.* 40, 2365(1907)), as well as the products obtained by their reduction with Na and alc., have the structures assigned to them by him and accepted by A. and T.

CHAS. A. ROUILLER.

1,3-Dimethylcyclohexan-2-one and 1,2,3-trimethyl-1-cyclohexene. K. v. AUWERS AND F. KROLFFHEIFFER. Marburg. *Ber.* 48, 1226–33(1915).—Attempts to prep. pure 1,3-dimethylcyclohexan-2-one (a) by Haller's method (C. A. 7, 3490) showed that there is formed at the same time the asym. 1,1-Me₂ deriv. in far greater amt. than indicated by H. (1/3 or at least 1/4 of the original ketone), and, moreover, his method of removing the latter by condensation with BzH and NaOEt is impracticable, for the 1,3-Me₂ compd. also condenses. It was finally obtained pure by Kötze and Schaeffer's method (C. A. 6, 2757). 1-Methyl-3-hydroxymethylenecyclohexan-2-one is obtained in 53% yield from 10.4 g. Na wire in 16 cc. Et₂O and 50 g. methylcyclohexanone in 250 cc. Et₂O treated in the cold in the course of 30–45 min. with 60 g. of HCO₂Am (previously shaken 2 hrs. with ignited potash), allowed to stand overnight, decompd. with 335 cc. ice H₂O and acidified with 30% AcOH; it b_{118} 79.2–9.4°, d_4^{20} 1.051, n 1.50149, 1.50664, 1.52123 for α , D and β at 15.4°, n_D^{20} 1.5046, E_Z 0.94, 1.04, 94% for α , D and β — α . Reduced by the K. and S. method it gives (a) which, after purification with ice-cold 2% KMnO₄ (yield, 8 g. from 30 g. HOCH< compd.), b_{118} 53.6–5.3°, d_4^{20} 0.914, n 1.44976, 1.45189, 1.45811, 1.46252 for α , D, β and γ at 11.85°, n_D^{20} 1.4482, E_Z 0.01, 0.01, 2%, —3% for α , D, β — α and γ — α ; semicarbazone, m. 196–7°. 1,2,3-Trimethylcyclohexene, obtained by treating dimethylcyclohexanone, MeI and Mg in the usual way and slowly heating the resulting liquid carbinol with 1.5 parts (CO₂H)₂ to 140–50°, b_{118} 149.6–50.0°, d_4^{20} 0.828, n 1.46015, 1.4646296, 1.47021, 1.47603 for α , D, β and γ at 11.75°, n_D^{20} 1.4593, E_Z —0.11, —0.10, 5%, 3% for α , D, β — α and γ — α ; microchloride, blue oil.

CHAS. A. ROUILLER.

Flavone as the farina of the *Primula* (MÜLLER) 11D. Complex compounds of platinum with tellurium ethers (FRITZMAN) 6.

II. BIOLOGICAL CHEMISTRY.

WILLIAM J. GIES, EDGAR G. MILLER, JR., PAUL E. HOWE.

A. GENERAL.

FRANK P. UNDERHILL.

Chemical nature of enzymes. TH. BOKORNY. *Allgem. Brau.-Hopfen Ztg.* 55, 899-900(1915).—The enzymes investigated were brought in contact with definite quantities of normal H_2SO_4 and NH_3 for prolonged periods, and the free acid and base detd. The expts. showed that trypsin, rennin and emulsin have an acid as well as a base-binding capacity. Diastase (also taka-diastase) showed indifference to acid and pepsin to both acid and alkali. B. sees in the amphoteric character shown by many of the enzymes a strong argument in favor of their protein nature (cf. C. A. 9, 1788-9).

L. W. HAAS.

The lipoids of ancient Egyptian brains and the nature of cholesteryl esters. A. LAPWORTH AND F. A. ROYLE. Univ. Manchester. *J. Path. Bact.* 19, 474-7(1915).—The existence of only one series of esters of fatty acids has been established. The chlorides of the higher fatty acids when heated with cholesterol at moderate temps. yield esters. Above 350° , however, they give aliphatic ketones. The cholesterol of ancient Egyptian brains is present mainly in the form of esters. No appreciable amt. of the higher fatty ketones is to be found in them.

JOHN T. MYERS.

Participation of the intermediate products of alcoholic fermentation in oxygen respiration. LEONID IVANOV. Petrograd. *Ber. botan. Ges.* 32, 191-6(1914).—I. attempts to clarify his position in his controversy with Kostychev. The exceptions taken by I. to the conclusion of K. that normal respiration is stimulated by the intermediate products of alc. fermentation are based upon the following alleged defects in K.'s expts. and reasoning: (1) the wheat germs employed were not capable of germination and were unsuited for the investigation; (2) the pronounced stimulation in the CO_2 excretion of wheat germs, which was observed in sugar solns. fermented by zymin, was not a case of normal respiration, but really represented a stimulation of alc. fermentation, since absorption of O was not correspondingly increased, the amt. of alc., on the contrary, increased and the stimulation even occurred without access of O; (3) boiled zymin ext. alone (without fermented sugar) produced a similar stimulation and the active substances are probably organic and inorganic phosphates (with possibly the coenzyme). K. has in turn repeated some of his expts. and finds that living germs (unlike dead germs and those incapable of germination) do not react to phosphates, and that the respiration of these germs is stimulated by fermented sugar solns. without any change in the relation CO_2/O . I. replies that this stimulation of respiration is then of a quite different character from that first observed by K. since the ratio CO_2/O increased progressively in the 1st expts. in the media H_2O , sugar and fermented sugar, resp. I. concludes that, whatever the nature of the stimulation may be, it has not been proved that it is due to the intermediate products of alc. fermentation. H. S. P.

Away from sugar to betaine (PRINGSHEIM) 10.

B. METHODS AND APPARATUS.

STANLEY R. BENEDICT.

Another sensitive iodine test for the practising physician. J. SCHUMACHER. *Deut. med. Wochschr.* 41, 532(1915).—To the urine to be tested H_2O_2 and 1% alcoholic benzidine soln. are added. The upper part of the fluid is heated and becomes intensely brown or black in the presence of I.

S. AMBERG.

The estimation of acetone. N. O. ENGFELDT. Stockholm. *Berl. klin. Wochschr.* 52, 458-9(1915).—A modification of Frommer's test; it will detect 0.001 mg.

of acetone in 10 cc. of H_2O . To 10 cc. of urine distillate add 5 drops of conc. salicylaldehyde and 5 g. of solid KOH and heat the mixt. to 50° on a H_2O bath, then gradually to the b. p. In the presence of acetone the KOH is colored orange or red before it goes into soln., and after going into soln. the whole mixt. has this color. This test is not specific for acetone alone but is for the acetone compds.

JULIAN H. LEWIS.

A simple clinical method for the determination of ammonia in urine. A. A. BONNEMA. Apeldoorn. *Chem. Zig.* 39, 519(1915).—In the first method described (not new) distn. from CaO and C_2H_5OH at atm. pressure is used. Henriques and Sørensen's method (*C. A.* 4, 1622; 5, 1457) is also modified as follows: To 10 cc. urine add 30 cc. H_2O and 5 drops of a 1% alc. soln. of phenolphthalein and titrate with 0.1 *N* NaOH. Then add 10 cc. of CH_2O , previously neutralized with phenolphthalein indicator, and titrate again to the red color, using a 2nd flask containing 10 cc. urine and 30 cc. H_2O for comparison. The NaOH soln. used in the last titration corresponds to the NH_3 combined with amino acids. Purification of the urine with $BaCl_2$ and $Ba(OH)_2$ is unnecessary.

J. H. MOORE.

The Wassermann reaction according to Wassermann himself. E. PALIER. *Med. Record* 88, 62-5(1915).—A description of materials and technic. P. says that the Wassermann reaction is not well understood even in Germany.

A. H. RAHE.

An improved and simplified technic for auto-serotherapy. E. E. PALMER AND WM. LEE SECOR. *Med. Record* 88, 108-9(1915).—An area on the chest of 2 sq. in. is painted with 3% I soln. and after drying a piece of fly blister paper, $1\frac{1}{2}$ in. square, smeared with petrolatum, is applied and protected with a shield. After 12 hrs. one corner of the blister is raised and the serum drawn off and injected at once. The authors believe that serum obtained as above is more active than that from centrifuged blood.

A. H. RAHE.

C. BACTERIOLOGY.

ERNEST D. CLARK.

Classification of Streptococci by fermentation. J. G. HOPKINS AND A. LANG. *J. Infect. Dis.* 15, 63-84(1914).—*Streptococci* in infections of man may be differentiated from the common saprophytes by fermentation of a broth colored with litmus containing 2% or more of peptone and 1% of the carbohydrate, with an initial reaction of 0.0 and 0.5% normal acidity to phenolph. With these reactions one pathogenic and six saprophytic forms are recognized. The amt. of acid produced is of no value in classification. The hemolization of human blood is of value, while the coagulation of milk and the neutral red reaction are not reliable.

J. GAUB.

Indole reactions in the case of proteus bacilli. E. A. R. F. BAUDET. *Folia Microbiol.* 2, No. 3; *Chem. Zentr.* 1914, I, 1845.—Indole reactions were tested in the case of peptone-NaCl solns., the distillate from the cultures, the nutrient soln. of Zipfel and the nutrient substrate of Berthelot. The following points must be observed in order to obtain satisfactory results in qual. tests for indole: (1) the *p*-dimethylamino-benzaldehyde reagent of Ehrlich is recommended because of its sensitiveness; (2) the Zipfel soln. should be employed as a nutrient medium; (3) in default of the Zipfel soln. accurate results can only be obtained by means of distn. of the cultures.

H. S. PAINE.

D. BOTANY.

CARL L. ALSBERG.

The occurrence of flavone as the farina of the Primula. HUGO MÜLLER. Davy-Paraday Lab. Roy. Inst. *J. Chem. Soc.* 107, 872-8(1915).—The mealy secretion or "farina" on the leaves, stalks and seed capsules of many species of *Primula* was shown to consist almost entirely of flavone, $C_6H_4.O.CPh:CH.CO$ (A), silky tufts, m. $99-100^\circ$,

identical with the compd. synthesized by Kostanecki and Feuerstein (*Ber.* 33, 333), which when decompd. by cold $\text{Ba}(\text{OH})_2$ in MeOH yielded *o*-hydroxydibenzoylmethane (B), $\text{HO} \cdot \text{C}_6\text{H}_4\text{COCH}_2\text{Bz}$, pale yellow prisms, m. 120° (goniometric data given in detail), which when heated in aq. NaOH formed AcPH, *o*- $\text{HO} \cdot \text{C}_6\text{H}_4\text{CO}_2\text{H}$ and some BzOH. Acetate of (A), needles, m. 118° . Although many of the yellow plant coloring matters are derivs. of (A), its physiological function in the life of the species *Primula* remains unknown. The excretion of (A) does not appear to be a necessary result of the life process, since in a number of plants raised from the seeds of *P. denticula* and *P. capitata*, there were some perfectly healthy leaves which did not secrete (A).

LOUIS E. WISE.

A biochemical study of nitrogen in certain legumes. ALBERT L. WHITING. Illinois Agr. Expt. Sta., *Bull.* 179, 471-542(1915).—This bulletin deals with the biochemical nature of N especially with reference to its fixation and assimilation through the symbiotic relationship of *Bacillus radicicola* and certain members of the Leguminosae. After a consideration of the historical features of the problem, W. takes up biological and chemical considerations as reported in the literature, and in addition, discusses the theories of assimilation, fixation and immunity in connection with published data. The exptl. part of the bulletin is divided into 2 parts. Part I consists of studies made to det. the organs through which legumes obtain their N from the air. The expts. reported show conclusively that the cow pea and the soy bean utilize atm. N through their roots and not through their leaves. No combined N could have been assimilated in the expts. as carried out. Part II is concerned with an attempt to det. more definitely the mechanism of the reactions occurring in the fixation and assimilation of atm. N by *B. radicicola* and legumes. The legumes employed were the soy bean and the cow pea. About 74% of the N of cow peas and soy beans at the time of harvest is in the tops, the roots and nodules containing the remainder. This reverses the results found in the earlier periods of growth. About 45% of the sol. N, as an average, was found in the tops, 34 in the roots; in the nodules of the soy beans, 14%, in cow pea nodules, 34%. The N pptd. by phosphotungstic acid averaged in the tops of both soy beans and cow peas about 12% of the total N; in the roots 5.5%, in the nodules of soy beans 1%, in the nodules of cow peas 17%. "Other forms of sol. N than those pptd. by phosphotungstic acid and NaOH occur. In these series they constituted as an average in the tops of both soy beans and cow peas about 68% of the sol. N, in the roots 77%, in the nodules of soy beans 89%, and in the nodules of cow peas 53%." Fixation takes place early and is rapid in some cases, especially with cow peas. "Plants grown under the conditions of these experiments contain no NH_3 , nitrites nor nitrates." B. E. B.

F. PHYSIOLOGY.

ANDREW HUNTER.

The pigment granules of the hepatic cells. I. ANDRÉ MAYER, FR. RATHERY AND GEORGES SCHAEFFER. *J. physiol. path. gen.* 16, 581-96 (1914).—These granules are very sol. in EtOH, MeOH, but less so in the higher alcohols; they are also sol. in Et_2O , EtOAc, CHCl_3 , CCl_4 , pyridine; slightly sol. in CS_2 and C_6H_6 ; insol. in petroleum ether, the aldehydes and ketones. The solubility is altered by salts of the heavy metals. The extent of oxidation varies with the agent used, concn. and time of exposure. The effects of gram stain, Hübl soln., Br water and of Cr-OS mixt. are given. II. *Ibid* 16, 607-22(1914).—Two types of reactions follow injection of various substances (organic acids and bases, anesthetics). Type 1 is cytolytic and chromolytic, and is characterized by the progressive disappearance of the chromatic granules and the increasing lability of the protoplasm. Type 2 is one of protoplasmic homogenization. There is an increase in the vol. of the granules and a fusion with the cellular protoplasm.

A. H. RAHE.

The influence of the spleen on the localization of iron in the organs of the pigeon, particularly the liver. PAUL CHEVALLIER. *J. physiol. path. gen.* 16, 638(1914).—The injection of human hemoglobin into the pigeon causes an excess of Fe in the cells of the spleen and other organs, particularly the lymph nodules and intercapillary cells of the liver. After splenectomy there is added to a polyblastic siderosis a considerable siderosis of the parenchyma. The former indicates a process of assimilation of Fe, the latter one of excretion. The spleen tends to prevent the elimination of Fe and appears to be an organ of assimilation of Fe.

A. H. RAHE.

G. PATHOLOGY.

H. GIDEON WELLS.

Observations and researches on the pyrogenic and antigenic action of the proteins of the typhoid bacillus on man, especially the aged. VALENTINO SEBASTIANI AND CARLO GALASSI. *Arch. farm. sper.* 19, 367-411(1915).—Intravenous injection of the optimum dose of typhoid serum for the formation of agglutinins and bacteriolysins, does not give rise within a period of 9 days to the antibodies of Bordet-Gengou. The production of agglutinins bears no strict relation to the degree of febrile reaction, and is much lower in the case of old men. In both aged and normal subjects, there is marked leucocytosis, which consists in an absolute and relative increase of the polynucleated neutrophiles.

A. W. DOX.

Tuberculosis antibodies and tubercular hypersensitiveness. E. UNGERMANN. *Arb. kais. Gesundh.* 48, 381-411(1915).—I. Even in the case of animals rendered actively immune there is no reason to believe that, in the case of tuberculosis immunity, phagocytic serum bodies play an important part. Sera, capable of developing distinct phagocytic activities even in such diln. as 1:100, were not obtained as a result of immunization, while the opsonic index frequently attained considerable values. A specificity of the phagocytes of the animals rendered immune by means of the serum, which might render possible a differentiation of the *Typhus humanus* and *bovinus* could not be established. An appreciable intensification of the tubercle bacilli phagocytosis in the peritoneum of guinea pigs which had been treated with highly active tuberculosis immunoserum was not observed. A soln. of the tubercle bacilli in the peritoneum of tubercular guinea pigs was repeatedly seen, but such was also frequently the case in normal animals. II. Classified according to their toxic action upon tuberculous animals the preparations examined rank as follows: (1) Live bacilli with a lethal dose of from 0.3 to 0.5 mg. (2) Bacilli killed in accordance with Loeffler's process, from 0.1 to 1 mg. (3) Bacilli ground and killed in steam, 1 mg. (4) Tuberculin, 0.03 cc. (5) Filtered bouillon culture, 0.3 cc. By the use of dead tubercle bacilli it is possible to produce a hypersensitiveness in guinea pigs and rabbits, the detection of which, however, is more difficult and requires larger antigen doses than is the case with infected animals. The most favorable, because comparatively regular, action was obtained by means of the bacilli killed in accordance with Loeffler's method. Old tuberculin employed repeatedly in large doses did not bring about any sensitiveness in guinea pigs. This is correlated with the absence of any irritation on the part of the tuberculin in spite of the antigen content present. In three instances with guinea pigs and one with rabbits, the reaction for hypersensitiveness took the acute form of anaphylactic shock, twice after injection of bacilli and twice after injection of tuberculin. In 7 cases death due to hypersensitiveness occurred within the 2nd to 4th days. Many of the animals which survived the longer period showed pneumonic changes in the lungs without the discovery of any specific bacteria. These acute processes of inflammation are believed to be the symptoms of tuberculous allergy. In many guinea pigs treated intravenously with large doses of dead bacilli, local conditions were discovered which showed great similarity with those of active tuberculosis; foremost among these was a marked en-

largement of the spleen. Hypersensitiveness could not always be produced in these animals.

C. A. NOWAK.

Some comments on a new antiserum for cancer. WILLIAM N. BERKELY. *N. Y. Med. J.* 102, 45-7(1915).—Local remedies for cancer (X-rays, Ra, fulgulation) rarely meet indications in full because typical cancers metastasize and secondary growths develop in vital organs. The antigen is obtained by extn. of fresh, unpreserved tumor with water and pptn. of nucleoproteins and globulins. 3 weeks after injection into sheep, antibody is demonstrable by the complement-fixation test. Serum should be used after primary operations. Owing to its protein nature the antiserum excites formation of anti-antibodies and its effect upon extensive growths is palliative only.

A. H. RAHE.

Studies on the toxicity and hemotoxicity of normal and anti-sera. I. M. NICOLLE AND E. CÉSARI. *J. physiol. path. gen.* 16, 680-9(1914). II. *Ibid* 696-703.

A. H. RAHE.

Further experiments on the poisons of the spiders (*Epeira diadema* Walck). L. E. WALBUM. *Statens Seruminst., Copenhagen. Z. Immunitt.* 23, 623-84(1915).—The chief poison found in exts. of these spiders, and called epeiratoxin, seems to be formed in the ovaries, passing only in small amts. into the blood; it is found only in females, and most during active egg production. The poison of the salivary secretion seems to be quite different; it is much weaker but strong enough to kill flies. Epeiratoxin is antigenic, and the antitoxic serum can prevent death from lethal doses of the poison. The hemolysin, epeirialysin, is identical with arachnolysin, and seems to be formed in the same place as the toxin, and to form antitoxin under the same conditions. In exts. of spiders the lysin is found chiefly in the albumin fraction, while the strong tryptic enzyme of the saliva is pptd. with the globulin. This enzyme does not cause an increase in the antitryptic power of the blood of animals immunized with it.

H. G. W.

Do the exhalations of mice possess anaphylactogenic properties for the serum of the same animals? TH. MESSERSCHMIDT. *Univ. Strassburg. Z. Immunitt.* 23, 685-90(1915).—No anaphylactic sensitization could be obtained with the salt soln. through which had been passed the air from a jar containing mice for long periods, thus failing to substantiate the work of Rosenau and Amoss (cf. C. A. 5, 3590).

H. G. W.

H. PHARMACOLOGY.

ALFRED N. RICHARDS.

Treatment of internal leishmaniosis. G. DI CRISTINA AND G. CARONIA. *Deut. med. Wochschr.* 41, 396-7(1915).—Children with leishmaniosis were treated with intravenous injections of Sb tartrate in 1% aq. soln. beginning with 0.02 g. and increasing the dose to 0.1 g. Five cases recovered, 2 are on the road to recovery, and 1 died after a transitory improvement with acute nephritis. The action of the remedy is not sufficiently known, but after the first injections a deformity of the cytoplasm of the parasites is seen.

S. AMBERG.

A new salvarsan preparation, "salvarsan-sodium." T. FABRY AND A. FISCHER. *Münch. med. Wochschr.* 62, 612-4(1915).—"Salvarsan-sodium" contains about 20% As and is easily sol. in water. It was given intravenously in average doses of 0.45 g. in 50 cc. 0.4% NaCl with good results.

S. AMBERG.

Study of the curarizing action of scopolamine. ALBERT OBRÉ. *J. physiol. path. gen.* 16, 655(1914).—Scopolamine suppresses indirect nerve excitation. It does not prevent nerve response by its local action.

A. H. RAHE.

Michael Servetus' book on syrups. CHARLES GREENE CREMSTON. *New York Med. J.* 102, 165(1915).—Historic note on Servetus' therapeutic dissertation written in 1537. A. H. RAHE.

Contra-indications to the intra-abdominal use of oil. WATERS F. BURROWS. *Med. Record* 88, 66-7(1915).—B. detd. by animal expts. that pure mineral oil poured into the peritoneum caused no ill effect. After opening the cavity, oil was found to be partially emulsified. There were no adhesions. Microscopic exam. showed no signs of peritoneal exudate and leucocytes were absent. With impure oil or in the presence of infection the oil thickened, caused adhesions and large numbers of leucocytes were present. Sweet, Chaney and Wilson (*Ann. Surg. Mar.*, 1913) have shown that these leucocytes have decreased phagocytic action. A. H. RAHE.

12. FOODS.

W. D. BIGELOW AND F. F. FITZGERALD.

Revision of the Edible Fats and Oils Section of the Swiss Food Regulations. KREIS, *et al.* *Mitt. Lebensm. Hyg.* 5, 367-82(1914).—Methods for the analysis of edible fats and oils including butter, margarines and cooking compounds are given in detail. Definitions and standards for table butter, cooking butter, melted butter, margarine, beef tallow, lard, coconut oil, cooking compound, olive, nut (walnut), poppy, sesame, peanut, cottonseed and kapok oils together with the particular detns. to be made on each of these products are included in the regulations. H. S. BAILEY.

The avocado in California. I. Culture, production and marketing. IRA J. CONDIT. II. Composition and food value. M. E. JAFFA. College of Agr. Expt. Sta., *Bull.* 254, 381-402(1915).—Analyses of 28 varieties are given. The avocado is easily digestible and is an excellent source of vegetable fat. E. H.

Aldehyde color reactions. Contribution to the detection of artificial invert sugar, especially of caramel. D. SCHENK AND H. BURMEISTER. Saarbrücken. *Chem. Zig.* 39, 465-6(1915).—Investigations like those of Schenk (cf. C. A. 8, 2006) were made with phenol, β -naphthol, pyrocatechol, resorcinol, hydroquinol, guaiacol, pyrogallol, phloroglucinol, salicylic acid, salol, thymol and vanillin, and the color reactions tabulated. The phenol-H₂SO₄ and guaiacol-H₂SO₄ reactions are best, the latter being more delicate. The tests are to be carried out as in the previous work.

J. H. MOORE.

Composition of corn (maize) meal manufactured by different processes and the influence of composition on the keeping qualities. A. L. WINTON, W. C. BURNETT AND J. H. BORNHANN. Bur. of Chemistry, U. S. Dept. of Agr., *Bull.* 215, 31 pp. (1915).—The authors' main purpose is to show the general compn. of American table meal milled by different processes and especially the keeping qualities of the extreme types dried to different degrees and stored in different localities. The products of a white-corn mill may be arranged in the following order in regard to acidity, fat, fiber and ash, beginning with the lowest percentage: grits, meal, flour, feed, germ; in the following order in regard to protein: flour, meal, grits, feed, germ. The N-free ext. is not strikingly different in grits and meal but is lower in the feed and lowest in the germ. Samples of meal taken from 41 mills located in 32 towns and 17 states are classified as (1) whole-kernel, stone-ground meal; (2) bolted, unde germinated meal; (3) degerminated, bolted, roller-ground meal ("cream meal"); and (4) low grade or "standard" meal. Class 1 at time of grinding has the same compn. as corn except in moisture but soon develops a greater acidity. Class 2 contains less fiber than the corn but no other general rule can be formulated, owing to the variable manufacturing

conditions. Class 3 contains less protein, fat, fiber and ash and more N-free ext. than the corn. Class 4 contains sometimes more and sometimes less of each constituent than the corn. Ton and carload lots of degerminated bolted meal with a range in moisture content were stored at Savannah and Chicago. A study of the analyses of these samples made at intervals up to 6 months indicates that degerminated, bolted meal containing not over 14% moisture and 1% fat as detd. by the A. O. A. C. method, properly stored, should keep for 6 months; with a moisture content of 15% it should keep for 3 months. Comparative tests with whole-kernel and degerminated, bolted meal, undried and dried to different degrees and stored at Savannah and New Orleans showed the superior qualities of the latter. Whole kernel meal should be produced locally and consumed soon after grinding; properly dried, degerminated meal keeps well during transportation and long storage.

P. B. DUNBAR.

Changes in bread on aging. M. P. NEUMANN. *Z. ges. Getreidew.* 6, 119-22 (1914).—The fact that the crumb of fresh bread has a greater capacity for absorbing H_2O than has the crumb of old bread indicates that the changes which occur during the aging of bread are not due exclusively to loss of H_2O . This view is also confirmed by expts. which showed that a fresh 2 kg. loaf of rye bread lost 1.18, 1.01 and 0.96% in wt., resp., during each of the 1st 3 days and 1.14-3.15% during each 3-day period thereafter until a total age of 27 days had been reached, while staleness ensues after a period varying from several hrs. to 1-2 days with a corresponding loss in H_2O of 1-2%. It is extremely probable that the aging of bread is primarily due to the influence of loss of H_2O on the colloidal system starch- H_2O ; in view of the high concn. of the starch (as starch paste) a very slight change in the H_2O content would be expected to exert considerable influence on the system. The H_2O liberated by the sepn. of amorphous starch is partly evapd. and partly absorbed by the albumin coagulum; a progressive sepn. of amorphous starch is thereby produced and the staleness of bread is essentially due to this coagulation of starch from the paste to the amorphous form. The efficacy of preps. which are employed for retarding the progress of aging is due exclusively to their property of rendering the liquefaction of starch more complete. The above view is consistent with the results of Katz who ascertained the existence of a physico-chem. equil. in the crumb; the fresh condition is the stable form at higher temps. (50-100°), while the stale condition is the stable form at lower temps. (25-0°). It is suggested that further valuable data may be obtained by correlating the rate at which bread becomes stale with the physical and chem. nature of the starch grains, as well as with the mineral (phosphates, Ca salts, etc.) constituents of the flour and the NaCl which is added to the dough.

H. S. PAINE.

New constant for the investigation of partial separation of fat from milk. RENE LEDENT. *Bull. soc. chim. belg.* 28, 229-34 (1914); *Ann. chim. anal.* 20, 77-81 (1915).—Vandam has proposed (cf. *C. A.* 8, 3602) to employ the relation c/g (c and g = contents of casein and fat, resp.) as a criterion of the partial sepn. of fat from milk; the value of c/g is greater than unity in the case of milk from which the fat has been partially sepd. L. proposes to employ a new coeff. C/V obtained by dividing the Cornalba factor C by the Vandam index V . The cream was sepd. from milk containing 3.0% fat ($C/V = 7.54$) so that the fat content was reduced to 0.3%. This cream was then added in varying amt. to the residual milk so that samples were prepd. which contained 0.3, 0.5, 0.6, 0.7, 1.4, 1.7, 1.9, 2.7% fat; the corresponding values of C/V were 0.80, 1.40, 1.61, 2.11, 3.80, 4.32, 5.22, 6.06. Exam. of 40 samples of milk (each from a single cow) showed a variation of 6.12-20.50 in the value of C/V ; the smallest value of fat content was 2.30% and the corresponding value of C/V was 6.34. A pure milk showed values for fat content, Cornalba coeff., Vandam index and C/V of 2.7, 6.71, 0.98, 6.84 and 2.35, 7.00, 1.20, 5.83, resp., before and after sepn. of fat;

another sample of pure milk showed corresponding values of 3.4, 6.62, 0.75, 8.82, and 1.8, 6.82, 1.53, 4.45 before and after sepn. of fat. The preceding data indicate that a sample of milk which shows a value of C/V less than 6.0 may be considered to have undergone partial sepn. of fat. It is possible, however, for milk containing an unusually high % of fat to show a value of C/V greater than 6.0 after slight sepn. of fat. The relation C/V , as well as the Vandam index, may be considered to be a reliable criterion for partial sepn. of fat in the case of the ordinary grades of milk which contain a medium % of fat.

H. S. PAINE.

The alcohol test in relation to milk. S. H. AYERS AND WILLIAM T. JOHNSON. U. S. Dept. Agr., *Bull.* 202, 35 pp. (1915).—Exptl. work to det. the practical value of the alc. test for the quality of market milk is given. The alc. test may be positive as a result of the growth in milk of lactic acid and rennet-forming bacteria; there is no definite relation between the alc. test and the number of bacteria in milk. If samples from a single cow or small herd show a positive 68% alcohol test some change in the milk from its normal condition is indicated and a more careful exam. of the herd should follow. With mixed market milk other factors present themselves for consideration. In these cases the alizarol test may be of more value than the plain alc. test to give additional information as to the kind of fermentation. Acid and rennet fermentation may be differentiated by neutralizing the acidity by sodium hydroxide. Considerable literature is cited.

E. H. INGERSOLL.

Milk powder. G. CORNALBA. *Boll. chim. farm.* 54, 34-7 (1915).—C. traces the origin and progress of the attempts to secure milk in more stable form (both as condensed or evapd. milk and milk powder) by evapn. of H_2O ; he discusses the methods of Appert and Martino De-Lignac (who were the first to make progress in this direction) as well as the later procedures of Legripp, Ellin, Just-Hatmaker and the recent, more nearly perfect method employed for the prep. of "Verolatte" ("Trufood"). The last method is considered to approach very nearly to a soln. of the problem of obtaining H_2O -free milk with retention of the desirable organoleptic and nutritive properties of fresh milk. The contents of H_2O , fat, casein, lactose and ash in a sample of the Hatmaker milk powder were 8.00, 28.70, 22.70, 35.10 and 6.50%, resp.; the contents of H_2O , fat, nitrogenous substance, sugar and ash in the "Verolatte" milk powder were 1.54, 30.70, 26.43, 35.32 and 6.01%, resp.

H. S. PAINE.

The milk question. III. L. HORON. Liège. *J. pharm. Anvers* 1914, 401-7; *Bull. soc. chim. belg.* 28, 246 (1914).—H. discusses the efficacy of pasteurization and the use of the alc. reaction for investigating the quality of the milk of commerce.

H. S. PAINE.

Pasteurizing milk in bottles and bottling hot milk pasteurized in bulk. S. HENRY AYERS AND W. T. JOHNSON. U. S. Dept. Agr., *Bull.* 240, 27 pp. (1915).—Pasteurization in bottles using a temp. of $145^{\circ}F$. for 30 min. causes satisfactory bacterial reduction. The bottles must have perfect water-tight fitting caps; their capacity must be sufficient to allow for expansion and contraction of the milk in the process. Great care is necessary to insure that all the milk has been heated to $145^{\circ}F$. for 30 min. Another process is to bottle the milk hot, cap with cardboard caps and cool by an air blast. Commercially these processes although more time consuming have the following advantages: bottle infection can be eliminated; milk losses from evaporation are eliminated and ordinary cardboard caps can be used.

E. H. INGERSOLL.

Heating of cottonseed (BARROW) 27. American wild mustard seed (WINTON) 27.

U. S., 1,147,888, July 27. E. M. POTTER. Coffee mixtures are prepared by roasting the green coffee beans and then mixing with chicory which has been pre-

viously boiled to remove its bitter constituents. This proportion of chicory neutralizes, in part at least, undesirable physiological action of the coffee.

U. S., 1,148,168, July 27. J. G. HODGSON. Coating mixture for lining cans containing food; a C_6H_6 soln. of the residue of wood tar and gas tar obtained by removal of the volatile and non-drying constituents, mixed with a very small amt. of linseed oil.

U. S., 1,148,328 and 1,148,329, July 27. H. A. KOHMAN, C. HOFFMAN and T. M. GODFREY. Leavened bread is made with the addition of about 0.015 part of $KBrO_3$ or 0.005 part of KIO_3 to 1000 parts of the usual mixt. of flour, yeast and other ingredients of the dough, before fermentation, to hasten the time of fermentation, decrease the amt. of yeast required and slightly increase the possible H_2O content of the bread.

U. S., 1,148,815, Aug. 3. H. B. ALEXANDER. Bread is formed of flour containing a large amt. of germ material, by fermenting with a small amt. of yeast, checking the fermentation with $NaCl$ and vinegar, and baking.

U. S., 1,148,823, Aug. 3. O. BOCANDE. Preserving meat and other foods by sterilizing with O_2 *in vacuo*, partially drying *in vacuo*, covering with a tight-fitting casing of cloth, Sn foil, paper or gutta-percha, and coating the latter with a mixt. formed of H_2O 40-60%, gelatin 20-25%, sea salt, sugar and glycerol about 5% each and about 0.2% CH_2O .

U. S., 1,149,066, Aug. 3. J. L. KELLOGG. A powdered extract for preparing beverages is formed by roasting wheat, rye or other grain until it has a light brown color, grinding, mixing with thick sirupy cooked figs, forming the mixt. into pellets, roasting the latter, steeping and boiling the pellets to ext. the sol. matter, and concg. and drying the ext. *in vacuo* and granulating it. Cf. C. A. 9, 338.

Brit., 22,143, Oct. 1, 1913. E. VON CHRZANOWSKI. Drying grain and other agricultural products in a series of narrow chambers with walls of porous material, which form intermediate flues for heating gases; the moisture evolved is drawn off through the walls by the gases. The bottoms of the drying chambers are inclined, causing the material to be discharged through adjustable openings.

Brit., 8,027, Mar. 30, 1914. F. GÖSSEL. Construction and operation of an app. for mfg. artificial milk according to 27,860, 1912.

Ger., 283,608, Nov. 29, 1912. J. STRAUSS. A composition for coating eggs consists of a soln. of rubber, gutta-percha or balata, with wax, ceresin or Japan wax added. Each of the substances can be dissolved in a common solvent or in a solvent specially suited to it. E. g., 4-10 parts rubber and 2-10 parts wax dissolved in 90-150 parts CCl_4 and benzine may be used. The eggs are dipped in the soln., left for about 2 mins., then dried to eliminate the solvent, which is effected in 15 mins. The coated eggs are then packed and shipped in the usual manner, and are not affected by warmth or air. The coating prevents drying out of the eggs as well as passage of putrefying agents from without.

14. WATER, SEWAGE AND SANITATION.

EDWARD BARTOW.

Septic and Imhoff tank sludges as fertilizers (LIPMAN) 15. Fertilizer from municipal waste (TURRENTINE) 15. Device for taking continuous samples of waste water (GRASWINCKEL) 1.

U. S., 1,147,736, July 27. L. D. KINZIG. Apparatus for automatically regulating the supply of purifying chemicals used in treating water.

U. S., 1,148,920, Aug. 3. J. M. NOLL. Apparatus for purifying water for use in boilers, dye-houses, etc., by treatment with chemicals and heating.

U. S., 1,149,045, Aug. 3. J. C. W. GRETH and M. F. NEWMAN. Apparatus for purifying water by filtration and chemical treatment.

Brit., 24,387, Oct. 28, 1913. RIEDEL AKT.-GES. In softening or purifying water, the H_2O is first mixed with the hydroxide of an alk. earth or with the hydroxide or carbonate of an alkali, and then filtered through stones or stony material, such as trass, phonolite, porphyry, leucite, or their tuffs, trachyte, nepheline, sodalite, or mica. The materials may be continuously stirred during use. The filtration may be through two beds of materials such as are described above, the first comprizing base-exchanging bodies which contain lime and the second base-exchanging bodies which contain Na.

Ger., 204,794, Dec. 4, 1908. M. BECKER. Composition for preventing or dissolving boiler scale, consisting of graphite, with which small amts. of pumice ($1/15$ - $1/10$), and powdered Al-bronze ($1/10$ - $1/12$), are mixed.

Ger., 281,841, July 11, 1913. VESUVIO, AKT.-GES. FÜR DEN BAU VON MÜLL-VERBRENNUNGSANLAGEN. Removing the flue dust in garbage incinerating plants.

Ger., 282,880, Feb. 18, 1913. M. BECKER. Addition to 204,794 (*supra*). Modification in the manuf. of a composition for preventing and removing boiler scale. *E. g.*, when employing sea water for feeding boilers, Zn bronze (powdered Zn) is used instead of, or in addition to, the Al bronze (finely powdered Al) specified in the principal patent as a constituent of the compn. together with graphite and powdered pumice stone; about 3% Zn is desirable so that the compn. becomes 8 parts ground pumice, 5 of powdered Al, 3 powdered Zn, and 84 graphite. For the purification of especially hard H_2O , $BaCl_2$ should be added also, by substituting 4-5% crystd. $BaCl_2$ for 1 part of graphite. For particularly slimy water, 5% soapstone or talc is added. For slimy sea water and slimy hard water, 8 parts ground pumice, 4 parts powdered Al, 4 of powdered Zn, 44 of graphite, 40 soapstone or talc are used.

Ger., 283,341, Dec. 17, 1913. Addition to 283,340 (C. A. 9, 2415). F. & M. LAUTENSCHLAGER, G. M. B. H. Disinfecting by means of formaldehyde, in closed app., according to the principal process. The steam containing HCHO is generated by heating acetone or alc. solns. of HCHO. HCHO is mixed with MeOH or acetone or their mixt., or paraform is dissolved to satn. in acetone or MeOH. By heating such a soln., HCHO and acetone or MeOH vapors are produced at the same time in the form suitable for use in the process. The proportions of HCHO and acetone or MeOH are such that the evolved steam mixt. contains about 2 parts HCHO gas to 100 parts acetone vapor. In the soln. of paraform in acetone or MeOH, the proportions are controlled by the degree of satn.

Ger., 283,363, Jan. 4, 1914. C. A. HARTUNG. A sand filter with provision for reversing the flow for cleaning.

Ger., 283,415, Mar. 20, 1913. B. BLEICKEN. App. for the production of distilled water on board ship, with the use of sea water.

Ger., 283,468, Mar. 20, 1914. R. WOELFERT. In the production of distilled water, the H_2O is volatilized under partial vacuum produced by a steam injector which serves to carry the vapors through a diffuser, into a superheater and on into the condenser. The condensate is used as boiler feed water. The coils used for heating the supply of H_2O may be used as cooling elements.

15. SOILS AND FERTILIZERS.

R. O. E. DAVIS.

Determination of sulfate in soils. P. E. BROWN AND E. H. KELLOGG. *J. Ind. Eng. Chem.* 7, 686-7(1915).—Sulfates cannot be extd. from soils by treatment with dil. HCl because of the interference of organic substances and Fe compds. while with strong acids SiO_2 is also dissolved. All the sulfates present can be extd. by 6-8 hrs.' shaking with twice the wt. of H_2O . In a supplemental investigation it was found that the S photometer yields accurate and rapid results. ISADOR MILLER.

Chemical studies of soils. S. TIJMSTRA. *Meded. Deli Proefstat. Medan* 8, No. 8, 244-65(1914); *Expt. Sta. Record* 33, 22.—Comparative chem. and physical studies of 8 plats subjected to different cultural treatments gave results showing decided variations. The differences, in certain instances, were attributable to the plowing under of the ashes of burnt weeds. This treatment was accompanied by a decrease in the content and solubility of P_2O_5 , a decrease in Mg and Fe and an apparent increase in K and Cl. B. E. B.

Some preliminary investigations into the chemical composition of certain vineyard soils in the Montagu and Robertson districts. ABRAHAM IZAK PEROLD AND DAVID CHAMBERS CRAWFORD. *S. African J. Sci.* 11, 337-49(1915).—HCl exts. of numerous soils were analyzed and the results are discussed. W. H. FRY.

Availability of organic nitrogen. J. E. BRECKENRIDGE. *J. Ind. Eng. Chem.* 7, 671-3(1915).—Chairman's address before the Fertilizer Division of the Am. Chem. Soc. The paper contains no new, original data but reviews recent work on the subject. ISADOR MILLER.

Experiments to determine the influence of the fineness of subdivision and richness in magnesium carbonate of crushed limestone used for amendment of acid soils. WALTER THOMAS AND WILLIAM FREAR. Penna. State College, Agr. Expt. Sta., *Ann. Rpt.* 1912-13, 206-19.—The following subjects were studied: (1) To what degree of fineness should limestone be crushed to secure the best economic return from its use? (2) What influence upon plant development has the MgCO_3 contained in varying proportions in the different limestones? Limestone of 20-, 40-, 60-, 80- and 100-mesh was tried; the yield of red clover following the use of 40-mesh limestone was about $5\frac{1}{2}$ times that with the 20-mesh. The 60-mesh gave a yield $\frac{1}{2}$ greater than the 40-mesh, the 80-mesh $\frac{1}{4}$ greater than the 60-mesh. The extra costs involved in grinding finer than 60-mesh makes the 80- and 100-mesh unprofitable and doubtless unnecessary. Paraffined pots, $5\frac{1}{2}$ in. diam. $\times$ 7 in. depth, were used. Two soils, of varying degree of acidity, were used in the test. The authors recommended, as a result of their tests, that limestone at least 60-mesh in fineness should be used when the use of limestone is indicated. Dolomite gave practically the same yield as pure limestone. B. E. B.

The utilization of the nitrogen and organic matter in septic and Imhoff tank sludges. C. B. LIPMAN AND P. S. BURGESS. Calif. Agr. Expt. Sta., *Bull.* 251, 287-95(1915).—The N content of the sludges examd. varied from 1.23 to 2.66% and P_2O_5 from 0.77 to 1.82%. Availability studies, in which sludge was mixed with different types of soil, showed that there are variations in the same soil, and that the different soils vary markedly in this respect. As a rule, however, the amt. of nitrates formed from sludge was greater than in the case of materials like dried blood, tankage, etc. B. E. B.

Preparation of fertilizer from municipal waste. J. W. TURRENTINE. *Am. Fertilizer* 43, 37-44(1915).—The classes of city waste are given as: ashes, rubbish, sewage, street sweepings, trade waste, dead animals and garbage. The compn. and

availability of the various materials are discussed. Sewage and garbage presents the greatest difficulties of disposal. Garbage is best disposed of either by incinerating or by rendering; both methods are described. B. E. B.

Utilization of prickly pear as a fertilizer. J. H. JOHNSTON AND H. TRYON. *Rpt. Prickly Pear Travel. Com., Queensland 1912-14*, 25-6; *E. S. R.* 33, 25(1915).—A brief description of the use of the prickly pear as a fertilizer as practised in Madras, Mysore and the Bombay Presidency of India. B. E. B.

New experiments with carbon dioxide as fertilizer. H. FISCHER. *Ern. Pflanz.* 11, 11-2(1915); *Z. angew. Chem.* 28, II, 215.—Plants fertilized with CO_2 (by introducing this gas into the glass-house) gave more than double the yield of unfertilized plants, thus corroborating previous results. Similar results were obtained by Löbner but he reported an objectionable after-effect. The question of the after-effect will be further investigated by F. R. O. E. D.

Calcium cyanamide and its application. B. SCHULZE. Breslau. *Deut. Landw. Presse* 41, 761(1914); *Z. angew. Chem.* 28, II, 110.—Granular cyanamide is only about $\frac{1}{2}$, as efficient as that finely ground. Tar-oil, added to prevent dusting, does not appreciably affect its efficiency. R. O. E. D.

The effect of different methods of inoculation on the yield and protein content of alfalfa and sweet clover. A. C. ARNY AND R. W. THATCHER. *J. Am. Soc. Agron.* 7, 172-85(1915).—Alfalfa grown in soil inoculated with soil from an old alfalfa field plus CaCO_3 contained more protein than in the case of other methods of inoculation and produced a larger crop of dry material. Commercial cultures applied to seed and to soil increased the dry material produced and the % of protein over the check. Inoculation increased the ash content of the roots and decreased it in the tops of the plants; the % of P_2O_5 in the ash was not effected, while K was higher in uninoculated plants. J. J. SKINNER.

The action of certain new nitrogenous fertilizers on sandy and upland moor soils. B. TACKE. *Mitt. Ver. Förd. Moorkultur deut. Reiche* 32, No. 23, pp. 411-42(1914); cf. *C. A.* 8, 195.—With oats, rye and potatoes grown on sandy and moor soils, the effects of NH_4NO_3 , $\text{Ca}(\text{NO}_3)_2$, urea, and superphosphate prepared with synthetic HNO_3 equaled those of NaNO_3 and $(\text{NH}_4)_2\text{SO}_4$. B. E. B.

Bacteriology of the general fertilizer plats. III. Ammonifications. GUY C. GIVEN. Penna. State College, Agr. Expt. Sta., *Ann. Rpt.* 1912-13, 200-6.—The velocity of NH_3 production was studied in 5 plats of the "General Fertilizer Series" by inoculating sterile portions of a carefully prepared fertile soil mixture containing 65 mg. of N added in the form of cottonseed meal, with like suspensions of the bacteria from the several plats under examn. The amt. of NH_3 was detd. each successive day for 7 days. The amt. produced was practically equiv., irrespective of the field treatment. The same applied when dried blood was used. In the nitrification studies, however, using $(\text{NH}_4)_2\text{SO}_4$, some marked differences were obtained, noticeably where a considerable degree of acidity existed in the soil. B. E. B.

The origin, composition, and fertilizer value of the bat guano of Cuba and the Isle of Pines. C. N. ACKTON. *Modern Cuba* 3, 48-59(1915); *Exp. Sta. Rec.* 33, 24.—The fertilizing value of guano is discussed. Its compn. varies widely. On the basis of analyses of samples from Cuba, Porto Rica and Haiti, bat guano contains as an average 3.5 to 7.0% P_2O_5 , 1.5 to 3.0% K and 8 to 11% N. The fresh friable bat excrement, which usually occurs as a thin cover over the floor of the cave, is easily distinguished from the other material. The light-colored deposit contains large amts. of CaCO_3 and CaSO_4 and more P_2O_5 than fresh guano. The reddish deposits contain more P_2O_5 and very little N. J. J. SKINNER.

Improving Iowa's peat and alkali soils. W. H. STEVENSON AND P. E. BROWN. Iowa Agr. Expt. Sta., *Bull.* 157, 43-79(1915).—A study of shallow Iowa peat soils and alkali conditions in fields. Physical improvement should come first, then the question of fertilizing. The "alkali" spots are best remedied by liberal application of manure or plowing under of straw and green crops. B. E. B.

Phosphates in Massachusetts. Agriculture, importance, selection and use. WM. P. BROOKS. Mass. Agr. Expt. Sta., *Bull.* 162, 131-67(1915).— P_2O_5 is not relatively deficient in Mass. soils. The general results of two series of expts. comparing different phosphates, one extending over 12 and the other over 18 years, are presented. These results indicate that the application of at least a moderate amt. of phosphate is usually profitable, and that the more sol. and available materials give results much superior to those obtained with the finely ground rock phosphates. It is shown that the dissolved phosphates favor more rapid early growth, earlier and more perfect maturity and larger yields than the rock phosphates, and that the former are used with greater profit than the latter. B. E. B.

Chemical control of cattle dipping tanks. CORNELIUS WILLIAMS. *S. African J. Sci.* 11, 287-96(1915).—Sodium arsenite solns. were analyzed after standing various intervals, and the conclusion that oxidation is negligible in solns. made up with distd. water but is very rapid when excretory matter is present is confirmed. Oxidation in tanks is greater in summer than in winter. While a dipping tank is in constant use there is less risk of oxidation than when the tank is idle. Addition of carbolic acid or any of the coal-tar disinfectants arrests oxidation of the dip fluid, if used in sufficient quantity. One or 2 gallons of disinfectant to 1000 gallons water is considered sufficient. W. H. FRY.

Biochemical study of nitrogen in legumes (WHITING) IID. American wild mustard seed (WINTON) 27.

U. S., 1,147,926, July 27. W. B. CHISHOLM. Fertilizer is made by mixing ground phosphate rock with S, steaming to initiate the formation of sulfuric and phosphoric acids and then tightly packing the moistened mixt. to prevent escape of moisture.

Ger., 283,311, July 29, 1913. G. GREYER. In the treatment of diseased plants, the liquid volatile insecticides commonly used are solidified in admixt. with glue, gelatin, or the like, and H_2O , and applied in this form to the affected parts. Glue is dissolved in 10 parts of H_2O , and CS_2 is added, in small amts. at a time, with gentle stirring. Ninety or more parts of CS_2 can be retained mechanically by 1 part of glue. The gelatinous or solid end-product is applied, *e. g.*, to *Phylloxera vastatrix* on the vine. The volatilization of the CS_2 progresses very slowly.

16. FERMENTED AND DISTILLED LIQUORS.

ROBERT WAHL.

Quantitative determination of the higher alcohols in cognac. L. SETTIMI. *Ann. lab. chim. cent. delle Gabelle* 7, 163(1914); through *Ann. chim. applicata* 3, 373(1915).—To 10 cc. of the alc. to be examd., previously distd. and brought to 50%, add $\frac{1}{2}$ cc. 1% benzaldehyde in very pure 50% alc., then little by little 10 cc. concd. H_2SO_4 , allowing the latter to run down the walls of the vessel, and rapidly mix the whole contents. After $\frac{1}{4}$ hr. the liquid, if it contains higher alcs., presents a more or less intense cherry red color, and should be compared in a colorimeter with the color

given by a liquid made up in the same way from a soln. of 0.5 g. isobutyl alc. in very pure 50% EtOH. The results are slightly higher than those obtained by Rocque's method, which, however, is less simple and rapid than the new method.

S. LEVY.

Phosphoric acid. P. EQUETER. *Mons. Bull. assoc. inst. sup. brass. Gand* 20, 162-6(1914); *Bull. soc. chim. belg.* 28, 246(1914).—E. discusses the use of phosphoric acid in fermentation.

H. S. PAINE.

The adulterations of tannins used in liqueurs. F. REPITON. *Ann. fals.* 8, 118-23(1915).—Tannins extd. from galls with alc. or ether are used in the prepn. of liqueurs such as vermouth. These are sol. in 95% alc. and have a tannic acid content of 82-86% with 12-14% water. One sample of the commercial tannin when treated with 95% alc. left a cryst. deposit of sucrose. For detg. the tannic acid content of these preps. the hide-power method is satisfactory.

H. S. BAILEY.

Adulteration of crude and refined tartrates. P. CARLES. *Ann. chim. anal.* 20, 147-51(1915); *Ann. fals.* 8, 125-8(1915).—The inert Ca tartrate in K H tartrate is valueless for the manufacture of baking powder. In disguising its presence by addition of KHSO_4 to cream of tartar, a double fraud is committed: (1) the acidity is increased and the prepn. consequently sells at too high a price; (2) the physiol. action of the K_2SO_4 and Na_2SO_4 produced in the reaction with NaHCO_3 is different from that of the desired Na K tartrate. *Recognition of this adulteration:* Crude, simply ground material is sepd. by means of a sieve into finer and coarser particles. Both portions are examd. separately. About 10 g. of the fine powder are agitated with 50% alc. for 10 min. in the cold. In presence of KHSO_4 the filtrate presents an excessively high acidity and gives an abundant ppt. with BaCl_2 and even with CaCl_2 , if very much KHSO_4 is present. The coarser particles are dropped from a considerable height on a sheet of blue, damp litmus paper, spread on a shallow dish. After a few min. the KHSO_4 particles become visible, due to the formation of red spots on the litmus paper; they may be picked out and individually characterized. With refined impalpable powders the detection of a fraudulent admixt. of KHSO_4 is much more delicate, but not less important. The mere sulfate (or even bi-sulfate) content is not always indicative of a fraudulent intention, as these substances may be introduced by the process of manuf., when an excessive amt. of KHSO_4 is employed for the conversion of the Ca tartrate in the lees into K H tartrate and the latter only poorly purified. C. proposes that not more than 0.75% sulfate, calcd. as K_2SO_4 , and 0.25% Ca tartrate be tolerated in commercial K H tartrate.

L. W. HAAS.

Practical points concerning fermentation waste with a description of a new process for pressing yeast. WALTER SCOTT. *J. Inst. Brewing* 21, 391-416(1915).—S. deals largely with excize measures, discusses the reasons why the waste figures of any 2 breweries are rarely, if ever, comparable within narrow limits, describes the methods adopted for the sepn. of "barm ale" from skimmed yeast, and gives an account of his efforts to improve the existing method of dealing with waste yeast. The essential feature of S.'s new process is the application of compressed air for pressing skimmed yeast. The latter is collected in a movable receiving vessel, from which it is discharged by means of air pressure (gradually rising to 40 lbs.) into the specially constructed press; this reduces the moisture of the pressed yeast to 70%, leaves the yeast in excellent condition for pitching and furnishes a brilliant filtrate. The latter may be automatically returned to the fermenter without being exposed to air. The whole work can be completed in much less than 1 hr. from the time the yeast is skimmed. The process, intended for top-fermentations only, is illustrated by 14 cuts and diagrams.

L. W. HAAS.

Note on the starch-forming enzyme from malt. S. BORN. *J. Ind. Eng. Chem.* 7, 722(1915).—B. was unable to confirm the work of Davis (*C. A.* 9, 690) as far as the enzyme hemi-cellulase is concerned.
ISADOR MILLER.

The use of saccharometers for beers and for solutions of beer extracts. G. ROSSI. Rome. *Ann. chim. applicata* 3, 339-43(1915).—Continuation of expts. previously made (cf. *C. A.* 8, 3343), applied to beers and beer exts.
S. LEVY.

Note on the determination of original gravity. JULIAN L. BAKER AND F. E. HULTON. *J. Inst. Brewing* 21, 389-91(1915).—In the course of the authors' practice they found that in the case of beers which filter with an ordinary degree of freedom there is no appreciable loss of alc. even when the funnel is uncovered, but with waste beer, "bottoms," etc., which frequently contain a large amt. of sediment (hop sludge and finings), the filtration is often very difficult and protracted, and the loss of alc. in such cases is serious unless suitably protected.
L. W. HAAS.

Reducing original gravity of beers. P. PETIT. *Brewer and Malster* 34, 69-71; through *J. Soc. Chem. Ind.* 34, 628(1915).—With certain waters, *e. g.*, those rich in CaSO_4 and contg. little or no alkali carbonates, those contg. large amts. of Na_2SO_4 , and those which introduce a considerable amt. of iron into the wort, the original gravity of the wort cannot be reduced without the beer becoming thin and flat; waters rich in organic matter are particularly undesirable, owing to the presence of iron. Waters rich in NaCl and CaCl_2 and sufficiently calcareous are favorable to "body" and mellow-ness. Malts of long acrospire, friable and mellow, low-cured and moist, are not suitable for brewing full-bodied beers at low original gravities (the malt must be sharply kilned and employed in a thoroughly dry condition). Very mellow malts are preferably premashed at a high temp. (60-62°) and mashed quickly. Malts with a considerable proportion of steely points are best treated by preliminary acidification of the mash. The subsidiary acid mash should be added when the main mash has reached 60-62°. This eliminates bottom yeast cells, and also facilitates clarification of raw grain worts and improves the stability of the beer. For a full-bodied beer the most valuable dextrans are not those produced by slow saccharification of raw grain below the final mashing temp., but those produced between 65 and 70°. It is most important to boil sharply and the hops should be added after the wort has boiled for 15 to 30 min. Contact with air operates against fullness of body.
L. W. HAAS.

Experiments and experiences with sucrose as partial barley-malt substitute in the production of beer. AD. CLUSS AND VIKTOR KOUELKA. *Allgem. Z. Bierbrau.-Malzfabrikation* 43, 167-70, 173-8, 181-2, 189-91, 201-4, 209-13(1915).—The authors investigated the amt. of sucrose suitable to partially substitute malt, influence of sucrose on the compn. of wort, yield of ext., final degree of fermentation and character of final product, further means of regulating degree of fermentation, and proportion of hops best adapted to "sugar" beers. The extensive exptl. work (conducted on both lab. and practical scales) cannot be abstracted briefly; it led to the general conclusion, that even with a foregoing substitution of sugar for malt, there may be produced beers, which are free from objection and are fit to satisfy the demand of the consumer in every way.
L. W. HAAS.

Composition of beer wort prepared from malt and sucrose. ED. MOUFANG. *Allgem. Z. Bierbrau.-Malzfab.* 43, 191-4(1915).—By joint employment of malt and beet sugar (the proportion of the latter detd. by degree of modification and character of malt) a better yield (0.8-2%) was obtained. It makes a difference whether the sugar is added at the start of the mash or only after the wort is run off. Co-mashing of sugar increases the amt. of total as well as of non-coagulable protein substances. Sugar also effects perceptible differences as to assimilable N. Sugar-malt worts are

brighter and finer than pure malt worts and the final product of fermentation differs from pure malt beers as to total amt. and kind of fermentable substances.

L. W. HAAS.

U. S., 1,145,332, July 6. F. PAMPE. In rectifying alcoholic liquors, in a column still, steam is injected into the zone where the fusel oil is about to dissolve but is still substantially undissolved so as to form a whirling layer of mixed steam and fusel oil vapors and this mixt. is discharged from the still.

U. S., 1,146,139, July 13. J. F. DORNFELD. **Malting apparatus.**

U. S., 1,146,171, July 13. W. O. KAISER and G. F. STROEBEL. A non-alcoholic beverage is made by fermenting a mixt. of ext. of malt, cereals and hops with yeast and boiling the mixt., after fermentation, to rupture the yeast cells and dissolve their contents in the liquor and volatilize the alc.

U. S., 1,146,363, July 13. N. STATHAM. A catalytic material for oxidizing and purifying distilled spirits is made by carbonizing the woody material obtained in making pulp by the NaOH process. The product thus obtained is very porous (containing 85% of voids in some cases) and serves as an efficient carrier of O when the liquor is filtered through a tall column filled with it.

U. S., 1,146,793, July 20. M. HESSBERG. **Brewing.** The bittarn and hop resins are extd. from the residue and dregs obtained from a brew after cooling by mashing in the succeeding brew.

U. S., 1,147,767, July 27. A. VON LASZLOFFY. **Making cattle food and by-products from distillery slop** by concg. to a sirupy consistency and extg. with alc. to ppt. the albumins, dextrin, gums, etc., which are used for stock food.

U. S., 1,147,768, July 27. A. VON LASZLOFFY. **Lactic acid, succinic acid and fats from distillery slop** are recovered by acidifying, evapg. *in vacuo* a portion of the H₂O, treating with ether to dissolve fats and organic acids but not glycerol, sepg. the soln. and recovering its constituents in any desired manner. The slop may be given a preliminary fermentation treatment with lactic acid bacteria.

U. S., 1,147,769, July 27. A. VON LASZLOFFY. **Recovering lactic and succinic acids from distillery slop.** The gummy and albuminous constituents are eliminated from the slop by adding alc. and the remaining slop is treated with ether or other solvent which will dissolve the organic acids but not the glycerol, the soln. is sepd., concd. by evapg. the solvent, the pptd. fat is sepd. and the remaining soln. is allowed to crystallize to obtain succinic acid, leaving the lactic acid in soln.

U. S., 1,147,770, July 27. A. VON LASZLOFFY. **Recovering lactic and succinic acids and other by-products from distillery slop** by treatment of the slop with ether or other solvent which will dissolve the fat and lactic and succinic acids but not the glycerol, sepg. the soln., treating the residue with alc. and sepg. the soln. of ether and glycerol thus obtained.

U. S., 1,148,938, Aug. 3. J. TAKAMINE. **Moyaashi.** See Fr., 456,391 (C. A. 8, 2026).

Brit., 23,003, Oct. 11, 1913. C. REITER. **Non-alcoholic or practically non-alcoholic beers** are prepd. by acidulating the wort or mash by means of lactic acid or other acid-forming bacteria, or acids such as lactic, citric, and tartaric, or other chemicals, adding hops or their equivalent, pasteurizing, fermenting to a slight extent, if desired, again pasteurizing, chilling, and finally bottling. The beer may also be further pasteurized after bottling. Acids, etc., having a beneficial effect upon the bacteria may be added to the wort.

Brit., 6,519, Mar. 14, 1914. R. BLUM. Fermentation is influenced by exposing the liquid undergoing fermentation to radiations from a porous body, such as a clay plate, treated with a metal colloid, such as colloidal Au, Ag, or Pt prepared by the methods of Bredig or Svedberg, and a vegetable ext. such as aq. ext. of *Melissa officinalis* or *Phellandrium*. The clay plate may be suspended in a bottle above the fermenting liquid.

Brit., 6,775, Mar. 17, 1914. F. THATCHER and L. M. STILES. Alcohol is prepared from cactus plants, such as sotol (*Dasyliirion wheeleri*), napal (prickly pear), opuntia, cholla, sechugilla (*Agava lechugilla*), *Cereus giganteus*, *Echinocactus breconhotus*, etc. The cactus plants are ground and treated in a digester with superheated steam. The vapors are allowed to escape in order to remove HCOOH, etc. The liquid is filtered and fermented with a pure culture of *Saccharomyces cerevisiae* which has been grown in a mash of rye and malt containing NH_4 phosphate. The solid residue is dried for use as a food for animals.

Brit., 7,456, Apr. 18, 1914. E. W. KUHN. In brewing the malt is repeatedly treated with H_2O at about 10° to ext. the saccharifying enzymes, is then introduced into H_2O at 50° to peptonize the albumin, is boiled to gelatinize the starch, and is finally treated, during agitation, with the first ext. at 80° , to convert the starch into dextrin by the action of amylase only. H_3PO_4 may be added to the malt, and pepsin and amylase during the treatment at 50° and 80° , resp. Cf. C. A. 8, 3343.

Ger., 283,177, Oct. 31, 1913. VERSUCHS- UND LEHRANSTALT FÜR BRAUEREI. Removing the unpleasant taste from yeast by neutralizing it, before drying, by means of alkali (NaOH , Na_2CO_3 , $(\text{NH}_4)_2\text{CO}_3$, etc.), without washing, before or after the treatment. In this manner the cost of manuf. is lessened, and the loss of the product, due to washing, is avoided. Care must be exercised, in neutralizing, not to add the alkali in excess, since this would result in a change in the yeast substance. The drying of the neutralized yeast is effected in the usual manner.

17. PHARMACEUTICAL CHEMISTRY.

M. I. WILBERT.

Albert Plaut. M. C. WHITAKER. *J. Ind. Eng. Chem.* 7, 715-6(1915).—Obituary. ISADOR MILLER.

Micro-reaction of brucine. J. SCOTT. *Chem. and Druggist* 86, 145-6(1914).—Under the microscope brucine appears in semi-cryst. shapes, many of which are opaque; when put in water they sep. with fuzzy edges. On sublimation at about 150° brucine cracks during cooling, forming structures resembling trees and branches. At 185° a filigree is obtained. When CH_2I_2 is added to an alc. soln. groups of roseted needle-tufts of methylbrucine iodide are formed. Strychnine does not interfere. Brucine differs from strychnine in that a soln. of acetate with NH_4OH gives needle crystals (in excess of reagent this fails) and it is pptd. by CO_2 and OH but not by CrO_7 . HNO_3 produces a scarlet color, changing to blood-red, then yellow-red, and yellow; in water with HNO_3 soln. rosets of yellow, transparent, rectangular prisms are formed. When the soln. is dild. abundantly with H_2O , yellow specks of kakotelin separate, insol. in H_2O , sol. in dil. acids and crystallizable from dil. HCl and HNO_3 . To a HNO_3 soln. of HgNO_3 add some of the kakotelin and warm; a carmine color is produced. With Cl brucine gives red colors, which turn yellow when neutralized by NH_4OH . J. GAUB.

A new adulterant of essence of bergamot. E. COEN. *Ann. lab. chim. cent. dello Gabelle* 7, 89(1914); through *Ann. chim. applicata* 3, 372(1915).—The product is a

mixt. of 70% triacetin, 20% essence of bergamot, and 10% essence or terpenes of orange. C. proposes as test a modification of Schimmel's method: 10 cc. of the essence are agitated with 40 cc. of 10% EtOH, the liquid evapd. to a small vol., neutralized and saponified with alc. KOH, the whole evapd. to dryness, the residue extd. with Et₂O-EtOH mixt., and the ext. treated with KHSO₄. In presence of glycerol esters, there are given off in the cold vapors of AcOH, and in the hot vapors of acrolein (detectable by Rimini's reaction). S. LEVY.

Detection of camphor oil in essence of turpentine. E. COEN. *Ann. lab. chim. cent. delle Gabelle* 7, 99(1914); through *Ann. chim. applicata* 3, 372(1915).—The reactions of Utz, Halphen-Grimaldi, and Herzfeld are not always decisive for the detection of light camphor oil in essence of turpentine, and for distinguishing between that oil and pine oil. C. proposes as a test the detection of safrole, a component of camphor oil (it is found in only very small quantities, however, in certain special light camphor oils). He distils 100 cc. of the sample, and to the last 5 cc. of the distillate adds conc. H₂SO₄ drop by drop while cooling, and pours the mixture into 20 cc. H₂O, and exts. with 10 cc. amyl alc. On shaking the alcoholic layer with 5 cc. 20% KOH, the presence of safrole is indicated by a green or bluish color, passing into red on addition of H₂SO₄. S. LEVY.

Studies in synthetic drug analysis. IV. Estimation of phenacetin and salol in admixture. W. O. EMERY, G. C. SPENCER AND C. C. LE FEBVRE. *J. Ind. Eng. Chem.* 7, 681-4(1915); cf. *C. A.* 8, 3218, 3617; 9, 1972.—Two methods are given. The first employs acid hydrolysis; only the phenacetin is detd., the salol being found by difference between the wt. of phenacetin and the wt. of salol + phenacetin found by the usual procedure. The second employs alk. hydrolysis; in it both constituents are detd. directly. In the first, the phenacetin is converted into phenetidine sulfate and AcOH, the salol being partially volatilized during digestion. The phenetidine sulfate is freed from adhering salol by its insolubility in CHCl₃ and then re-converted into phenacetin by Ac₂O and NaHCO₃. In the second case (alk. hydrolysis) the salol is first converted into sodium salicylate and phenolate from which the phenacetin is easily separated and recovered by extn. with CHCl₃. The salol is then treated in rotation with Br soln. (excess), HCl, KI, and Na₂S₂O₃. Titration of the I liberated by the unexpended Br affords sufficient data for the estn. of salol. Explicit directions are given. ISADOR MILLER.

Study of civet. ERWIN SACK. Riedisheim. *Chem. Ztg.* 39, 538(1915).—S. gives a method of isolating a colorless oil which easily solidifies to a crystal mass, m. 32.5°, b₇₆₀ 342°, which he calls "civetone." Analysis gives the formula C₁₇H₃₀O, differentiating it from Walbaum's "muscone," C₁₅H₂₈O. Cf. *C. A.* 5, 762; 6, 2285. J. H. MOORE.

Substances which mask the color reactions of strychnine. EFISIO MAMELLI. Pavia. *Boll. chim. farm.* 53, 366-9(1914).—M. has studied the influence of various compds. employed in therapeutics on the Otto (violet striations of a H₂SO₄ soln. of the alkaloid in contact with crystals of K₂Cr₂O₇) and Mandelin (bluish violet coloration with a H₂SO₄ soln. of NH₄ vanadate which changes to reddish violet and finally to red after standing or addition of H₂O) color reactions. The tests were usually made with a H₂SO₄ soln. of strychnine to which varying amts. of H₂SO₄ solns. of the compds. in question were added. Phenacetine, *p*-phenetidine, *p*-aminophenol, phenocoll, salacetol, pyrocatechuic acid, aminomethylenepyrocatechol, dormiol, guaiacol, eucol, heroin, helmitol, pyramidone, Zn sulfophenate, glycerol and HCl are each capable, when present in considerable amt., of completely inhibiting both the Otto and the Mandelin color reactions; in smaller amts. these substances either diminish the intensity

of the colorations obtained or render them less definite. PhOH, anisole, phenetole, β -naphthol, betol, benzonaphthol and dulcin, even in small amts., prevent the recognition of strychnine by means of the Otto and Mandelin reactions. Acetylacetone and salol, when present in small amts., prevent the recognition of strychnine by the Otto reaction, but only mask the Mandelin reaction when present in somewhat greater amts. (a green coloration is then produced in the latter reaction). If strychnine is present in excessive amt., the above green coloration is replaced by a violet coloration which then yields the usual variations of reddish violet and reddish brown tints. PhNH_2 , AcOH, tartaric acid, stovaine and urotropine do not interfere with the Mandelin reaction, but render the Otto reaction less definite and completely mask the latter when present in excessive amts. *o*-Toluidine and Zn lactate mask the Otto reaction and diminish the intensity of the Mandelin coloration; quinoline and certain terpenes have a similar effect and render the latter coloration fugitive so that the usual variations in color are not presented. Piperonal, lecithin and papain have practically no influence on the Otto reaction and only effect a slight modification of the violet coloration of the Mandelin reaction. Antipyrine, aspirin, menthol, analgene, apolisine and salicylic acid interfere with the Otto reaction when present in preponderant amts. (as compared with the amt. of strychnine); they cause a fugitive bluish green coloration with the Mandelin reagent (salicylic acid causes a stable dirty green coloration). Quinine, euquinine, glucose, mannitol and citric and piperonylic acids either modify or mask the characteristic reactions of strychnine when present in excessive amts. The red striations which the anilides (acetanilide, benzanilide) give with $\text{K}_2\text{Cr}_2\text{O}_7$ crystals may be readily distinguished from the violet striations produced by strychnine. On the whole, phenols and aromatic amines and their derivs. show the greatest tendency to interfere with the characterization of strychnine by means of the Otto and Mandelin reactions, although this cannot be given as a general rule. Of all the substances employed in therapeutics which were investigated only caffeine, theobromine, saccharin, saligenin, sulfonal, trional, tetronal, veronal and antithermin were without effect on both the Otto and the Mandelin reactions. The variation in solubility of the compds. which mask the color reactions of strychnine affords an opportunity of sepg. the latter from a mixt. before applying the characteristic tests. A favorable procedure consists in extg. the mixt. under exam. with CHCl_3 , evapg. the CHCl_3 soln., drying the residue in a desiccator and washing the dry residue several times with anhydrous Et_2O ; in this way most of the substances mixed with the strychnine are eliminated and the latter remains undissolved. The color reaction of strychnine in a mixt. with phenacetin and phenetidine was rendered distinct by preliminary and repeated washing of the mixt. with warm H_2O . Any method of sepn. must be varied, however, to suit the circumstances.

H. S. PAINE.

Bismuth subnitrate. BILHANT. *Boll. chim. farm.* 54, 389-90(1915).—The following mixt. is used for impregnating a gauze which is used as a substitute for the usual iodoform gauze: 60 g. magistery of Bi, 60 g. neutral glycerol, 1000 g. boiled H_2O . The magistery of Bi is first mixed with the glycerol and this mixt. is then dild. with the boiled H_2O with stirring. The H_2O should be added at a temp. of about 40° so as to obtain a finely divided emulsion in which it is sufficient to immerse the gauze several times; the gauze is then wrung, dried, cut into the desired dimensions and finally sterilized by heating. This form of gauze has the advantage of being softer than iodoform gauze and is also inodorous, non-irritant and economical.

H. S. PAINE.

Hematoxylin as indicator in titrating alkaloids. H. P. *Svensk Farm. Tidskrift* 19, 336 (1915).—Defense of the Pharmacopeia in reply to criticism of Frerichs and Mannheim (*Arch. Pharm.* 235, 117). Based on *Pharm. Germ.* and *Pharm. Helv.*, H. P. suggests close adherence to the following procedure in titrating for quantities

of the cinchona alkaloids with HCl using hematoxylin as indicator: Warm 2.5 g. ground bark, 2.5 g. HCl and 20 cc. water in a covered dish on the water bath for 10 min. Then let stand 1 hr. and add 25 g. CHCl_3 and 50 g. Et_2O , shake and add 5 g. 15% NaOH soln.; shake occasionally for 10 min. and add 10 g. powd. tragacanth, shake vigorously and filter. To an aliquot (2 g. sample) add a few grains of sand and 10 cc. alc. and evap. until odor of CHCl_3 can no longer be detected. Now add 10 cc. alc. and warm to dissolve; then add 10 cc. water and a few drops of the indicator (alc. soln. of hematoxylin 1:100) and titrate with 0.1 N HCl to a brownish red; add 50 cc. water and again titrate to just yellow. One cc. of the acid is equiv. to 31 mg. alkaloid. The indicator need not be freshly prepared.

A. R. R.

Two compounds of emetine which may be of service in the treatment of entamebiasis. A. G. DU MEZ. *Philippine J. Sci.* (B) 10, 73-9(1915).—A review of the history, chemistry and pharmacology of ipecac, with the suggestion that emetine mercuric iodide and emetine bismuthous iodide be used in the treatment and also in the prophylaxis of entamebiasis. Emetine mercuric iodide is prepared by pptg. an acidified aq. soln. of emetine hydrochloride with Mayer's reagent, collecting, washing the ppt. with water and drying in the air at a temp. below 50° . Emetine bismuthous iodide is prepared in a similar way by the use of Dragendorff's instead of Mayer's reagent. Theoretically these compds. should be decomposed only slightly in the stomach but should liberate emetine in the intestinal tract. The compds. may be given in doses of 0.03 g. without causing nausea or vomiting.

M. I. W.

Standardized colored fluids (ARNY) 7.

Brit., 8,690, Sept. 5, 1913. BADISCHE. 3,3'-Dinitro-4,4'-dichlorobenzophenone is prepd. by nitrating 4,4'-dichlorobenzophenone with nitrating acid containing 44.5% of HNO_3 , and while maintaining the temp. between 0 and 10° . 3,3'-Dinitro-4,4'-diaminobenzophenone is prepd. by heating the above-mentioned chloro deriv. with alc. NH_3 . 3,3'-Dinitro-4-chloro-4'-aminobenzophenone is obtained, mixed with the 4,4'-diamino deriv., when using aq. instead of alc. NH_3 .

Brit., 21,134, Sept. 18, 1913. CHEM. FABRIK GRIESHEIM-ELEKTRON. Acetylene hydrogen halide addition products are obtained by the combination of C_2H_2 with H halides in the presence of Hg salts; the Hg salt may be in solid or liquid form, or dissolved or suspended in an appropriate medium, such as H_2O , HOAc , acetone, methyl ethyl ketone, etc. The reaction is effected at a suitable temp. and at ordinary or increased pressure; excess of either of the gases may be used. When solid Hg compds. are employed, the mixed gases may be led over the catalyst; when the Hg compds. are employed, dissolved or suspended in liquids, the two gases may be introduced into the catalytic liquid at two different points, so that the gases are not directly in contact. According to examples, mixts. of vinyl bromide and ethylidene bromide are obtained by passing C_2H_2 and HBr gas over coke impregnated with HgBr_2 ; vinyl chloride is obtained by passing C_2H_2 through aq. HCl containing HgCl_2 .

Brit., 8,153, Mar. 31, 1914. CHEMISCHE FABRIK VON HEYDEN AKT.-GES. Organomercuric compounds of aminoarylsulfonic acids, stated to be of therapeutic value, are obtained by heating mercuric salts of aminoarylsulfonic acids, or the acids together with compds. capable of forming mercuric salts thereof, until the products are sol. in alkalis. Products are specified from metanilic acid, aminophenolsulfonic acids, and aminosulfobenzoic acids.

Brit., 8,589, Apr. 4, 1914. H. MARTIN. To obtain lecithin from egg-yolk the

yolk is treated with hot alc. or other substance, which is then removed, as by distn. The prepn. is made into biscuits, sweetmeats, etc., with flour, sugar, cocoa, vanilla, etc.

Ger., 282,491, Mar. 1, 1913. O. GERNGROSS. In mfg. *N*-acyl derivatives of the imidazole series, halides of organic acids are allowed to act on the soln. or suspension of imidazole, its homologs, analogs, or derivs. in a solvent, in such manner that the halogen hydride acid resulting from the reaction is combined with an excess of the imidazole itself or with another base. Pyridine or quinoline or even inorganic bases are specified as suitable for this purpose. The resulting *N*-acyl derivs. are applied therapeutically; they are less poisonous than the non-acylated derivs.

Ger., 282,531, Apr. 26, 1914. CHEM. FABRIKEN V. WEILER-TER-MEER. In extracting reduction products of aromatic nitro compounds from aq. solns., the original nitro compds. are used as extrn. agents. *E. g.*, 1000 parts of a warm satd. aq. *p*-toluidine soln. are shaken, for a long time, twice with 200 parts of molten *p*-nitrotoluene. The extrn. is completed when the aq. soln. still contains about 0.02% *p*-toluidine.

Ger., 282,567, Mar. 31, 1914. CASSELLA & Co. Mfg. tetrachlorotoluene from PhMe, with the use of Fe or anhydrous FeCl₃ as carrier, by conducting Cl over the surface of the liquid, first with cooling to 12–15° and stirring, and then, after conversion into Cl₃C₆H₂Me, increasing the temp. gradually to 35–50° so that the mass just remains liquid.

Ger., 282,568, Nov. 7, 1913. BADISCHE. Mfg. aromatic amines from the corresponding nitro compds. by catalytic reduction with H or gases containing H, in the presence of Cu. Cu obtained by reduction from its salts, by heating in reducing gases such as CO or H below a red heat, is preferred. The reduction proceeds spontaneously in the presence of activators such as alkali compds. or metal oxides (MgO, Al₂O₃).

Ger., 282,611, Mar. 6, 1914. F. HOFFMANN-LA ROCHE & Co. In mfg. arsenic compounds of phosphatides or substances containing phosphatides, these substances are treated in organic solvents with H₃AsO₄, with heating, and the As compds. are sepd. in the usual manner, as in obtaining lecithin and other phosphatides. The products, on account of their solubility in the various solvents and the ease with which they may be emulsified, are used to supply As to the body in a readily assimilable form. They are applicable therapeutically.

Ger., 282,914, June 20, 1913. E. BENARY. Mfg. thiophene derivatives by allowing alkali hydrosulfides to act on haloacylaminocrotonic acid ester and haloacylalkylaminocrotonic acid ester. *E. g.*, Et 3-hydroxy-5-thiitolene-4-carboxylate is obtained from 100 g. Et chloroacetylaminocrotonate, 200 cc. alc., and 200 cc. of about 33% aq. KHS soln.

Ger., 282,991, July 13, 1913. BAYER & Co. In mfg. hydroxy derivatives of aliphatic aromatic ethers, the homologs obtained by substituting the CH₃ groups of ethylene glycol by alkyl, or their derivs., are etherified at one point by phenols, their homologs or their substitution products. The new products are used as intermediate substances in the manuf. of pharmaceutical prepn., and directly for allaying pain.

Ger., 283,061, May 30, 1913. I. POLLAK. In mfg. diastase preparations, the extrn. and concn. are effected in the presence of reducing substances, the action being effected at about 40°. Otherwise, H₂SiO₄ or salts and derivs. of this acid or sulfoxylic acid, etc., may be added to the diastase exts. obtained in the usual manner, without previous evapn.

Ger., 283,163, Mar. 10, 1910. GEN. CHEM. CO. Acetic acid anhydride or other acid anhydrides are obtained from the salts of the particular acids and halogens, by allowing these salts to react with halogens and thiosulfate. In the case of Ac₂O, a yield of 90% of the theory is realized by this method.

Ger., 283,271, Apr. 6, 1913. FARBW. v. M. L. & B. Mfg. 4-aminodiphenyl-3-sulfonic acid and its derivs. substituted in the 4'-position, by first converting benzidine-3-monosulfonic acid, in finely divided form, with 1 equiv. of nitrite and dil. weak acid, into the monodiazio compd., and then substituting H, halogen, OH, or other groups, for the diazo group, in the known manner.

Ger., 283,305, Nov. 17, 1912. CHEM. FABRIK ACTIEN (v. E. SCHERING). Mfg. pyrrolidine derivatives by the interaction of acylated pyroracemic acid ester, BzH, and *m*- or *p*-substituted derivs. of PhNH₂. The products have diuretic action. Cf. C. A. 9, 1829.

Ger., 283,306, Feb. 4, 1914. F. RASCHIG. Mfg. 1,3-dimethyl-5-hydroxybenzene-4-sulfonic acid by treating Me₂(HO)C₆H₃ with concd. H₂SO₄ or other sulfonating agents. The product is exceptionally reactive.

Ger., 283,333, Oct. 21, 1913. BAYER & Co. Mfg. alcohols of the pyrrolidine series by treating pyrroles with alc. groups in a side chain, in acid soln., with H in the presence of a catalytic metal of the Pt group, preferably under pressure. The resulting alcs. are applied in the manuf. of pharmaceutical preps.

Ger., 283,334, Nov. 23, 1913. F. FRITZSCHE & Co. Mfg. *o*-hydroxyquinoline double salts by the interaction of polybasic acids (tartaric, citric, etc.), alkali hydroxide, and *o*-hydroxyquinoline, in such amts. that at least one valence of the polybasic acid is satd. with alkali. These non-poisonous *o*-hydroxyquinoline salts are applicable as pathogenic bactericides in the blood stream.

Ger., 283,414, Feb. 5, 1913. M. LANDAU. Mfg. water-soluble neutral copper succrates by dissolving Cu(OH)₂ in alk. solns. of bioses, neutralizing these solns. with dil. organic acids, and evapg. to dryness. The Cu succrate is sepd., by means of an organic solvent, from the admixed organic alkali salts. This neutral, water-sol. Cu product is applied therapeutically.

Ger., 283,448, Aug. 5, 1913. BAYER & Co. Mfg. cyanomethylbenzimidazole and its derivs. substituted in position 2, by the reduction of *m*-nitro-*p*-acylamino-benzyl cyanides in acid soln., and the treatment of the resulting 1-amino-2-acylamino-5-benzyl cyanide by the usual methods. The new compds. are valuable intermediate products in the manuf. of dyes and pharmaceutical preps.

Ger., 283,449, Mar. 6, 1914. Addition to 282,568 (*supra*). BADISCHE. In mfg. aromatic amines, employing a catalytic mass obtained from Cu salts with the addition of salts or oxides of other heavy metals (Fe, Ag, Zn). The reduction of Cu salts is effected before or after the addition of the heavy metal compds.

Ger., 283,512, Apr. 19, 1913. A. KAUFMANN. Amino alcohols of the quinoline series, applicable therapeutically in the treatment of malaria, are obtained by allowing reducing agents to act on aminoketones of the quinoline series.

Ger., 283,537, Mar. 11, 1913. VEREINIGTE CHININFABRIKEN ZIMMER & Co., G. m. b. H. The amines of the quinia alkaloids result from the reduction of the corresponding nitro products according to the usual methods. They find application in pharmacy.

Ger., 283,538, Sept. 2, 1913. BAYER & Co. Mfg. salicylic acid derivatives by acylating the OH group of salicylic acid, its homologs or nucleus substitution products, with hydroxy-acids, in which the OH group is esterified by an aliphatic or aromatic acid residue. The new products have the advantage over the known simple acyl salicylic acids in being less irritating, more palatable, and more readily sol.

Ger., 283,597, Apr. 8, 1913. E. EBLER. Calcium substitution products of aromatic amines are obtained by allowing CaH₂ to react upon primary or secondary

monoamines of the aromatic series or upon primary arylhydrazines, with the exclusion of H_2O and at an elevated temp. The new Ca compds. are exceptionally reactive compds. sensitive to air and moisture, and serve for the prepn. of new compds.

Ger., 283,616, May 30, 1913. I. POLLAK. Diastase preparations are obtained by neutralization of the resulting lactic acid by means of $CaCO_3$, if the malt is repeatedly extd. in the presence of $CaCO_3$, and the residue desugared at $65-66^\circ$. The clarified wort, after cooling, together with the previously obtained diastase exts., and the addition of small amts. of strong reducing substances, is evapd. *in vacuo* to a sirupy consistence.

Ger., 283,859, Mar. 28, 1913. H. W. KLEVER. In compounding a hair dressing, the soln. of castor oil in alc. used heretofore has the disadvantage of matting hair, particularly the finer hair of women, on account of the high viscosity of the castor oil. Instead of castor oil, or other oils not sol. in alc., the esters of oleic acids or their derivs., as ricinoleic acid, with monohydric aliphatic alcs., are employed. The esters are dissolved in alc. and can be employed in that form as a cosmetic. A small amt. of β -naphthol, resorcinol, salicylic acid, or similar agent, can be added to this soln. The esters of oleic acid, especially the Me, Et, *n*-propyl, *i*-propyl, *n*-butyl, *i*-butyl esters, are freely sol. in 90% alc. *E. g.*, 13 parts Et oleate, $b_{11} 195-210^\circ$, are dissolved in 100 parts 90% alc. The viscosity is much less than that of castor oil, so that the hair does not mat.

Ger., 283,860, Aug. 28, 1913. Addition to 283,859 (*supra*). H. W. KLEVER. In the manuf. of a hair dressing, properties similar to those of the products specified in the principal pat. are exhibited by the esters of monohydric hydroaromatic alcs., as well as the mono- and di-esters of trihydric alcs. of a fatty, hydroaromatic or aromatic character. These esters are generally sufficiently sol. in alc. or liquid. If an ester is cryst., it is mixed with others of the specified esters to obtain a product sol. in alc. and of sufficient fluidity. *E. g.*, cyclohexanyl and menthyl oleates are liquid fats which are sol. in 96% alc. to the extent of 5%. The same is true of the phenyl or cresyl oleates, whose tendency to crystallize is overcome by the addition of some cyclohexanyl or ethyl oleate. Also, suitable products consist of a mixt. of mono- and diglycyl oleate (obtained by heating ethylene glycol and oleic acid), and of a mixt. of mono- and diglyceryl oleates. The terpinol, resorcinol, pyrocatechol, guaiacol, and phloroglucinol esters of oleic acid, and the like, which are crystalline at the ordinary temp., yield with Et oleate fluid fats sufficiently sol. in alc. The unsatd. fatty acids can be substituted, in the esters, by the satd. fatty acids, especially by those in which the C chain contains less than 18 C atoms.

Ger., 284,003, July 11, 1913. F. L. HAHN. Mfg. oxygen baths by decomp. persulfates in the presence of other per-salts, such as perborate or percarbonate, or of H_2O_2 , if necessary in the absence of carbonates, by means of catalyzers. The reaction temp. can be depressed by very small amts. of catalyzers to the temp. of a warm bath, about 40° . The known organic catalyzers can be employed, also the metals of the Pt group, as well as all metals which can exist in several stages of oxidation, such as Fe, Mn, Cu, Ce, etc. They can be applied dissolved, colloidal, or in fine suspension, sep. and in mixts. The action of some of these catalyzers is greatly increased by the addition of small amts. of NH_4 salts. Suitable therapeutic or cosmetic additions may be made to the baths. Since by the decomp. of the persulfate, acid is liberated, mixed $O-CO_2$ baths can be made by the addition of carbonates, or directly by employing percarbonates.

Ger., 284,148, Feb. 5, 1915. F. HOFFMANN-LA ROCHE & Co. Isolating the active constituents of the pituitary body in a H_2O -sol. form suitable for injection.

Exhaustive clinical expts. have shown that all of the active substances of the pituitary ext. are readily sol. in abs. alc. In the treatment with abs. alc., admixts. of inactive albuminous substances (albumoses and amino acids) remain undissolved, together with inorganic constituents. From the abs. alc. soln., the chlorides of the active pituitary substances sep. in cryst. form upon the addition of pure anhydrous ether. By repeated pptn. with abs. ether, completely purified compds. can be secured. The sulfates can be prepd. from the hydrochlorides by substituting alc. H_2SO_4 for the alc. HCl . The resulting product is nitrogenous, and dissolves readily in H_2O and alc. With mineral acids, cryst. hygroscopic salts are obtained. The N-content is 10.80%. *E. g.*, 1 kg. of an aq., albumin-free pituitary ext., is evapd. *in vacuo* to dryness. To the soln., obtained by extg. this residue for about 15 mins. with 50–100 cc. abs. alc. at the ordinary temp., are added 200–400 cc. abs. ether, whereupon the active substances ppt. By repeated soln. in abs. alc. and pptn. with abs. ether, the product is rendered perfectly pure and colorless.

18. ACIDS, ALKALIES, SALTS AND SUNDRIES.

T. LYNTON BRIGGS.

Composition of the salines of the United States. IV. A correction. J. W. TURRENTINE. *Bur. Soils. J. Ind. Eng. Chem.* 7, 687–9(1915).—Table of corrections to the analyses of C. A. 7, 870. ISADOR MILLER.

The potash situation. E. HART. *J. Ind. Eng. Chem.* 7, 670–1(1915).—A brief account of the various suggestions which have been made for the relief of the potash situation with emphasis on Hart's process, about to be introduced technically. In this a mixt. of feldspar refuse and BaSO_4 is heated in a reducing flame producing a Ba Al silicate (36% SiO_2). This is run into H_2O while molten and the granulated material ground and floated. The paste is treated with H_2SO_4 , yielding a soln. of alum and $\text{Al}_2(\text{SO}_4)_3$ and a solid residue of $\text{BaSO}_4 + \text{SiO}_2$. The latter can be used as a substitute for China clay. The soln. yields K alum on evapn. and from this K_2SO_4 can be prepared. ISADOR MILLER.

The potash situation. SAMUEL H. DOLBEAR. *Met. Chem. Eng.* 13, 481–2(1915).—Because of the embargo placed on German exportations the situation is becoming acute. In the Searles Lake region, Cal., which consists of 40,000 acres of placer claims, the problem consists in sepg. KCl from solns. of NaCl , Na_2SO_4 , $\text{Na}_2\text{B}_4\text{O}_7$ and other salts. Litigation and difficulty in perfecting processes delay supplies from this source. A plant has been erected at Agnew, Cal., to ext. potash from "vinasse" or distillery refuse. At Point Loma, Cal., a plant has been erected to treat kelp, which contains, dry, 15% K_2O . In Alsace, deposits 6–30 ft. thick covering 7 sq. m. estd. at 1,500,000,000 tons of salts have been discovered. The future possession of the province will det. whether the product will compete with that of the German trust. Barcelona and Lerida, provinces in Spain, contain undeveloped deposits. H. L. OLIN.

Potash deposits in Spain. C. B. HURST. *Commerce Reports* No. 188, 739(1915); cf. C. A. 9, 2431.—A discussion of the attitude of the Spanish government with reference to the working of these deposits. E. J. C.

Substitutes for materials seized (in Germany) in the interest of defence. GARLEPP, STABY, NALLINGER, OVERATH, PICHLER AND WAHL. *Z. Ver. deut. Ing.* 59, 457–63, 478–85(1915).—The subject matter is the proceedings of the Mannheim section of the Verein deut. Ingenieure. The topics of the discussions were the necessity of substitutes for bearing metals; better service from and substitutes for lubricating oils; substitutes for benzine for power purposes, petroleum for illuminating purposes,

rubber and copper conductors; and the desirability of increasing the use of coke in order to obtain the by-products. Each subject is treated in detail by one of the above authors and followed by a discussion. The article cannot be briefly abstracted.

H. R. GUNDLACH.

The thermal insulation of high-temperature equipment. P. A. BOGCK. *Bull. Am. Inst. Mining Eng.* 1915, 1539-50.—A discussion of the general principles of heat insulation with special reference to the properties of celite, a kieselguhr product. Celite, m. p. 1610°, when ground and molded weighs 8 lb. per cu. ft., equals cork in insulating quality, is 12 times that of fire brick, while it costs little more than the latter.

H. L. OLIN.

Research and chemical industry. M. O. FORSTER. *J. Soc. Chem. Ind.* 34, 759-63(1915); *Chem. Trade J.* 57, 50-2(1915).—An address before the Soc. of Chem. Ind. In conclusion F. outlines a "suggested scope of a chem. intelligence department to be instituted by H. M. Government as a branch of the Board of Trade." E. J. C.

Research in technology. CHARLES C. CARPENTER. *J. Soc. Chem. Ind.* 34, 763-5(1915); *Chem. Trade J.* 57, 54-5(1915).—An address before the Soc. of Chem. Ind. E. J. C.

Chemical engineering. G. T. BEILBY. *J. Soc. Chem. Ind.* 34, 769-74(1915); *Chem. Trade J.* 57, 55-6(1915).—An address before the Soc. of Chem. Ind.

E. J. C.

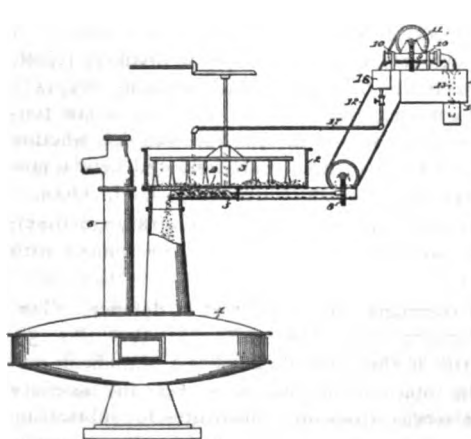
The development and control of industry by public influences. H. E. ARMSTRONG. *J. Soc. Chem. Ind.* 34, 765-9(1915); *Chem. Trade J.* 57, 52-4(1915); *Chem. News* 112, 75-9(1915).—An address before the Soc. of Chem. Ind. E. J. C.

(British) government scheme for organizing and developing research. *J. Soc. Chem. Ind.* 34, 783(1915).—An outline of the scheme and its scope. E. J. C.

Co-partnership in chemical industries. WILLIAM H. LEVER. *J. Soc. Chem. Ind.* 34, 754-9(1915); *Chem. Trade J.* 57, 49-50(1915); *Chem. News* 112, 55-8(1915).—An address before the Soc. of Chem. Ind. E. J. C.

The chemist and chemical industry in England. TH. DIEHL. *Z. angew. Chem.* 28, I, 309-13(1915). E. J. C.

Destructive distillation of Pacific coast kelps (HOAGLAND) 22.



U. S., 1,145,897-8, July 13. H. HOWARD. Apparatus and method for making hydrochloric acid. NaCl is supplied from the receptacle 2 and H₂SO₄ from the receptacle 16 to the chamber 5 where the two are mixed in proper reacting proportions. The gas evolved is led off through the pipe 6 to an absorption system and the partially decomposed mixt. is continuously fed to the furnace 1 where the reaction is completed.

U. S., 1,147,832, July 27. F. VON KÜGELGEN and G. O. SEWARD. Aluminium chloride is made by mixing bauxite or clay with sufficient C to reduce compds. of Fe or Al, heating to

300-450° with Cl until the Fe is eliminated, and then treating with Cl at 900° in an other app. until the alumina is converted into AlCl_3 . Any Ti chloride formed is sepd. by volatilization.

U. S., 1,147,942, July 27. J. S. HEALY. Printers' blankets are formed of composite layers of felt, muslin or other fabrics impregnated with a mixt. formed of glue 4, glycerol 5, gum arabic 0.5, china clay 0.5, and CH_2O 0.015 part.

U. S., 1,147,969, July 27. G. PALMER. Printers' blankets are formed of layers of felt and rubber or canvas with an intervening layer formed of glue, glycerol, plaster of Paris and chicle, in the proportions of 8:2:2:2.

U. S., 1,147,991, July 27. L. VON JARACZEWSKI. Bone-black filtering material. See Ger., 268,881 (*C. A.* 8, 1861).

U. S., 1,148,092, July 27. H. T. KALMUS, W. L. SAVELL and K. B. BLAKE. Alumina is made by treating a mixt. of nephelite syenite with SO_3 and H_2O to form an unstable sol. compd. of alumina with SO_3 carrying some silica into soln., heating the soln. thus formed to 55° to drive off some of the SO_3 and ppt. the silica, sepg. the soln. and further heating it to 80° and agitating it to decompose the alumina- SO_3 compd. and ppt. alumina. Cf. *C. A.* 8, 1647.

U. S., 1,148,156, July 27. E. E. DOUGHERTY. Obtaining alkali and alumina from leucite. Sufficient H_2SO_4 is added to the leucite to combine with the bases and the mixt. is then heated with the further addition of about 2% its wt. of HCl until it becomes pasty and the greater part of the H_2O present has been driven off. Then the temp. is raised to 500° and the heating continued to drive off the HCl and remaining H_2O (the HCl being passed into a fresh charge which has been mixed with H_2SO_4); the H_2O -sol. sulfates are recovered from the residue by lixiviation.

U. S., 1,148,570, Aug. 3. C. BOSCH, A. MITTASCH, H. WOLF and G. STERN. A catalyst for the synthesis of ammonia from its elements consists of Fe 98% and Al_2O_3 2% and is capable of retaining its catalytic power for several weeks if not contaminated with contact poisons. It is made by melting Fe with Al_2O_3 in a current of O and then reducing in H at as low a temp. as possible. MgO, ZrO_2 , clay or Mo oxide combined with Fe also form efficient catalysts.

U. S., 1,148,850, Aug. 3. S. E. MELEMAN. Obtaining potash from siliceous minerals. Comminuted feldspar is mixed with C and NaCl, the mixt. is heated in a bath of concd. H_2SO_4 to 200° to partially decompose it and then roasted in air at 1000-1150° and the sol. K salts formed are recovered by lixiviation.

Brit., 12,142, May 24, 1913. W. PLINATUS. A plastic composition, resembling horn, ivory, or ebonite, is made by mixing albumins, such as serum or egg albumin or casein or conversion products thereof, with an ester of a polyvalent alc. of the fatty-acid series or derivs., such as the acetins or other esters of glycerol or polyglycerol. The esters of tartaric, lactic, glycollic, hydroxybutyric, formic, or acetic acid may be used, or those obtained by esterifying lactones, or anhydrides of the α -hydroxy acids. Other substances, such as fats and oils, or sulfuretted oils, resins, pitches, paraffins, camphor, cellulose derivs., or caoutchouc, may be added in a dissolved state or otherwise. The mixt. or finished product may be treated with hardening substances, such as aldehyde, tanning substances, or Cr compds., and coagulable albumins may be coagulated by chem. or steam treatment. Filling and coloring substances, such as metals, salts, asbestos, pumice, infusorial earth, and SiO_2 , may also be added. Cf. *C. A.* 8, 3378.

Brit., 15,090, June 30, 1913. P. DE BRÜNN. In the manuf. of zeolites by the wet method, very dil. solns. of the reagents (Na aluminate and Na silicate) are employed. An example mentions 6 lbs. Na_2SO_4 , 12 gals. H_2O , 844 cc. of a soln. of alumina contain-

ing 45.6 g. of Al_2O_3 and 315 g. of water-glass soln. at 45° Bé. containing 75 g. of SiO_2 . The ppt. is allowed to settle, the mother liquid is poured off, and the ppt. is washed and then pumped in a filter-press; or it may be washed in the filter. The cake is dried, broken up, and hydrated in hot H_2O . The mother liquor may be treated with an acid such as H_2SO_4 and made into a 5% soln. for use again; or more soda may be added so that it will form Na aluminate of the right concn. for use again when an Al salt is added. Cf. C. A. 8, 2915.

Brit., 17,731, Aug. 1, 1913. H. PLAUSON. Pure finely divided carbon is obtained from coal or wood charcoal by grinding it to a very fine powder, purifying by treatment first with H_2SO_4 or a mixt. thereof with HCl , washing with H_2O , treating with HNO_3 , again washing, treating with HF , and again washing, traces of acid, if desired, being finally removed by means of alkali; the product is then brought into colloidal soln., preferably in H_2O , by known methods, *e. g.*, by means of tannin, by trituration at high speed or under great pressure, as described in 17,729, 1913 or by the elec. current; natural colloids such as gelatin, casein, India rubber, albumins, etc., may be added to accelerate the process. The colloidal soln. is allowed to settle and is poured off, the residue being again treated as before; the C is then pptd. from the soln., by addition of acid or other electrolyte, and dried. It may be treated further in an atm. of H or N or *in vacuo* to carbonize any hydrocarbon present. The product is suitable for coloring purposes.

Brit., 17,732, Aug. 1, 1913. H. PLAUSON. Colloidal graphite is obtained from coke by bringing finely powdered coke into colloidal soln. in H_2O or other nonelectrolytic liquid, such as oil, kerosene, ligroin, etc., in known manner, or as described in 17,729, 1913, and 17,731, 1913 (*supra*). The graphite can be sepd. from the liquid by known means. The coke powder may be subjected to a preliminary purification with acids, followed by neutralization with alkalies and washing. The plasticity of the product may be improved by adding powdered clay or the like to the coke, so as to obtain a colloidal mixt. of graphite and clay, etc. Small amts. of natural colloids, aldehydes, tannin, W, or chromic acid, etc., may also be added to facilitate the process.

Brit., 19,924, Sept. 3, 1913. M. TÖFFER and P. MÜLLER. In a process of evaporating liquids, etc., the liquids, damp substances, etc., are sprayed in a finely divided condition into a chamber or passage, so as to form a flat layer of mist which is projected between two layers of drying-medium occupying almost the width of the chamber and moving closely above and below and parallel or slightly convergent on the layer and in the same direction; the process may be carried out at about 40° .

Brit., 23,541, Oct. 17, 1913. BADISCHE. Catalytic agents for use in the manuf. of sulfuric anhydride are prepd. by bringing vanadic acid, or a compd. thereof, on to a very finely divided, indifferent carrier, *e. g.*, finely ground pumice, the granules of which have a diam. of not more than 20 microns. The vanadic acid is pptd. on to the carrier from a suitable soln., optionally in the presence of other catalytic bodies; or the ingredients are merely mixed together, with or without binding agents, and, if desired, the mixt. can be formed into any suitable shape. It is advantageous to heat the catalytic agents for some time in gases containing SO_2 . Should the catalytic agent be hygroscopic, for instance, after heating in SO_2 , this property is removed by heating in the presence of air and in the absence of SO_2 . Alkali, either as such or as a salt, may be added to the catalytic agent to impart thereto stability against increase of temp. In examples, pumice powder with grains of the diam. of about 1 micron is mixed with NH_4 vanadate, and the mixt. heated first in air to drive off NH_3 and then in gases containing SO_2 ; kieselguhr or pptd. silicic acid is mixed with a soln. of K vanadate or NH_4 vanadate and KOH , or alkali carbonate, sulfate, or nitrate, and the mixt. granulated and afterwards heated in burner gases and, if desired, in air.

Brit., 7,866, Mar. 28, 1914. A. CLASSEN. Royal Technical University. Nitrogen pentoxide is prepd. synthetically by subjecting air in the presence of finely divided, conducting contact substances consisting of metal in a colloidal form to the simultaneous action of dark and sparking elec. discharges at a temp. substantially between 50 and 90°. The pentoxide is afterwards absorbed in H_2O or alkali lye. The colloidal contact substances are advantageously prepd. with the aid of gelatose, obtained by protracted boiling of a soln. of gelatin or bone or fish glue, although glue, albumin, and salt-like compds. of albumin may be used in the place of gelatose. This method is particularly suitable for the metals of the Pt group, the rare earth metals, Au, Ag, W, Mo, U, Ti, and Nb. The gelatose acts as a protective colloid for the soln. of the colloidal metal, and may be added before or after the production of such soln. In the case of Au, the gelatose acts as a reducing agent in a boiling soln. of a salt; while in the case of $PtCl_4$ soln., the reduction is effected in the presence of gelatose by, e. g., $N_2H_4 \cdot H_2O$. The colloidal soln. is concd. and treated with indifferent carriers, such as asbestos, saw-dust, or kieselguhr, which take up the colloidal metal. The mass is then dried, and may be afterwards calcined to convert Cr, Mo, W, Si, ferrochromium, ferrosilicon, or chrom-nickel into finely divided state, and after corrosion with acids or bases, it is treated in a ball mill with concd. gelatose soln. The liquid so obtained is used to treat indifferent carriers, such as asbestos. The oxides of U, Ni, W, etc., may be used as contact carriers, and they at the same time exercise contact effects.

Brit., 7,920, Mar. 28, 1914. W. FELDENHEIMER. A cleaning composition consists of olive-oil or other soap and killas, an argillaceous schist found in Cornwall, with or without essential oils. The killas may be obtained sufficiently fine by the process described in 4,155, 1907.

Brit., 8,015, Mar. 30, 1914. SIEMENS & CO. Rare earth salts, such as the fluorides, phosphates, tungstates, borofluorides, silicofluorides, titanofluorides, and other salts are obtained by treating a soln. of rare earth salts, for instance residues from Th manuf., opened-up monazite sands, cerite solns., and the like, with insol. or sparingly sol. precipitants, particularly Ca, Ba, Sr, Mg, and Al salts. Precipitants mentioned are fluorides and phosphates of alk. earths (particularly natural apatite and fluorspar), Ca tungstate, and K borofluoride, silicofluoride and titanofluoride. The ppts. may be rendered more dense by heating, particularly when intended as illuminating additions to arc-lamp electrodes.

Brit., 8,030, Mar. 30, 1914. BADISCHE. Removing carbon monoxide from gases by treating the gas, in Fe or steel app., with ammoniacal Cu_2Cl_2 solns. containing at least 60 g. of NH_3 per l., either as free NH_3 or as $(NH_4)_2CO_3$. The absorption is preferably effected under pressure; pressures above 100 atms. effect rapid absorption. The soln. can subsequently be freed from CO by evacuation, and re-used; the process may be made continuous by using 2 vessels which are employed alternately for absorption and evacuation; or the soln. may be circulated continuously, first through an absorption vessel, and then through an evacuation vessel. According to an example, a soln. containing Cu_2Cl_2 , NH_4Cl , and NH_3 is employed. The process is particularly applicable to the purification of H from small quantities of CO. Cf. C. A. 9, 2299.

Brit., 8,279, Apr. 1, 1914. H. E. WILKINSON and H. STEWARD. A lubricant for gear-boxes, etc., is obtained by adding 20.25% of flour to hot oil or grease and allowing the mixt. to cool slowly in a closed pan.

Brit., 8,462, Apr. 3, 1914. BADISCHE. Catalysts are prepared by treating with a compd. of a catalytic metal, a complex insol. compd. containing 1 or more easily replaceable bases, and of the type of the artificial zeolite, Na Al silicate. The catalyst

may be heated or subjected to reduction before use. In examples, Na Al silicate is treated with an acidified soln. of PdCl_4 or with $\text{Ni}(\text{NO}_3)_2$ soln., and the product reduced, giving a catalyst suitable for the hydrogenation or dehydrogenation of organic compds. or oils. Other catalysts may be prepared by treating the Na Al silicate with solns. of salts of Cu, Zn, or V, or with solns. of salts of several metals either simultaneously or successively. The catalyst obtained by treating Na Al silicate with HCl soln. of V chloride is suitable for use in the manuf. of SO_2 .

Ger., 275,343, June 13, 1914. F. HLAVATÍ. Mfg. compounds of nitrogen with hydrogen or oxygen, with the aid of contact substances. A mixt. of Ti with 1 or more metals of the Pt group is used as the carrier.

Ger., 277,054, July 20, 1914. F. HLAVATÍ. Addition to 275,343 (*supra*). Mfg. ammonia. See U. S., 1,079,705 (C. A. 8, 405).

Ger., 283,212, Mar. 1, 1914. F. RASCHIG. In the manuf. of nitric acid from KNO_3 and H_2SO_4 in chambers under reduced pressure, employing a heated vacuum pan, to which the mixt. of H_2SO_4 and KNO_3 is fed through a barometer tube, continuously, while the bisulfate flows out continuously through another barometer tube, the evolved HNO_3 , after condensation, flowing out through a third barometer tube in a uniform stream. A suitable app. is specified.

Ger., 283,444, Apr. 26, 1913. SUDENBURGER MASCHINENFABRIK UND EISENGIESSEREI, AKT.-GES. Process and app. for evaporating strongly foaming liquids, such as albuminous or oleaginous materials. The steam, laden with foam and liquid drops, is conducted through a jet separator with such speed that the bubbles constituting the foam are broken up and held by the walls of the jets, the steam issuing with but a few drops. The steam is then conducted, under much less pressure, to a disk separator, where the remaining liquid is sepd.

Ger., 283,447, Apr. 7, 1911. F. HLAVATÍ. Addition to 275,343 (*supra*). In mfg. ammonia from its elements, employing contact substances, such as Ti and Pt, in the proportions of their at. wts., *e. g.*, 48.1 parts Ti to 195.2 parts Pt, in admixt. The resulting amts. of NH_3 are uniformly greater than when these contact metals are used in other proportions. At high temps. the difference is not so great as at moderate temps. Practically twice the yield of NH_3 is secured with the use of the metals in equiv. proportions, as when they are used in equal parts. Cf. C. A. 8, 23.

Ger., 283,461, Dec. 2, 1913. A. GASSER. Mfg. a plastic mass from peat and wood by crushing peat and wood together in a wood-crushing machine. The product is used for packing and transporting fruits, meats, fish, storing fruit for the winter, also as an insulating layer and for holding moisture under flower pots, and the like.

Ger., 283,472, Jan. 21, 1913. F. W. BAKEMA. Machine for crushing and transporting superphosphate and like substances, with the employment of a rotary cutting drum similar in construction to a grass cutting machine.

Ger., 283,535, Apr. 12, 1914. Addition to 281,084 (C. A. 9, 1833). E. HERMAN. In the manuf. of nitrogen oxides by the combustion of air and C compds., according to the principal pat., the combustion gases are conducted through the combustion furnace in a current directed downwardly from above, and the gaseous products of combustion are drawn off through a cooling chamber below the reaction chamber, while the H_2O of condensation is drawn off from the lowest point of the cooling chamber. The CH_4 is first mixed with air of normal comp., and the enriching with O is effected in the reaction chamber. CH_4 and a part of the air are conducted in a number of currents, obliquely downwards, into the center of the reaction chamber, while the principal portion of the air is conducted through the reaction chamber centrally. Suitable constructional details are specified.

Ger., 283,395, Feb. 1, 1914. UNION-WERKE, AKT.-GHS., FABRIKEN FÜR BRAUEREI-EINRICHTUNGEN. App. for washing filter masses and the like. Cf. C. A. 8, 1892.

Ger., 283,790, Oct. 31, 1913. O. BRÜNLER. In a process and app. for the continuous evaporation of sulfuric acid, the acid is evapd. in Pb-covered or earthenware containers by means of an immersed flame, to about 62° Bé., whereupon it is conducted into an Fe container, in which the final concn. is effected by means of an immersed flame. As shown in the constructional details, the immersed flames act in auxiliary vessels, and the partially concd. acid is conducted from the bottom of the earthenware or leaden vessel where a test outlet is provided. The purpose of the preliminary concn. is to conc. the acid to such an extent that it will not attack the Fe vessel used in the final concn. where the higher temp. necessitates the use of this metal.

Ger., 283,824, Apr. 15, 1914. BADISCHE. Mfg. nitrogen oxides by the catalytic oxidation of NH_3 with air or O, with the employment of metals of the Fe group or their oxides as catalyzers. The addition of Bi or its compds. materially increases the catalytic activity of the specified agents. Binding agents may be added also, but metalloids compds. are to be avoided. The contact masses are best employed in the form of a layer of sep. pieces. E. g., a mixt. of 45 parts pure Fe or Mn nitrate and 1-2 parts of Bi nitrate is dissolved with the addition of pure HNO_3 . The pptn. is effected with NH_3 ; the ppt. is dried to some extent, formed into dice-shaped pieces, carefully heated, and then charged into a tube through which NH_3 and air are led. At about 700°, a yield of over 90% of N oxide is obtained. Such a contact mass can be made also by the oxidizing melting of a mixt. of pure Fe powder with 3% Bi_2O_3 , and subsequent grinding. Metallic Fe itself may be activated with Bi or its compds., and then introduced into the contact furnace. Cf. C. A. 9, 1673.

Ger., 283,894, July 16, 1914. HENKEL & CIE. Mfg. perborates by subjecting to autooxidation, amalgamated Al or Zn in aq. soln. of H_3BO_3 or alkali borates, in the presence of alk. earth hydroxide, especially $\text{Ca}(\text{OH})_2$, with continued introduction of O or gases containing O under increased pressure. A temp. of 0° is preferred. E. g., 0.5 part thin Al cuttings and 10 parts Hg are treated with 10 parts satd. borax soln. and 1 part $\text{Ca}(\text{OH})_2$. The reaction mixt. is maintained, in a pressure vessel, under a pressure of O of about 5 atms., and well stirred, with cooling, for 3 hrs. An Al Ca perborate with a content of active O of about 3.5% is pptd. in almost theoretical yield. The mother liquors are almost free of active O.

Ger., 283,956, July 13, 1913. P. FENAROLI. Mfg. nitrosyl chloride and its solns. or mixts. with Cl by allowing NO to act on gaseous Cl, evolved from liquid Cl, under increased pressure. NO and Cl can be simultaneously or alternately forced into a container. In the gaseous layer in the upper part of the container NOCl is formed; this dissolves immediately in the liquid Cl, with reduction of pressure. In consequence of the reduced pressure, a fresh amt. of Cl is volatilized; this combines with more NO until all Cl is converted, by further introduction of NO, into NOCl. The reaction can be interrupted earlier with a view to obtaining compds. which contain NO and Cl in other mol. proportions than 1:1. The solns. of the NOCl in Cl can be used, among other purposes, for bleaching flour. Quant. yields are obtained.

Ger., 283,981, Nov. 25, 1911. CHEM. WERKE KIRCHHOFF & NEIRATH, G. M. B. H. Mfg. stable mixtures of sodium perborate with tartaric or citric acid, by mixing a concd., strongly cooled, aq. soln. of the acid or of an acid salt thereof, with crystd. or more or less dehydrated NaBO_3 , and evapg. the resulting sirupy mixt. *in vacuo* at a low temp. There is no resulting decompn. of the perborate. The mass obtained

in vacuo is scarcely hygroscopic, but stable and solid. E. g., 150 g. pure tartaric acid are treated with 50 cc. H_2O , poured over it, and the whole is then cooled with a refrigerating machine. Then, with constant stirring, 320 g. crystd. $NaBO_3$ are introduced, in small amts., and the mass is stirred further until an almost clear, viscous mass results. A small amt. of O is evolved during this process. The mass is then filtered under pressure, and then either directly converted into the sirupy stage, or first evapd. *in vacuo* to such an extent that upon cooling it solidifies.

Ger., 284,043, Aug. 23, 1912. M. ULLMANN. Mfg. soluble fluoride by treating Na_2SiF_6 with alkalis. The Na_2SiF_6 is slowly charged into a heated alkali soln. in such amt. that the resulting alkali fluoride remains in soln. after the reaction is completed. A concd. soda soln. of known content of Na_2CO_3 is heated to about 100° , and into this soln. an amt. of Na_2SiF_6 corresponding to the reaction formula is introduced in small amts. in order to prevent foaming. The thin slurry is heated with stirring until practically all the CO_2 has escaped. The mass is then dild., heated, the ppt. allowed to settle, and the almost clear liquid decanted or filtered. If, on the whole, so much H_2O is employed as corresponds to the solubility of the entire amt. of NaF obtained, the clarified soln. contains the NaF in almost quant. yield. If less H_2O has been taken, then to the silicic acid residue can be added sufficient H_2O , with mixing and heating, to ext. the residual NaF. In this manner the enclosure by gelatinous silicic acid of undecompd. Na_2SiF_6 or of NaF formed, and its removal from the reaction mixt., are prevented. Also, the silicic acid is obtained in a form in which it can be readily sepd. from the liquid. In this manner a NaF soln. of about 5% is obtained, from which the fluoride can be recovered by evapn. Instead of dilg. after the conclusion of the reaction, the mass can be heated further until the mixt. is converted into a dry powder in which SiO_2 and NaF are mechanically mixed. The NaF can be dissolved simply by placing the mixt. in H_2O . The dry mixt. can be more readily transported, and in many cases can be employed instead of pure NaF.

19. GLASS AND CERAMICS.

G. E. BARTON, A. V. BLEININGER.

The microscopic character of China clay. GEO. HICKLING. *J. Soc. Dyers, Colorists* 31, 70-4 (1915).—The extreme minuteness of particles of China clay has long delayed its microscopic study. Only 3 minerals, kaolinite, muscovite and quartz are present in appreciable quantities in China clay and after examining 5 typical analyses, and studying the sp. gr. of particles by introduction into a diffusion column of $CHBr_3$ and $CHCl_3$, H. states that the whole process of the conversion of feldspar into kaolinite may be described as consisting in the gradual extn. of the alkali and loosely combined silica, muscovite being an intermediate stage in the process. There are also indications of other intermediate stages and China clay may be described as consisting principally of the intermediate decompn. products from muscovite to kaolinite. The article contains photomicrographs and descriptions of samples of coarse and best China clay and of individual rouleaus of kaolinite.

L. A. OLNEY.

Terra cotta—its use for civic and commercial buildings. *Brit. Clayworker* 24; *The Brickbuilder* 1915, 18-19.—The advantages are (1) durability, (2) low cost, (3) permanency and (4) variety of color.

C. H. KERR.

The making of hollow blocks. ANON. *Brit. Clayworker* 24, 66 (1915).

C. H. KERR.

Deterioration of fireclay goods in coke ovens and gas retorts (HOLGATE) 21. Substitute for China clay (the potash situation) (HART) 18.

Brit., 24,304, Oct. 27, 1913. T. MOSES. A ceramic mass is produced by burning a mixt. of powdered pottery waste and glass, the proportion of glass being less than 25% of the whole. In an example, 100 parts of porcelain fragments, 35 of earthen ware, and 20 of glass are finely ground, mixed, molded, and burned at 940-1350°. The articles are polished on Fe, stone, and wood plates, or they may be glazed as usual.

Brit., 8,495, Apr. 3, 1914. J. G. A. RHODIN. Removing coloring materials, such as Fe, Mn, or Cu compds., from sand by roasting with a fixed alkali chloride at a temp. of 1100-1200°. Much of the Fe, etc., present volatilizes, and any remaining sol. matter is removed by washing.

Ger., 282,000, Jan. 25, 1914. CREFELDER MODELLFABRIK M. CLAESGENS. App. for mfg. thin plates of refractory material.

Ger., 282,601, Sept. 10, 1913. Addition to 281,207 (C. A. 9, 2301). W. HAPPE. Mfg. a basic lining in revolvable tube furnaces, according to the principal patent. Cf. C. A. 9, 2443.

Ger., 282,700, Apr. 12, 1914. C. JANSEN and P. HEINEMANN. Bell valve for kilns used in the ceramic industry.

Ger., 282,772, July 26, 1912. E. MÜLLENBACH. Brick press.

Ger., 282,773, Dec. 7, 1913. MEISSNER OFEN- UND PORZELLAN-FABRIK (v. C. TRICHERT). Mfg. tiles.

Ger., 282,774, Nov. 16, 1913. UTZSCHNEIDER & E. JAUNEZ. Mfg. colored ceramic plates, the base material being provided with depressions for the accommodation, later, of colored masses.

Ger., 282,807, Dec. 7, 1913. H. WAGNER. Hollow form for mfg. glass melting pots.

Ger., 282,845, Oct. 8, 1911. G. POLYBIUS, EISENGIESSEREI UND MASCHINEN-FABRIK. Constructional details of a revolvable tube furnace for ceramic purposes.

Ger., 283,017, Dec. 28, 1912. AKT.-GES. NORDDEUTSCHE STEINGUTFABRIK. App. for use in mfg. ceramic products.

Ger., 283,018, Mar. 27, 1914. T. GROTE, AKT.-GES. Feeding device for brick machines.

Ger., 283,036, Dec. 19, 1913. VERTRIEBSGESELLSCHAFT FÜR AUTOMATISCHE FLASCHEN-TRANSPORTVORRICHTUNGEN PATENTE MÜHLIG-BRAUER, GES. M. B. H. Automatic machine for receiving the bottles from glass-blowing machines.

Ger., 283,122, Oct. 19, 1913. M. BOHN. Construction and operation of an app. for cleaning clay.

Ger., 283,474, Oct. 6, 1912. J. K. JENSEN. Machine for cutting clay tubes.

Ger., 283,504, June 23, 1911. Addition to 274,860 (C. A. 8, 3107). VEREINIGTE CHEM. FABRIKEN LANDAU, KREIDL, HELLER & Co. Mfg. white enamels with the aid of Zr compd.

Ger., 283,547, Mar. 21, 1913. H. SEVERIN. Intermittently operating automatic glass-blowing machine.

Ger., 283,700, Aug. 14, 1913. A. SEITER. Producing mono- or polychrome designs in relief or otherwise on enameled surfaces.

Ger., 283,791, Oct. 17, 1913. E. R. EICHLER. Mfg. blue luster colors for glass, porcelain, and the like, without Au, but containing Co, by mixing solns. of organic Co, Zn and Si compds., and burning-in as customary in luster coloring. To obtain

dark blue lusters, solns. of organic Na compds. and organic boric acid compds. are added to the specified mixt. The resulting colors remain pure blue even at the highest temps., and resist wear. The organic Co, Zn, and Si compds. are dissolved in ethereal oils and then mixed with each other, and in like manner the organic Na and boric acid compds. Solns. of organic Co compds. can be obtained by incorporating Co(OAc) , in white American resin (colophonium) or in other resins at the m. p., obtaining thereby a Co resinate which is dissolved in ethereal oils. Co(OAc) is dissolved in alc. and this soln. is placed in hot resin-alc. soln. on the water bath, then the alc. is driven off by boiling and the residue is heated over a small free gas flame until a friable dry metal resin results which is dissolved also in ethereal oils. The solns. of the organic Zn and Na compds. are treated in the same manner. To prep. solns. of the organic Si compds. ethereal resin solns., ethereal oils or the like, SiCl_4 or like Si compds., are incorporated in cooled abs. alc., and the excess volatile constituent is driven off by continued boiling. Instead of alc., aldehydes, mercaptans, ketones, or unsatd. hydrocarbons may be used. To obtain solns. of organic boric acid compds., molten H_3BO_3 is heated in isobutyl alc. After distg. off excess alc. at 250° , a residue remains which is completely and readily sol. in ethereal oils and contains 12% H_3BO_3 . All other boric acid esters may be applied. Of the organic solns. of Co, Zn, etc., the content of inorganic oxide is detd., and the luster is made up accordingly. E. g., in 100 g. of a blue luster containing no Au, are contained 2.005 g. Zn, 4.625 g. SiO_2 , 3.235 g. CoO , 0.175 g. B_2O_3 , 0.300 g. Na_2O .

Ger., 283,869, Feb. 1, 1913. W. HIRSCH. Constructional details of a furnace for enameling metal and other articles.

20. CEMENT AND OTHER BUILDING MATERIALS.

C. N. WILEY.

The development and present position of the impregnation of wood with salts. F. MOLL. *Z. angew. Chem.* 28, I, 317-22, 328-31(1915).—An historical review containing numerous references to the literature, especially to patents. E. J. C.

Toxicity of various wood preservatives. II. R. M. FLEMING AND C. J. HUMPHREY. *J. Ind. Eng. Chem.* 7, 652-8(1915).—Continuation and elaboration of C. A. 8, 1336. The methods were the same as those of the earlier work, but the investigation was extended to new preservatives. Some of the previous data are corrected and amended. ISADOR MILLER.

U. S., 1,148,013, July 27. H. A. GARDNER. Rendering wood resistant to fire by first applying to it a coating containing a sol. silicate or aluminate, e. g., Na silicate soln., and then applying a mixt. of oleic acid and linseed oil paint.

Brit., 19,191, Aug. 23, 1913. W. LESSING. App. for granulating slag and like smelting products, for use in the manuf. of cement, etc.

Brit., 23,416, Oct. 16, 1913. C. N. BOSSEN and A. BURGHARDT. Process of imitating marble and other stones and majolica tiles and pottery by the application to glass of a comp. containing liquid and pulverized water-glass and a sol. tar color, consisting (1) in replacing the tar color by other colors or pigments so that ordinary marble pottery and glazed tiles can be more closely imitated, and (2) in applying heat to harden the comp. after its application.

Brit., 7,577, Mar. 25, 1914. W. GRIFFITHS. A road-paving block consists of irregular stone fragments united along the lines of contact by Portland cement in a

mold to form a rigid framework and then immersed in a heated condition in molten pitch or the like sufficiently long for the molten pitch to penetrate into the interspaces between the fragments, these interspaces communicating with each other and with the outer faces of the block. The rigid framework is formed by mixing the stone fragments with dry cement powder and, as the fragments pass from the mixer to the mold, wetting the powder remaining in contact with them by a fine spray of H_2O . After the materials have set sufficiently to bear removal from the mold, the framework is immersed for some days in H_2O , to which has preferably been added Na_2SiO_3 .

Brit., 7,954, Mar. 30, 1914. SIR A. DENNY and D. G. ANDERSON. A composition for coating ships' decks, floors, etc., consists of a mixt. of gypsum cement and a relatively small proportion of portland cement, together with filling materials, such as pumice, coke breeze, asbestos, sawdust, etc., mixed with H_2O , or a dil. soln. of Na_2AlO_4 . The term "gypsum cement" does not include plaster of paris, stucco, or like hydrated sulfates. In an example, 100 parts of gypsum cement, 15 of portland cement, 20 of pumice, and 20 of sawdust are made into a stiff paste with a 2% soln. of Na_2AlO_4 , or with H_2O . Cf. C. A. 8, 3223.

Brit., 8,482, Apr. 3, 1914. A. FRANÇOIS. In the method of making fissured water-bearing strata water-tight by the injection of cement, the fissures are prepared to receive cement by introducing into the same a gelatinous ppt. obtained in the known manner by mixing together suitable chem. solns.

Ger., 282,876, May 6, 1913. P. ZÜRN. A cement vessel for liquids, with double metal covering. Fe is used next to the cement, and Al, or other metal not acted upon by the liquid, is used next to the liquid. Both coatings are applied by the Schoop or like process.

Ger., 282,906, Dec. 7, 1913. H. SIEGWART. Mfg. reinforced hollow concrete tubular structures, such as masts, tubes, posts, and the like.

Ger., 282,942, Mar. 18, 1913. A. HOFMEISTER. Mfg. hollow concrete masses.

Ger., 283,559, Nov. 15, 1913. Addition to 266,695 (C. A. 8, 813). A. ANKER. App. for treating mortar materials with steam or hot air containing H_2O .

Ger., 283,639, June 30, 1912. A. MOLFSHOLS, PRESSZEMENTBAU-GES. M. B. H. In the manuf. of cement blocks with gravel, the coarse gravel is powdered for filling in.

Ger., 283,640, July 27, 1910. MITTELRHEINISCHE CEMENT-INDUSTRIE G. M. B. H. App. for mfg. cement or the like from molten blast furnace slag or the like.

Ger., 283,955, Nov. 6, 1912. E. W. JUNGNER. Simultaneous production of alkali oxide, alkali hydroxide, or alkali carbonate and portland cement from minerals or rocks containing alkali, with addition of lime and vaporizing of the alkali. Cf. Fr., 453,462 (C. A. 8, 232).

Ger., 284,221, May 25, 1912. E. BOUVIER. Mfg. a hydraulic cement, of constant volume, by subjecting a pulverulent mixt. of lime and siliceous materials, such as clay, sand, acid slags, etc., to the action of superheated steam, and burning the product. The steamed mass is heated slowly up to 400–600°, until not only the moisture taken up in steaming, but also a portion of the combined H_2O (of hydration), is driven off, giving a product with about 9% H_2O of hydration. E. g., 3 parts of CaO and 1 part of clay, sand, acid slags, and the like, are intimately mixed as powder in the dry state. By the addition of some H_2O a pasty mass is formed, from which building blocks or other shaped masses are made, or the mass is placed in containers. The shaped or cased product is then subjected in an autoclave to the action of steam under a pressure of 8–12 atms. The period of steaming and the pressure depend upon the

comp. of the lime and siliceous admixts. The steamed product is then placed in a tunnel furnace, and heated there, slowly, up to 400–600°. The moisture taken up in the steaming process is first driven off, and then a portion of the hydrate H_2O . The temp. must not be allowed to exceed 600°, since otherwise all hydrate H_2O would be driven off and the product would be rendered inapplicable as a hydraulic cement. After removal of the product from the furnace it is ground fine, as cement. It sets and hardens under H_2O , without working.

Ger., 284,222, May 25, 1913. J. E. BAKHR. A furnace building material is obtained by first burning dolomite in alternate layers with coke in a shaft furnace, grinding the burned product, and again burning it in admixt. with combustion residues as sintering materials. E. g., the crude dolomite is crushed to pieces of 77–102 sq. mm. cross section, and then burned in the shaft furnace in alternate layers with coke. The burned dolomite, together with the fuel residues, is ground and sifted. This mixt. is burned in a revoluble tube furnace at about 1300°. The product can be used in the lining of metallurgical furnaces, for stopping tap holes, for the prepn. of furnace bottom, etc.

21. FUELS, GAS, TAR AND COKE.

J. D. PENNOCK.

Effect of high ignition voltages on the accuracy of bomb calorimeter determinations. E. J. DITTRUS. *Met. Chem. Eng.* 13, 480–1 (1915).—In the detn. of calorific values with the bomb calorimeter it is necessary to ignite the weighed portion of the substance in an atm. of O, under pressure, by melting a small piece of Fe wire (approx. 0.01 g.) with an elec. current. A small calorific increment results, due to the passage of the current. It is contended that high voltages enhance this increment. In order to det. the value of this source of error several expts. were made. The data obtained lead to the conclusion that unless great accuracy is required the ignition voltage is not an important consideration. That is, in the detn. of the calorific value of coal, oil, etc., an error of 0.2% is permissible, and the ignition voltage need not be seriously regarded.

C. A. NOWAK.

Selecting a coal. NATL. DISTR. HEATING ASSOC. *Practical Eng.* 19, 785 (1915).—General specifications.

C. G. F.

Anaconda coal pulverizing plant. E. P. MATHEWSON. *Eng. Mining J.* 100, 45–8 (1915).—A description of the new plant now being built at Anaconda, Mont., to supply coal-dust fuel for the reverberatory furnaces at the Washoe Reduction Works.

C. A. COLE.

Gaseous combustion at high pressure. W. A. BONE, HAMILTON DAVIES, H. H. GRAY, H. H. HENSTOCK AND J. B. DAWSON. *Proc. Roy. Soc. London (A)* 91, 464–5 (1915).—Report of work in 1906–12 at Univ. Leeds. Expts. in which mixts. of CH_4 with less than its own vol. of O were exploded in steel bombs at initial pressures of 8 to 32 atm. have given results in harmony with the theory of "hydroxylation" of Bone, put forward some years ago. The influence of various secondary reactions upon the products of the primary oxidation while the gases are cooling down after attainment of max. pressure is discussed in the light of exptl. results. Expts. on an equimol. mixt. of C_2H_4 and O_2 also confirmed the hydroxylation theory. From expts. on the relative affinities of CH_4 , H_2 , and CO for O in flames it was shown (1) that the affinity of CH_4 is at least 20 times as great as that of H_2 , and (2) that when mixts. corresponding to $CH_4 + O_2 + xH_2$ are fired under high initial pressure, in which the partial pressures of CH_4 and O_2 are kept const., and only x varied, the distribution of O between CH_4

and H_2 varies as x^2 , a circumstance which means that H is burnt *directly* to steam in flames as the result of the trimolecular change $2H_2 + O_2 = 2H_2O$ and not indirectly through H_2O_2 . The affinity of CO is comparable to that of H_2 in flames. Mixtures corresponding to $C_2H_4 + O_2 + xH_2$ were exploded at high initial pressure, and it was found possible to increase x up to 8 without causing any deposition of C on explosion. In the final section, expts. are described in which the whole pressure curves, up to and far beyond the attainment of max. pressure, were recorded when mixts. corresponding to (1) $2H_2 + O_2 + 4N_2$, (2) $2CO + O_2 + 4N_2$, and (3) $CH_4 + O_2 + 4N_2$ are exploded under initial pressures of about 50 atm. The rates of attainment of max. pressure in each case have no direct relation to the order of affinities of the various gases for O .
E. B. MILLARD.

Furnace efficiency. F. B. DUNN. *J. Elec. Power & Gas* 34, 512; 35, 24(1915).—A general discussion of proper combustion, gas analysis control, and the heat of combustion in gas- and oil-fired furnaces.
W. E. RUDER.

Vertical retorts for average and small size gas works. J. HUDLER. *Feuerungs-technik* 3, 209-13(1915).—A new vertical retort adapted for use in small gas works is described and results obtained with it given. The radiation losses are decreased particularly through the shortening of the retort. The advantages claimed are that small works can have a large number of units in operation, resulting in a reduction of unit heating surface exposed to cooler surfaces, a better control of the variations of the supply and demand, a more uniform gas and a greater fluidity of the sepd. tar.

H. R. GUNDLACH.

Spent oxide. VAN OOSTRAM MEYERS. *J. Gas Lighting* 131, 189-91(1915).—Various expts. showed that Fe_2O_3 takes up H_2S as well as does $Fe_2(OH)_3$ and that slightly burning the oxide increases its absorbent power about 20%. Acids have no deleterious influence on the activity of purifying materials. An absorption much higher than the average was obtained with bog ore after it had been treated for 1 hr. with CO_2 .
B. W. GRIMES.

Removal of carbon disulfide from gas. TEUNE. *Hel. Gas* April, 1915; *J. Gas Lighting* 130, 334.—The expt. was made to det. the ability of "spent oxide" containing a large quantity of free S to absorb CS_2 . Although the S was in a fine state of division it had only a slight capacity to dissolve CS_2 . The absorptive capacity was so slight that no actual purification process could be based upon it.
C. A. COLE.

Determination of benzene in gas mixtures. G. A. BURRELL AND I. W. ROBERTSON. *J. Ind. Eng. Chem.* 7, 669-70(1915).—The detn. is made in an app. which includes a bulb containing P_2O_5 for absorbing H_2O vapor. After introducing the gas mixt. the app. is cooled to -78° by immersion in a mixt. of solid CO_2 and acetone or alc. At the end of 10 min. as much gas as possible is removed with the aid of a vacuum pump; in this way practically everything is removed except C_6H_6 . The app. is then allowed to assume ordinary temp., and the pressure of the C_6H_6 measured. This pressure compared to atm. pressure gives % C_6H_6 . The method can be used with illuminating gases, etc., but is not applicable in the presence of C_7H_8 .

ISADOR MILLER.

Causes of coloring of ammonium sulfate produced from ammoniacal liquors obtained in the distillation of coal. G. BIANCHETTI. *L'industria* 29, 190(1915); through *Ann. chim. applicata* 3, 376(1915).—The colorings depend upon the impurities of the H_2SO_4 used. A gray color may come from Cu and Pb sulfates, a blue or red color from the action of cyanogen compds. on the Fe compds. of the acid, and a yellow color from sulfide of As or Cd .
S. LEVY.

The Beckton toluene recovery plant. ANON. *J. Gas Lighting* 129, 798(1915).—By using a limited amt. of oil in the washers, a little C_6H_6 is extd., but a max. amt. of toluene is absorbed. From the washer the oil containing toluene, etc., is pumped through countercurrent heat economizers to the still where the wash oil is sepd. from the light oil by means of steam. The mixt. of light oil is rectified in a fractionating boiler. A yield of about $\frac{1}{3}$ gal. of pure toluene per ton of coal is obtained.

C. A. COLE.

The improved Jones oil gas process at the Potrero Gas Works, San Francisco. E. C. AND L. B. JONES. *Am. Gas Light J.* 103, 23-7(1915).—A new process is described for the prep. of oil gas of high calorific value and high CH_4 content, eliminating the production of lamp black. The formation of lamp black is prevented by dissociating the oil under pressure in an atm. of gas obtained from previous operations. The app. consists of 2 column-like steel shells, connected at the bottom with a throat piece, and filled with checker bricks. These bricks are heated by burning oil among them, and act as heat reservoirs, subsequently giving up the heat to decompose the oil during gas making. Uniformity of temp. is obtained by passing steam through the app. The gas obtained by the new process has an av. heating value of 600 B. t. u. per cu. ft., and contains 38.3% H and 48.9 CH_4 . The generating sets actually in use have a rated daily capacity of 5,000,000 cu. ft.

P. J. COLE.

Increasing the use of coke. C. VOLK. *Z. Ver. deut. Ing.* 59, 445-6(1915).—Coal with an addition of 10-20% coke may, in many cases, be burned economically on moving grates; on stationary grates the coke content may be increased, and in special cases the coke may be burned alone. It is possible to use a mixt. of 15-50% coke in bituminous coal-gas producers.

H. R. GUNDLACH.

Deterioration of fireclay goods in coke ovens and gas retorts. I. THOS. HOGATE. *Gas World* 63, 32-3(1915).—Previous discussions of this question, spoken of as corrosion, are in most cases stated in a fragmentary manner making it difficult to locate the causes of what are apparently contradictory experiences and opposed explanations. It is the aim of this article to endeavor to get as many of the facts as possible and see whether they can be reconciled or at least furnish a starting point for further observation upon a systematic basis. The effect of carbon deposits upon cracked bricks is referred to, also the possibility that even volatile iron combinations, e. g., iron carbonyl, may exert an influence on the quality of the bricks. There is a further discussion covering the effects of NaCl in the coal, NaCl in the water used for washing coals, of the corrosion when firebrick containing a high percentage of alumina is used and also the resistance of silica brick. II. *Ibid* 50-3.—This part takes up the discussion of the loss of Al, the SiO_2 - Al_2O_3 ratio before and after a supposed change, the accretions of Mn_2O_4 and of Na, K and Ca. The changes are shown by complete tables of analyses. An accession of chloride and well-known chemical activity of $AlCl_3$ leads one to inquire whether the last-named substance may not be an intermediary in the mischief by acting as a powerful catalyst. A further discussion takes up the role of iron carbonyl, the effect of Fe as a flux in relation to SiO_2 and Al_2O_3 content, the tendency of SiO_2 to change its vol., deposits of C due to imperfection in the heating arrangements, and the importance of the water used in coal washing and of elec. considerations.

M. L. TROWBRIDGE.

The coke-handling plant of the New York Consolidated Gas Co. ANON. *J. Gas Lighting* 130, 636-8(1915).—An illustrated description.

E. J. C.

U. S., 1,147,790, July 27. A. MCD. DUCKHAM. Vertical retort for making coal gas.

U. S., 1,148,011, July 27. G. L. DAVIES and W. E. WINDSOR-RICHARDS. **Separating constituents of coal tar.** The tar is acidified, *e. g.*, with about 3% H_2SO_4 , and then mixed with kerosene or other light petroleum oil or with an animal or vegetable oil (preferably 4% of light mineral oil) and allowed to stand to complete the sepn. of the lighter from the heavier constituents of the tar. Then the lighter constituents are drawn off or decanted and the residue is aerated and washed with hot H_2O to remove S and coloring matter.

U. S., 1,148,925, Aug. 3. C. PICARD. **Storing acetylene.** The container is coated on the inside with glue, sol. silicate soln. or other adhesive and fibrous material is then blown into the container to adhere to the coating and aid in supporting the porous filling so that it cannot subsequently settle out and leave cavities within the vessel in which explosions might occur.

U. S., 1,149,056, Aug. 3. W. O. HOUSTON. **Gas-producer for furnaces.**

Brit., 17,729, Aug. 3, 1913. H. PLAUSON. A liquid fuel is composed of a suspension or colloidal soln. of coal or charcoal in H_2O , benzene, petroleum, naphtha, naphtha residues, tar, or the like. H_2O is employed in fuels for heating purposes, and hydrocarbons in those for internal-combustion engines. In making the suspension, coal or wood charcoal or the like is disintegrated sufficiently to pass through a sieve having, say, 40,000 openings to the sq. in., and is then mixed with the desired liquid and ground at a high speed or for a long time. *E. g.*, coal and H_2O require to be ground between smooth disks, plates, or spherical surfaces under a pressure of 60-100 atms. for 15 mins. to 2 hrs., to produce an emulsion or colloidal soln. Small amts. of colloids may be added, such as soap, milk (casein), gelatin, albumin, or the like, when using H_2O , or soap soln., India rubber, or the like, when using hydrocarbons. Tannin may be employed. A suspension, fine enough for use as fuel, may be obtained by trituration with colloids under 10 atms. for 10-15 mins., and a colloidal soln. by longer grinding. According to the provisional specification, HCHO , permanganate, chromic acid, tungstic acid, or the like, anhydrides, etc., may be used to decompose the coal particles.

Brit., 21,327, Sept. 22, 1913. J. S. ATKINSON and COKE OVEN MACHINERY CO. and K. HUESSENER. In regenerative reversible furnaces for the manuf. of steel, glass, etc., burners are employed at each end of the furnace; to these both gas and primary air are supplied, combustion not taking place until the mixt. meets a secondary air supply.

Brit., 24,329, Oct. 27, 1913. B. VERSEN. Constructional details of a gas producer.

Brit., 7,466, Mar. 24, 1914. DESSAUER VERTIKAL-OFFEN-GES. In a gas-retort furnace which may be heated either by producer gas or by lighting gas, and in which, during the lighting gas heating, a small supply of producer gas is maintained to the furnace, the lighting gas is passed through the incandescent fuel in the producer so that it is deprived of its illuminating constituents. Cf. C. A. 9, 2449.

Brit., 7,593, Mar. 25, 1914. O. A. FORD and J. C. LONG. App. for drying peat in furnace gases preparatory to grinding and molding comprizes an elongated drum with continuous feeding and discharging means and with means for delivering the gases partly into the drum at the exit end, and partly into an annular jacket, in proportions controlled preferably by a thermostat which operates various dampers. A partial vacuum may be maintained in the drum and volatile products recovered.

Brit., 7,664, Mar. 26, 1914. L. MARTEL. In mfg. composition fuel, a small proportion of tar is sprayed upon a dry mixt. of coal and pitch by an atomizer at the top of a mixing machine. Less than 1% of tar is used. Cf. C. A. 8, 2617.

Ger., 282,813, Jan. 10, 1913. Addition to 281,557 (C. A. 9, 2308). K. KILLING. Constructional details of an incandescent mantle lamp. Cf. C. A. 9, 2308.

Ger., 282,862, Oct. 29, 1913. E. GERBER. Plate grate for generator, half-gas, and other firings.

Ger., 282,863, Mar. 9, 1913. V. A. KRIDLO. Charging device for furnace firing.

Ger., 283,169, Oct. 24, 1913. POETTER, G. M. B. H. Process of mechanical stoking in rotary grate gas generators.

Ger., 283,248, Aug. 26, 1913. F. RAULS. Ring furnace and drying plant.

Ger., 283,701, Jan. 13, 1914. A. GANTKE. Mfg. the top of double-walled incandescent mantles.

Ger., 283,714, Mar. 4, 1913. F. WESSEL. Construction and operation of charging and regulating app. for ring furnaces.

22. PETROLEUM, ASPHALT AND WOOD PRODUCTS.

F. M. ROGERS.

Petroleum as fuel under boilers and in furnaces for heating, melting, and heat treatment of metals. W. N. BEST. *Bull. Am. Inst. Mining Eng.* 1915, 1527-38.—A general review and discussion with numerous illustrations. F. W. SMITHER.

Determination of mineral oil in dégras and in mixtures with fatty substances. K. BIAZZO. *Ann. lab. chim. cent. delle Gabelle* 7, 349(1914); through *Ann. chim. applicata* 3, 374-5(1915).—To the aq. soln. of the products of saponification there is added phenol, which saturates the excess of alkali and renders the sepn. of the aq. and ethereal layers rapid and clear, when Et_2O is subsequently used for extn. The ethereal layer is then shaken with KOH, washed with H_2O , dehydrated and distilled. S. LEVY.

Demulsification values of mineral lubricating oils for use in steam turbines. ARNOLD PHILIP. *J. Soc. Chem. Ind.* 34, 697-701(1915).—P. has devised an app. for detg. the power of an oil to resist emulsification with water. 500 cc. of oil and 500 cc. of H_2O are agitated at 100° for 5 min. The mixing is accomplished by means of a mechanical stirrer driven by an elec. motor at the rate of 350-400 r. p. m. This speed gave the most concordant results. Agitation by blowing with air and by shaking were unsatisfactory. After mixing, the emulsion is run into a 1000 cc. graduate and allowed to stand 24 hrs. The vol. of clear oil on top is read and calcd. as percentage of the original 500 cc. This percentage P. calls the demulsification value. 98% is the highest value obtainable due to mechanical losses. From the examn. of over 700 samples P. finds that an oil having a demulsification value of 90% or over will give no trouble with emulsions in use on steam turbines. Tables are given showing the effect of adding 1% of fuel oil high in bituminous matter to oils of high demulsification value. In every case the demulsification value is lowered. P. is not sure whether this is due to the bituminous or to the nitrogenous matter or S compds. in the fuel oil. P. considers the test of great value in detg. whether an oil will emulsify in use.

F. M. ROGERS.

Specific gravity of the cold and the hot fractions of the solid paraffins of naphtha. M. A. RAKUZIN AND A. A. ARSEN'EV, *J. Russ. Phys. Chem. Soc.* 47, 642-5(1915).—Detns. of the sp. gr. of the different fractions of paraffins obtained from a sample of naphtha previously examd. (C. A. 9, 2148) showed that its middle fractions are lighter than itself. This accounts for the impossibility of removing them by centrifugaliza-

tion. Scheller's statement that the yield of paraffins from naphtha differs with the method of distn. (C. A. 7, 3832) needs verification.

H. M. GORDIN.

Preliminary experiments on the effect of temperature control on the yield of products in the destructive distillation of hardwood. R. C. PALMER. *J. Ind. Eng. Chem.* 7, 663-9(1915).—Lab. distns. on 70-lb. samples of maple, beech and birch. The effect of controlling the distn. (lowering the temp. of reaction and decreasing the speed of distn. at the critical stage) is to increase the yield of alc. 45% for maple, 6% for beech, and 7% for birch, while increase in AcOH was 2, 9 and 5%, resp. The lab. distns. gave 40% more acetate of lime than usual com. yields. The practical value of these results was detd. by a study of the controlled distn. in a com. retort, the raw material averaging 93% maple, 4% birch and 3% beech.

ISADOR MILLER.

The destructive distillation of Pacific coast kelps. D. R. HOAGLAND. *J. Ind. Eng. Chem.* 7, 673-4(1915).—Distn. of 1 kg. samples of kelp (*Macrocystis pyrifera*), oak and Douglas fir was effected in an Fe retort of 1.5 gal. capacity. The yield of AcOH from kelp was only 0.2 that from the fir and 0.1 that from the oak, the alc. yields standing in the same proportion. Tar oils to the amt. of 4-7% by wt. dry kelp were recovered and this oil had d_{17} 0.984; on fractionation it yielded 11% between 0 and 125°, 27% between 125 and 250°, 23% between 250 and 300° and gave 39% tar residue. Most of the K_2CO_3 can be recovered as a high grade product by leaching the charcoal.

ISADOR MILLER.

Production of (wood) pitch and tar in Russia. H. D. BAKER. *Commerce Reports* 191, 803(1915).

E. J. C.

Improved Jones oil-gas process (JONES) 21. Oil-burning metallurgical furnaces 9. Substitutes for petroleum, etc. (GARLEPP) 18. Composition of the solid fraction of the naphtha paraffins as criterion of geologic age (RAKUZIN) 8. Petroleum in eastern Mexico (DUMBLE) 8. Formation of natural naphtha (CHICHIBABIN) 8.

U. S., 1,148,763, Aug. 3. J. G. FAGAN. Extinguishing oil fires by blowing onto the surface of the burning oil a light powder such as sawdust or cork (or other material which will float on the oil), the particles of which are coated and mixed with a fire-extinguishing liquid, such as reaction products of $NaHCO_3$ and H_2SO_4 .

U. S., 1,148,834, Aug. 3. F. F. EMORY. Oil filter.

U. S., 1,148,990, Aug. 3. M. C. ROGERS. Oil filter.

U. S., 1,149,027, Aug. 3. J. H. CASTONA. Distilling resinous wood. The wood is subjected to the direct action of superheated steam without pressure to drive out the turpentine without distg. the pine oils from the wood. Then the wood is treated with satd. steam while heating the bottom of the still from the exterior to retard condensation and evap. the condensate. The vapors thus produced are condensed and the turpentine is sepd. from the H_2O of the condensate. The pine oils are then distd. from the wood with superheated steam and the resin is dissolved from the wood by leaching with a solvent, the residue of which is recovered by steam distn. Cf. C. A. 8, 3628.

Brit., 20,188, Sept. 3, 1913. R. HENSE. Volatile hydrocarbons suitable for use as fuel for internal-combustion engines are obtained from a mixt. of heavy hydrocarbons with light hydrocarbons or alc. by adding to the mixt. a resinous substance and an oxidizing agent, distg. the mixt., and treating the distillate with O_2 . In some cases the distillates obtained above 250° are mixed with turpentine, resin, or amyl acetate, or with some of the distillate obtained at a lower temp. before the treatment

with ozone. If the hydrocarbons have already been distd., further distn. is omitted. The liquid mixt. is freed from H_2O either by freezing or by means of anhydrous Na_2SO_4 or other salts. Crude naphtha, mineral oils, tar products, and benzene and resin products may be treated by this process. In an example, crude naphtha, mixed with a small quantity of benzene, is treated with $NaOH$, and a soln. of resin or turpentine in benzene, benzine, or petroleum is added. A soln. of picric acid or Mg or other peroxide is then added, the mixt. is acidified with H_2SO_4 and is allowed to stand and settle. The oil is then sepd. from the lye, dehydrated with anhydrous Na_2SO_4 or by freezing with cold air, if necessary, and is then distd., the distillate being purified and enriched with O_3 and any ppt. allowed to settle out. The products are used as motor fuels, or for vapor lamps, or in dry-cleaning. The products collected above 250° may be used as turpentine substitutes or for extg. grease from bones, and the distillate and the residue may be employed for making boot blacking and boot creams. In an example of the use of an already distd. petroleum, the refined oil is mixed with benzine and C_6H_6 , the resin, turpentine, or amyl acetate is added, and the product is ozonized.

Brit., 7,700, Mar. 26, 1914. TRIESTER MINERALÖL-RAFFINERIE. App. for separating solid paraffin from oil, or hard paraffin from soft paraffin.

Brit., 20,488, Sept. 10, 1914. BADISCHE. Hydrocarbons, chiefly such as are easily liquefiable, and oxygen derivatives of hydrocarbons are obtained by passing CO and H_2 , mixed or not with other gases, in the proportions of at least $\frac{1}{2}$ of a vol. of the former to 1 vol. of the latter, over a heated catalyst under a high pressure exceeding that of 5 atms. In examples, the prepn. of hydrocarbons boiling from 20° up to 250° , of olefins, paraffins, and benzene hydrocarbons, of alcs., ketones, such as acetone, aldehydes such as $HCHO$, acids such as $HOAc$ and its homologs, and other products is described. In some cases, a basic compd. is added to the catalyst, and mixts. of 2 or more catalysts may be employed.

Ger., 282,367, Feb. 6, 1913. MARTINI & HÜNEKE, MASCHINENBAU-AKT.-GES. App. for transporting benzine or other combustible liquid.

23. CELLULOSE AND PAPER.

A. D. LITTLE.

Advances in the chemistry of cellulose (1913-1914). E. HEUER. *Kunststoffe* 5, 126-7, 138-40, 149-51 (1915); see *C. A.* 9, 1690. F. W. SMITHER.

Differentiation of parchment paper from pergamin paper. G. ANNONI AND G. RODANO. *Ann. lab. chim. Gabelle* 7, 19; *Ind. chim. min. met.* 2, 129(1915).—Since parchment paper consists of an SO_3H deriv. of cellulose transformed by H_2O into hydrocellulose which with I gives a blue color, when the paper is treated with a reagent containing I (like $ZnCl_2$), there is instantly formed a violet spot which gradually darkens and when placed under running H_2O turns to an intense azure which persists for a long time. Under the same conditions, the reagent dropped upon pergamin paper likewise turns violet, though more slowly, but under running H_2O all color disappears or only a very faint violet stain remains. Moreover, pergamin paper gives the Moransky test for resin (red-violet color with Ac_2O followed by H_2SO_4), while parchment paper does not. CHAS. A. ROUITLER.

U. S., 1,145,097, July 6. H. THORESEN and J. C. FALCH. Centrifugal strainer for wood-pulp and cellulose.

U. S., 1,145,498, July 6. J. L. MERRILL. Paper-pulp from ligneous materials such as flax straw, flax-tow and similar substances, is obtained by treating the material with about 15-25% its wt. of milk of lime, steaming under 75-100 lbs. pressure per sq. in., cutting into small pieces and washing.

U. S., 1,147,996, July 27. H. WREDE. Smooth coated paper for fine printing work. See Brit., 4,706 (C. A. 8, 2804).

Brit., 16,940, July 23, 1913. W. PLINATUS. Solid or liquid solutions of cellulose esters, such as nitrocellulose and organic acid esters, are prep'd. with the aid of aliphatic or aromatic esters of polyhydric alcs., such as the butyrins, the acetins, the esters of benzoic acid and glycerol, and the esters of glycol. Substances such as camphor, waxes, resins, oils, caoutchouc, and tar products may be dissolved in the solns., and the products obtained used in the manuf. of plastic masses, paints, impregnating compds., and artificial threads. Other solvents may be added. Solid solns. can be prep'd. from nitrocellulose without the aid of camphor by the use of these esters, and in the prepn. of these solns., it is sufficient to mix the substances between the heated rollers of a kneading-mill. When camphor is to be added, this may be dissolved in the ester of a polyhydric alc. before mixing with the nitrocellulose, or the nitrocellulose may be mixed with the solvent ester, pulverized camphor added, and the whole again kneaded. When these esters are used as solvents, resins may be employed as gelatinizing media in the place of camphor, and the resins may be worked up with the nitrocellulose by any of the methods above referred to. Filling substances, such as paper, fibers, dyestuffs, and salts, may be added.

Brit., 6,227, Mar. 11, 1914. FARBW. v. M. L. & B. In mfg. fancy papers, paper rendered rugged and uneven on the wirecloth by methods such as are described in 10,529, 1908, and 15,555, 1909, is flooded with a dil. dye soln., such as the waste H_2O dripping through the wirecloth and still containing coloring matter or colored particles. Dye solns. or differently colored fibers or particles of mica or pigments may be added to the waste H_2O . The colored H_2O fills up the depressions in the web and colors them a deeper shade than the elevated parts.

Brit., 6,677, Mar. 17, 1914. H. ARLEDTER. Treating or bleaching cellulose and other similar fibrous materials, either in the pulpy, spun, or woven condition, by a modification of the app. and process described in 16,085, 1912 (C. A. 8, 247). An elec. sparking device is employed in connection with a system of pipes and one or more pumps by which gases are withdrawn from the top of the treating vessel and returned, with fresh air and Cl, to the bottom. A continuous current of ozonized air and Cl is thus passed through the vessel by vacuum and pressure exerted in the opposite direction to that in which the liquid and solid materials traverse the vessel. Hypochlorite, or HCl, $H_2C_2O_4$, CO_2 , SO_2 or HNO_2 , may also be added during the operation. The sparking tube may be at the suction or delivery end of the air-pump, or between 2 pumps; or it may be inside, under the dome of the treating vessel. In some cases, the circulation and mixing of the material and liquid by means of the pump and disintegrator described in the principal patent will be unnecessary, the agitation and mixing produced by air current being sufficient. The specification mentions the treatment of wood pulp, jute fibers, straw, wool, and hair, and states also that linen and other cloth and spun yarn may be bleached by hanging or laying them up in the vessel and pumping the liquor through them, while circulating the ozonized air in the opposite direction. A battery of vessels may be used, the gases from one being passed to the next. The gases may be cooled before delivery to the bottom of the vessel.

Brit., 6,874, Mar. 18, 1914. T. H. NASH. App. for boiling and washing rags and the like used in the manuf. of paper.

Ger., 274,550, May 20, 1914. VEREINIGTE GLANZSTOFF-FABRIKEN A.-G. Mfg. threads, films, or plates. See Fr., 454,011 (C. A. 8, 257).

Ger., 282,592, Oct. 19, 1913. AFLENZER GRAFIT- UND TALKSTEINGEWERKSCHAFT, G. M. B. H. In a process of tinting paper, pulp, textiles, and the like, in gray or black, graphite powder is incorporated. Graphite powder is soft, tints uniformly, and has a strong covering power; it also imparts to the paper flexibility and a smooth texture. The calendering process requires less power when the paper is so treated, and the appearance of the product is better. Preferably the graphite is added to the material before the latter is sized. If graphite powder and aniline colors are used conjointly, the fastness of the resulting colors to light is claimed to be increased.

Ger., 282,950, Dec. 22, 1912. E. LEHMANN. Concentrating sulfite back waters which are drawn off from tanks while boiling and under pressure.

Ger., 283,006, Feb. 26, 1913. ANTOINE REGNOUF DE VAINS and J. F. T. PETERSON. Removing ketones from lignocelluloses preliminary to bleaching by treating with chloride of lime soln. and washing out the resulting chloroketone. The removal of the chloroketone is aided by rendering the wash H_2O alk.

Ger., 283,111, Dec. 9, 1913. E. HEUSER and G. BORDEKER. Mfg. resin size from unsaponifiable caoutchouc resins and colophonium or other saponifiable resins. Previous attempts to use the cheap caoutchouc resin together with the more expensive colophonium in the manuf. of resin size for paper were unsuccessful inasmuch as the colophonium was rendered unsaponifiable by reason of the presence of the caoutchouc resin. In the present process colophonium and unsaponifiable caoutchouc resin are mixed mechanically in a finely pulverized state. Upon boiling up this mixt. in an aq. soln. of caustic or carbonate (of an alkali metal), a resin size is obtained which forms a white emulsion with cold H_2O such as is necessary for sizing paper stock. The saponifying agent (soda) may be added, in powder form, to the mechanical mixt. of colophonium and caoutchouc resin, whereby a pulverulent prepn. is obtained which need only be boiled up in H_2O to prepare the resin size. The caoutchouc resin does not saponify in this process; it is simply emulsified in the resin soap.

Ger., 283,199, July 11, 1914. Addition to 259,691 (C. A. 7, 3227). B. JIROTKA. In the manuf. of articles from cellulose or lignose, the principal process is modified in that the articles, before complete drying, are coated with a quick hardening substance, such as gypsum or the like, or imbedded in it. In order to prevent adhesion of the gypsum, the article is covered previously with a neutral layer such as fat or shellac.

Ger., 283,286, Apr. 16, 1913. Addition to 274,550 (*supra*). VEREINIGTE GLANZSTOFF-FABRIKEN A.-G. In the manuf. of threads, films, or plates from viscose, tartaric and citric acids, and like hydroxy acids which form readily sol. Na salts, all of which are relatively cheap and easily regenerated, can be used instead of lactic and glycolic acids as specified in the principal patent. E. g., 300 g. Na citrate, 300 g. citric acid, and 1000 g. H_2O , are heated to 50° . A matured crude viscose soln., which has been heated for about 100 hrs. at 15° , is squirted into the pptg. bath and wound for transportation to the centrifuges. The threads, at first clear and sol. in H_2O , become whitish. The complete decomp. is completed readily by passage through a second bath prepared from the first bath by a 5 times diln. with H_2O . The product is then washed with H_2O , dried under tension, then desulfurized and bleached.

Ger., 283,371, Mar. 8, 1914. Addition to 268,243 (C. A. 8, 1669). FARBW. v. M. L. & B. Mfg. paper with designs on both sides, according to the principal process in which H_2O -sol. fat solvents, such as alc., HOAc, HCOOH, and the like, are applied

by means of rolls to one side of the paper, and the color soln. is applied thereon. The design is stronger and sharper when solns. of hygroscopic substances, such as $MgCl_2$, are added to the solvents.

Ger., 283,506, Nov. 14, 1913. M. SCHMIDT. Removing the salty taste of parchment paper treated with $NaCl$ soln., by adding to every liter of the $NaCl$ soln. with which the paper is to be treated, a soln. of 0.25–3 g. saccharin in H_2O . The parchment paper is immersed in this soln., and then dried on drying cylinders.

Ger., 283,736, Nov. 29, 1913. P. C. SCHAANNING. Construction and operation of an app. for dehydrating wood fiber in cellulose plants.

Ger., 283,751, Apr. 15, 1914. E. ALTMANN. Sizing paper by adding an emulsion of gelatin and talc to the paper stock. On contact with H_2O talcum forms colloidal substances, such as the hydroxides of Si and Mg . These take up colors and form about them a colloidal coating which protects the color. The talc, besides taking up the color, absorbs dextrin, albumin, gelatin, and other colloidal substances. This sizing is similar to resin sizing, even superior in some respects. To 1 liter emulsion, 5 g. white gelatin and 10 g. finely ground talc, taken up in hot H_2O at $70-75^\circ$, are used.

Ger., 283,752, Mar. 15, 1914. M. LÜTTICH. Mfg. a paper for documents, tickets, and the like, by applying, continuously or intermittently, to the paper band before it passes through the drier, a line of color, which in the finished paper does not appear sharply defined, but as a wash color.

Ger., 283,931, Sept. 10, 1911. ERBEN DES VERSTORBENEN DR. E. TRAINER. Process of utilizing sulfite cellulose back waters for tech. and agricultural purposes. The high content of SO_2 or of compds. splitting off SO_2 readily, and of lime, and the almost entire absence of albuminous substances, have been prime factors in rendering these back waters inapplicable as fertilizers and fodder. The sulfite liquors make a good medium for oxidizing microorganisms, by the action of which the S compds. specified are oxidized to less injurious compds. The organisms *B. subtil.*, *B. vulgaris*, *B. acet.*, *B. mycoid.*, *B. pasteur.*, *B. acid lact.* are suitable for this purpose. Irrespective of the oxidation of the S compds., whereby a considerable portion of the lime is combined with the H_2SO_4 formed as $CaSO_4$, the lyes are enriched by the organisms themselves in useful organic compds. The organism selected, or a number of them, are cultured on the soil containing the lyes, in pure culture, and then the principal portion of the lye is inoculated with this pure culture. The conversion of the lye is favored by the passage of air, so that the inoculated lye is allowed to trickle over step-work, or the like, and heated to a definite temp. In order to facilitate the action of the microorganisms, a portion of the S compds. may be removed from the crude lye before the inoculation. The reaction is adjusted, also, before inoculation. In order to incorporate albuminous matter, the liquors, freed as much as possible from S compds., are fermented with yeast, and the mass is then dehydrated until fit for use as fodder or fertilizer. The wood waste resulting from cellulose manuf. can be rendered fermentable by suitable treatment, and added to the liquors before fermentation. Also, fermentable waste matter of the sugar and starch industry can be used.

24. EXPLOSIVES AND EXPLOSIONS.

C. E. MUNROE.

Tolerances in tests of permissible explosives. *J. Ind. Eng. Chem.* 7, 716–7(1915).—Having admitted some 150 explosives to the Permissible List because, as submitted by the manufacturers, they had passed all of the required tests, the Bureau of Mines

officials deemed it essential, in order that all of the requirements of a Permissible Explosive shall be met, to secure tolerances for retesting samples of these various explosives as they are offered in commerce or used in the mines. It was recognized that identical results could not be obtained in the tests of the original and the "field" samples and, therefore, a committee was appointed to ascertain what tolerance should be officially adopted in the case of each chem. and physical test required. This committee, after analysis and study of all the data accumulated at the Station since its foundation, made a report. The manufacturers of the United States were then invited to meet in conference with the Bureau's officials to discuss this report. This was done on June 7th last and the tolerances fixed upon, which are set forth in detail in this journal, are now confirmed by the Bureau.

CHARLES E. MUNROE.

High explosives. GEORGE W. MACDONALD. *Nature* 95, 508-9(1915).—A popular article giving historical statistics and the various names, under which the same explosive is known in various countries.

CHARLES E. MUNROE.

Blasting explosives in northern Argentina. *Commerce Repts.* 174, 452(1915).—Notes, nature and extent of uses, kinds and quantities of explosives, together with sources of origin and methods of packing.

CHARLES E. MUNROE.

Mines, shells and high explosives. VIVIAN B. LEWES. *Engineering* 100, 65-6 (1915).—Résumé of a popular lecture at Royal Society of Arts giving an account of the explosives being used in the present war with some statistical and historical data relating to them. L.'s composition for ammonal differs from that usually given and he says "aniline could be converted into a further compd., which would yield the greatest explosive hitherto made."

CHARLES E. MUNROE.

Explosion in mixing house of factory of Nobel's Explosives Co., Ltd., at Ardeer. H. CONINGHAM. *Home Office Rept.* 213, 6 pp.(1915).—The explosion occurred in the operation of charging and stirring thin nitroglycerin-nitro-cotton jelly in a brass mixing pan provided with vertical bronze stirrers preparatory to mixing it with the material necessary for making it into "Gelignite" or "Samsonite." The operation of charging was performed by placing the rubber-lined box, in which the jelly was stored and transported, on a stool beside the mixer, joining the edges of the box and the mixer with a thin sheet-lead saddle to prevent any explosive falling between the box and the mixing pan, and then taking the explosive across this saddle by hand. It is believed the explosion was due to this saddle, or a brass screw, having accidentally fallen into the mixing pan and become entangled between the blades of the paddles and the walls of the pan, developing sufficient friction to fire the explosive.

CHARLES E. MUNROE.

Explosion of nitro-cotton. H. CONINGHAM. *Home Office Rept.* 214, 6 pp.(1915).—Some 68 pounds of dry nitro-cotton were taken in galvanized iron bins into an incorporating mill authorized for treatment of wet nitro-cotton only. It is believed that the explosion was caused by friction in the removal of a lid on one of these bins or by dropping a lid on to an open bin containing dry nitro-cotton. There were over 2 tons of wet nitro-cotton in the building but none of it was exploded or even burned by the fire which succeeded the explosion.

CHARLES E. MUNROE.

Gaseous combustion at high pressure (BONE) 21.

U. S., 1,147,958, July 27. W. L. MAIN. Mixture for detonating explosives, formed of Hg fulminate mixed with 5-70% of KBrO₃ or other bromate. The bromate gives a higher detonating force than a similar mixt. containing chlorate.

U. S., 1,148,258, July 27. F. SPARRE. A solvent for nitrocellulose is made by acetylating a mixt. of chlorinated derivs. of C_6H_{12} , C_6H_{14} , and their isomers.

Brit., 7,647, Mar. 26, 1914. A. C. PEARCY and CURTIS's & HARVEY. In mfg. explosives, adding a mixt. of KCl or NaCl, borax and KNO_3 to nitroglycerin-nitrocellulose explosives to render them safe against fire-damp, carbonaceous matter (except collodion cotton) being as far as possible excluded. One example contains 42.5 parts of nitroglycerin, 2.5 parts of collodion cotton, 20 of KNO_3 , 20 of borax, and 15 of NaCl.

Brit., 24,702, May 29, 1914. W. MACNAB and B. J. FLÜRSCHHEIM. Mfg. propellant explosives by mixing (1) one or more neutral polynitro compds. containing at least 4 nitro groups, such as $(NO_2)_4C_6H_4NH_2$ and $(NO_2)_4CMeNH_2$ with (2) 1 or more non-explosive organic colloids such as agar-agar, gelatin, and India rubber, and (3) an organic or inorganic nitrate or similar substance such as nitroguanidine and nitrates of urea, guanidine and Ba. Either (2) or (3) may be omitted. One example contains 68 parts $(NO_2)_4CMeNH_2$ ("tetryl"), 30 parts urea nitrate, and 2 parts of India rubber.

Ger., 281,510, Nov. 1, 1912. A. REBITZKI. In a fire-damp detector for miners' lamps, the heat produced by the aura surrounding an elec. heated incandescent body is used to det. the presence and the % content of the combustible gases.

Ger., 282,736, Sept. 20, 1913. R. HÖING and F. SCHWARZE. App. for preventing mine explosions by means of explosions which are produced immediately upon the opening of a water-spraying system.

25. DYES AND TEXTILE CHEMISTRY.

L. A. OLNEY.

Indigotin content of some Japanese indigoes. S. SATO. *J. Ind. Eng. Chem.* 7, 675-6(1915).—Analytical data on 9 samples. The method employed was that of Berghthiel and Briggs (*J. Soc. Chem. Ind.* 25, 734(1906)). The samples were found to be low in indigo and high in ash.
ISADOR MILLER.

Tree dyes of the United States. ANON. *Hardwood Record* May 25, 1915; *J. Am. Leather Chem. Assoc.* 10, 434-6.—If the dye famine caused by the war makes it necessary, America can obtain many natural dyes from her own trees. Of these the yellow oak (*Quercus velutina*) is most important. A list of 11 other trees is given with a description of the dyes that can be obtained from them.
E. H.

The dyeing value of some indigenous dyestuffs. J. P. SRIVASTAVA. *J. Soc. Dyers, Colourists* 31, 122-5(1915).—The red and yellow natural coloring matters used in Europe are of American origin, and no systematic investigation seems to have been made so far to find similar dye woods in India. This is an account of an investigation of the dyeing values of certain coloring matters still used by native Indian dyers, conducted by order of the Director of Industries of India. In dyeing wool 5 methods were employed: (a) direct, (b) with 4% AcOH, (c) same as (b) but with after-treatment with $K_2Cr_2O_7$, (d) mordanting with $K_2Cr_2O_7$, (e) mordanting with $Al_2(SO_4)_3$. In dyeing cotton the following baths were employed: (a) tartar emetic, (b) $SnCl_4$, (c) alum, (d) $FeSO_4$. The following coloring matters were tried out: (1) "Harsinghar" (*Nyctanthes arbor-tristis*), of which the yellow flower gave a good yellow on wool, fast to milling with soap and soda. (2) "Tun" (*Cedrela toona*); flowers of this tree give a dye which colors wool with mordant (not fast). (3) "Tesu" or "Dhak" (*Butea frondosa*); this dyes wool shades fairly fast to milling. (4) "Hadli" or "Turmeric" (*Curcuma longa*); yellow dye of commerce. (5) "Arusa" (*Adhotoda vacica*); yellow dye whose fastness

in mordanted wool is fair. (6) "Jangli Nil" or "Wild Indigo" (*Tephrosia purpurea*); dyes wool mostly brown shades possessing very good fastness to milling. (7) "Safflower" or "Kusum" (*Carthamus tinctorius*); yellow color; dyes wool direct; not considered very useful. (8) "Naspal" or "Pomegranite Rind." (*Punica granatum*); gives shades varying from yellow to brown. (9) "Majith" (*Rubia cordifolia*); roots and twigs contain a dye identical with madder. (10) "Cutch" or "Katha" (*Acacia catechu*); commercial article; Catechu Brown on cotton one of fastest colors known. (11) "Patang" or "Sappan wood" (*Caesalpinia sappan*); this is a variety of Brazil wood and can be used on cotton for reds; suitable for calico printing. (12) "Lac dye;" commercial article of animal origin, giving brilliant scarlet shades on wool with tin mordant. (13) Indigo.

L. A. OLNEY.

New coloring matters on cotton. G. G. HEPBURN. *J. Soc. Dyers, Colourists* 31, 119-20(1915).—Many amines of the diphenyl series in a fine state of distribution, such as is attained in calico printing develop color when submitted to the action of alk. hypochlorite soln. Dianisidine hydrochloride printed upon cotton cloth with tragacanth thickening, dried and passed for 15 to 30 sec. through NaClO soln., containing 3 g. active O per liter, then washed and soaped, gave a heavy yellowish to reddish brown shade. This reaction was found to be pretty general although negative results were obtained with primary amines of the benzene series. *p*-Phenylenediamine gave deep brown shades. Auramine O conc., Night Blue, Methyl Violet 1B, Rhodamine 6G Extra, New Methylene Blue N, Methylene Violet 3RA, Azine Green, all give positive results when printed with AcOH and tragacanth. All the bases giving positive results contained either primary or secondary amino groups, but those containing neither gave no development of color. Upon replacing NaClO with Na₂O₂, no development of color takes place.

L. A. OLNEY.

A method of developing a fast chrome brown on wool. M. FORT. *J. Soc. Dyers, Colourists* 31, 147-8(1915).—The scientific basis of the new method lies in the diazotization of wool, its coupling with gallic acid and fixation of the dyestuff thus formed by means of K₂Cr₂O₇. Tannic acid may be substituted but it gives shades inferior in depth and adds risk of making the wool harsh. *Process*: First mordant the wool (with 3% K₂Cr₂O₇ and 2 1/2% tartar). Dye in bath made up with 3% gallic acid, 4% NaNO₂, 5% MeCOOH. Enter cold, bring slowly to boil, and boil 1 hr. Wooden dye baths are best. Its fastness is very good to all usual agencies, and it is unimpaired by heavy milling.

L. A. OLNEY.

Fastness of basic dyes to rubbing. M. FORT. *J. Soc. Dyers, Colourists* 31, 148 (1915).—The similarity between Leech's method of improving the fastness to rubbing of basic dyes on cotton (cf. Eng. Pat. 29,479, 1913; C. A. 9, 1694) and expts. of Fort are noted. In Leech's method, after tannin mordanting, the cotton is treated with Na silicate neutralized with HCl. In F.'s expts. H₃PO₄ and Al and Mg salts are used. Sn tannates gave the poorest and Al tannates the best fastness to rubbing. Fixing with large amts. of Al acetate gave the best results.

L. A. OLNEY.

Fixing vat-dyes by steaming. G. TAGLIANI. *Färber-Ztg.* 26, 73-5(1915).—Bleached and thoroughly washed fabrics are passed through a maltodextrin soln. (100 parts potato starch, 5 parts "diamalt" or equivalent malt ext. and 2000 parts H₂O), and are then dried as usual. The usual vat-dye printing is done, and the goods are then steamed in a small Mather-Platt. Colors are improved in brightness and intensity. It is advantageous to allow the printed goods to be exposed to the air for some time after steaming. Washing is done in a weakly acid bath containing a little Na₂Cr₂O₇. In case aniline black and certain other colors are printed, the process is not desirable. The best results are obtained with indigoids and sulfur dyes.

W. F. FARAGHER.

Practical results with nitrate discharges. M. FREIBERGER. *Färber-Ztg.* 26, 41-6, 57-60, 77-81(1915); cf. *C. A.* 7, 705. W. F. FARAGHER.

British solution of the dyestuff problem. *Reports of U. S. Dept. of Commerce; Chem. Eng.* 22, 3-6(1915).—An account is given of the organization of the company "British Dyes, Ltd.," on lines suggested in the announcement abstracted in *C. A.* 9, 1548. L. W. RIGGS.

Manufacture of Turkey red oils from free fatty acids. F. ERBAN. *Seifenfabr.* 35, 519-21(1915).—A 5% soln. was prep'd. and its behavior toward well, lime and gypsum H_2O , also toward $MgSO_4$, $AcOH$ and dil. H_2SO_4 noted. The tinctorial properties of the Turkey red oils for particular purposes are discussed. Cf. *C. A.* 9, 1400. E. SCHERUBEL.

Substitution of free fatty acids for neutral fats and oils in the textile industry. F. ERBAN. *Seifenfabr.* 35, 557-8(1915).—Good emulsions are obtainable from elain and mineral oil by neutralization of the elain with NH_4OH . In the jute industry mixts. of fish oil and mineral oil are used. In the yarn industry it has been found that soap solns. answer the purpose as well as neutral oils. In the printing of textiles fatty acids are not satisfactory as thickeners because they are not inactive toward colors. E. S.

Heat of hydration of some textile fibers. G. TESTONI. *Industria tessile e tintoria* 16, 23(1915); through *Ann. chim. applicata* 3, 378(1915).—The fibers, oven-dried and cooled in desiccators, showed a rise in temp. due to absorption of H_2O when exposed to moist air. This rise is almost const. for each kind of fiber, but varies from fiber to fiber. In flax and hemp it varies according to the degree of maceration and becomes equal to that of cotton when the flax and hemp fibers are treated so as to give cellulose. The phenomena were better studied by immersing a given wt. of dried fiber in a given vol. of distd. H_2O , and calcg. the increase of temp. on 100 g. dried substance. In the case of fibers like cotton and wool that give sufficiently great differences in temp. rise this property may be used to det. with good approximation the proportion of the said fibers in mixed threads. S. LEVY.

Reactions of silks made from cellulose. L. J. MATOS. *Chem. Eng.* 22, 41-2 (1915); see *C. A.* 8, 2810. L. W. RIGGS.

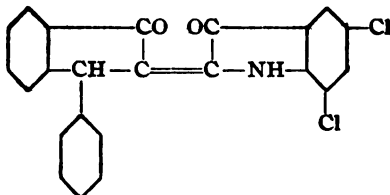
Measuring the impermeability of cloth and military fabrics. G. A. LEROY. *Compt. rend.* 160, 803-5(1915).—The app. consists of a glass cylinder 10-15 cm. high and 10 cm. interior diam., open at each end and the height graduated in cm. A brass collar is cemented to the inside of the lower end of the cylinder, the collar also forming a flange ring which is secured to a brass ring below by means of bolts. The fabric to be tested is cut into disks 12 cm. in diam. and clamped between the flange and ring, thus forming a cloth bottom to the cylinder. A tripod support, with an insulated portion in its column, carries a rigid disk of gilded brass 10 cm. in diam. A circular sheet of thin filter paper 12 cm. in diam., which has been previously dipped in an aq. soln. of K_2SO_4 and dried, is placed on the brass disk and the projecting ring 1 cm. wide is coated with paraffin or varnish. On the filter paper is placed a very thin circular disk of Pt or gilded Cu gauze 10 cm. in diam. and connected through a source of direct elec. current (110 volts) with the rigid brass disk. The cylinder with its cloth bottom is now placed on the support carrying the sheet of filter paper and thin metal gauze, and the permeability of the cloth to water shown by the passage of the current. The current is established when sufficient water passes through the cloth to dissolve the K_2SO_4 in the disk of filter paper, and this may be conveniently shown by introducing elec. lamps into the circuit. Cloth may be tested by filling the cylinder to various heights with water; or by a suitable arrangement of a sprinkling app. the permeability to artificial rain may be detd. In case of fabrics permeable to air, there should be a space

of 0.5 cm. between the cloth to be tested and the metallic gauze, while fabrics such as rubber goods impermeable to air should be in immediate contact with the gauze.

L. W. RIGGS.

Emulsification and detergent action (SHORTER) 27. Leuco derivatives of indigo dyes (CHILIKIN) 10.

U. S., 1,147,778, July 27. W. BAUER and A. HERRE. Red indigoid vat dyes of the formula



obtained by reaction of dichloroisatin- α -anilide with 3-Ph-1-indanone and Ac_2O ; brownish red cryst., sol. in conc. H_2SO_4 with a blue color and forming a yellow vat with hydrosulfite which dyes cotton fast rhodamine-red.

U. S., 1,147,803, July 27. H. JORDAN and W. NEELMEIER. Dye obtained by combining the diazo compd. of di-*p*-aminobenzoyl-*p*-aminophenylureadisulfonic acid 64 with 1,*m*-aminophenyl-3-methyl-5-pyrazolone 37.8 parts; a yellow powder which dyes cotton bright greenish yellow which is rendered fast by treatment with CH_3O . By diazotizing the dye on the fiber an orange shade is obtained by development with β -naphthol and a yellow shade by development with 1-phenyl-3-methyl-5-pyrazolone.

U. S., 1,148,695, Aug. 3. J. G. KING. Warp-dyeing apparatus.

U. S., 1,148,698, Aug. 3. B. LOOMIS. Retting flax, hemp or similar fiber stock. The material is crushed and the juice is pressed out. Tannic acid is extd. with warm H_2O and the extd. juice and an aq. hard-wood ext. are circulated through the fibrous material and through a heater to ext. gummy and resinous substances. The latter are floated off and the liquor from which they are sepd. is reheated and continued in use until retting and degumming are complete. Then the liquor is drawn off and the fiber is dried by treatment with warm gas. Cf. C. A. 8, 420.

U. S., 1,148,966, Aug. 3. J. C. HERDEN. Vat dyeing. The material is treated with an alk. bath of leuco compd. of algol yellow 3G and alizarin indigo G or other leuco compd., the alkalinity of which is progressively decreased to lessen the solvent capacity of the bath and fix the dye on the fiber, and the latter is then oxidized.

Brit., 20,664, Sept. 12, 1913. BADISCHE. A highly reactive alkaline reagent is obtained by mixing caustic alkali, preferably KOH, with EtOH or MeOH in quantity not materially exceeding half a mol. proportion, while avoiding, as much as possible, pressure or admission of air. The product is suitable for use in place of molten caustic alkali in effecting reactions with anthracene derivs. These reactions can be effected by mixing the anthracene compd. with the above described product, and then exposing the mixt. to air; or the anthracene compd. may be first mixed with caustic alkali, and then with alc. while excluding air, and the mixt. then exposed to air; or a mixt. of anthracene compd. and caustic alkali may be treated in the presence of air with the requisite quantity of alc. in spray or vapor form. The reactions can be effected with or without external heating. According to examples, alizarin, indanthrene, and pyranthrene are obtained by mixing Na anthraquinone-2-sulfonate, 2-aminoanthraquinone,

and 2,2'-dimethyl-1,1'-dianthraquinonyl, resp., with KOH and EtOH, while avoiding admission of air as far as possible, and then spreading the mixt. in thin layers in the air. Or a mixt. of KOH and 2-aminoanthraquinone is spread out in the air and the defined quantity of alc. sprayed over it. The process may be carried out on an endless band and evapd. alc. recovered.

Brit., 20,793, Sept. 15, 1913. AKT.-GES. FÜR ANILIN-FABRIKATION. **Dyeing** furs, hairs, or the like by means of ammoniacal aq. solns. containing mixts. of aromatic *m*- or *p*-diamines with dihydroxy compds. of the benzene series and H_2O_2 or other oxidizing agent; the furs, etc., may be previously mordanted with $CuSO_4$, $FeSO_4$, dichromate, etc. Cf. C. A. 9, 2153.

Brit., 24,360, Oct. 27, 1913. BAYER & Co. **Dinitrophenylbenzidine- and -tolidinedisulfonic acids** are obtained by condensing a mol. of 2,4-(NO_2) $_2C_6H_3Cl$ with benzidine- or tolidine-2,2'-disulfonic acid. **Monoazo dyes** are obtained by combining the diazo compds. of the above described condensation products with salicylic acid, methyl- or ethylbenzylanilinesulfonic acids, pyrazolones with a free 4-position, *e. g.*, 1-Ph-3-Me-5-pyrazolone, acetoacetanilide, -toluidides, or -anisidides, or α -methylindol ϵ . The product from dinitrophenylbenzidine-2,2'-disulfonic acid and Me-4-sulfobenzylaniline is described in an example. The products dye wool yellow shades from acid baths.

Brit., 7,899, Mar. 28, 1914. A. EICHENGRÜN. **Fireproofing fibrous materials** by treating them both with a fireproofing agent such as tungstic, silicic, sulfurous, or boric acid or their salts, or phenylphosphoric acid, or the non-inflammable Cl derivs. of aniline, and with solns. of fatty acid esters of cellulose containing such agents. The fireproofing agents may be used in soln. or may be dusted on the fabrics, etc., and fixed. Cf. C. A. 8, 3124.

Brit., 7,916, Mar. 28, 1914. BAYER & Co. **Indigoid dyes** are obtained by condensing α -derivs. of halogen isatins or halogen naphthisatins, containing readily replaceable substituents such as the anilino group in the α -position, with 3-Ph-1-indanone or its homologs or substitution products; the isatin derivs. yield red vat dyes, and the 2,3-naphthisatin derivs. violet dyes. According to an example, α -anilino-5,7-dichloroisatin and 3-Ph-1-indanone are employed; α -anilino-5,7-dibromoisatin and 3-*p*-tolyl-1-indanone are also specified as initial materials.

Brit., 8,043, Mar. 30, 1914. BAYER & Co. **Trisazo dyes** are obtained by diazotizing an acyldiamine or nitroamine, coupling with α -naphthylamine or a deriv. thereof, re-diazotizing, again coupling with α -naphthylamine or a deriv. thereof, diazotizing again, coupling with resorcinol, and finally eliminating the acyl group or reducing the nitro group.

Brit., 8,355, Apr. 2, 1914. FARBW. v. L. DURAND, H. & Co. **White effects on cotton printed with gallocyanins or leuco compounds thereof** are obtained by first printing the fabric with a resist containing Cr phosphate and a Cr salt of an hydroxy-fatty acid such as citric, lactic, or tartaric acid. According to an example, cotton is printed with a resist consisting of $Cr(OH)_3$, citric acid, H_3PO_4 , glucose, British gum, China-clay, and stearin soap, dried, padded or printed with a gallocyanin, dried, steamed, and finished.

Brit., 8,365, Apr. 2, 1914. O. LUFFT. **Construction of an inter-communicating 2-compartment vat for dyeing, washing, bleaching, and otherwise treating textile goods** with a circulating reversible flow of liquor.

Brit., 8,569, Apr. 4, 1914. H. LEVINSTEIN, J. BADDILEY and LEVINSTEIN, LTD. **Disazo dyes** are obtained by combining the tetraazo compds. of *m*-azoxyaniline,

p-diaminophenylaziminobenzene, *p*-diaminodiphenyl ether, or homologs or substitution products thereof, with 1 mol. of an acidyl- β -aminonaphtholsulfonic acid and 1 mol. of resorcinol or a homolog or substitution product thereof. Cf. C. A. 9, 1549.

Brit., 8,666, Apr. 6, 1914. BAYER & Co. Monoazo dyes are obtained by combining diazotized aminoacidyl-*o*-aminophenolsulfonic acids (containing no carboxylic group) with pyrazolones or methylketol. Cf. C. A. 8, 3240.

Brit., 8,689, Apr. 6, 1914. BADISCHE. Indigo-white preparations are obtained by mixing together indigo-white, a paste-forming medium such as molasses or glycerol, and a solid organic substance, such as bran, flour, dextrin, wood, or sugar which assists fermentation; Zn dust may be added. According to an example, indigo-white is mixed with molasses and bran.

Ger., 282,278, Oct. 24, 1913. FARBW. v. M. L. & B. Mfg. alkyl ethers of indirubin oxime by allowing alkylating agents to act upon salts of indirubin oxime. Alkyl halides or sulfates, arylsulfonic acid esters, and the like are specified as suitable. The resulting alkyl ethers can be converted into valuable dyes. By the action of concd. H₂SO₄ red wool dyes are obtained.

Ger., 282,490, Feb. 27, 1914. BAYER & Co. Mfg. *N*-anthraquinonylsatins by allowing oxalyl chloride to react upon arylaminoanthraquinones, with the addition of condensation agents such as AlCl₃, Fe₂Cl₆ or P₂O₅. The resulting isatins form valuable initial materials for the production of dyes.

Ger., 282,493, Nov. 21, 1913. F. ÜLLMANN. Mfg. 4-halogen-1-hydroxyanthraquinones and their substitution products, by condensing phthalic anhydride or the like with *p*-halophenols or their substitution products, by means of AlCl₃. The resulting 5-halo-2-hydroxybenzoylbenzoic acids are converted then into the corresponding anthraquinone derivs. by the action of condensation agents.

Ger., 282,647, Apr. 28, 1912. Addition to 280,505 (C. A. 9, 1998). BADISCHE. Chromium compounds of hydroxyanthraquinonesulfonic acids and their derivs. are obtained, according to the principal process, from hydroxyanthraquinonesulfonic acids or their salts, etc., by treatment with Cr-oxide salts, in the heat. If conc. preps. are to be made by evapg., then mineral acid binding agents are added to the solns., before, during, or after the evapn. Bisulfite, silicic acid, glass powder (when employing fluorochrome), kieselguhr, etc., are specified as suitable additions.

Ger., 282,672, Mar. 14, 1913. FARBW. v. M. L. & B. Mfg. condensation products of the anthraquinone series or of their sulfonic acids by bringing into reaction with NH₃ or amines or aminosulfonic acids, with or without contact substances, the products of ethylene dihalides and alizarin obtained according to 280,975 (C. A. 9, 1999). The resulting color bases can be sulfurized.

Ger., 282,818, Dec. 24, 1913. FARBW. v. M. L. & B. Polychloroanthracenes are obtained by treating the Cl addition products of 9,10-dichloroanthracene in the presence of alkali benzylsulfanilates with aq. potash or soda lyes. The products are used as pigment colors, and serve as initial materials for intermediate products, e. g., chloroanthraquinone and dyes.

Ger., 282,889, May 3, 1913. Addition to 268,791 (C. A. 8, 2490). BAYER & Co. Monoazo dyes are obtained according to the principal process by coupling diazotized aminoacylamino-salicylic acids with azo dye components. By substituting the monoacylamino-salicylic acids by aminoacyl compds. of other *o*-aminophenols, their homologs and substitution products, and coupling the diazo compds. of these compds. with pyrazolones or their derivs., or with Me ketol, new azo dyes are obtained which yield bright, fast yellow shades on wool with chrome mordant.

Ger., 282,890, Nov. 9, 1913. KALLE & Co. Indigoid vat dyes are obtained by condensing hydroxythionaphthene, its substitution products, homologs or analogs, with hydroxyazo dyes which contain at least one heteronuclear substituted naphthol residue, especially oxycarbazole or aminonaphthol, as component. The resulting products are halogenated, if necessary. Cf. C. A. 8, 2491, 3242.

Ger., 282,920, Oct. 14, 1913. Addition to 281,010 (C. A. 9, 1847). AKT.-GES. FÜR ANILIN-FABRIKATION. In mfg. thioureas of the anthraquinone series, the urea of 3-aminobenzoyl-*o*-benzoic acid specified in the principal process is substituted by the corresponding thiourea. The product forms, with hydrosulfite and soda lye, orange dyeing vats, from which cotton is dyed in orange yellow shades fast to washing and Cl.

Ger., 282,957, July 15, 1913. BAYER & Co. Yellow wool dyes are obtained by coupling the diazo compd. of *p*-Cl-*o*-anisidine ($\text{Cl}:\text{NH}_2:\text{OCH}_3 = 4:2:1$) with alkyl-aralkylanilinesulfonic acids, such as Et or Me benzylanilinesulfonic acid.

Ger., 282,958, July 20, 1913. H. WEIL. Red wool dyes are obtained by oxidizing aminoaryl-*p*-sulfaminic acids together with *m*-hydroxydiarylamines. The resulting new oxidation products may be dyed out on wool from weak acid bath. They are, however, used as intermediate products for the manuf. of S dyes.

Ger., 283,066, Oct. 31, 1913. BADISCHE. Ketone-like condensation products are obtained by treating hydroxy derivs. of C_{10}H_8 with glycerol or similar agents in the presence of acid condensing agents (KHSO_4). The new products are valuable initial materials for the manuf. of dyes.

Ger., 283,103, Apr. 27, 1913. R. P. SMITH and G. E. DRUM. App. for dyeing, bleaching, and otherwise wet-treating textile materials. Cf. C. A. 8, 3373.

Ger., 283,137, Mar. 15, 1913. E. LEDERER and A. LEDERER. Black dyes are obtained by treating furfuran derivs. with S and an alkali, alk. earth or metal oxide. Wool, cotton, and other cellulose fibers are dyed directly by means of these dyes.

Ger., 283,181, Dec. 7, 1913. R. REXROTH. Device for use in dyeing cops.

Ger., 283,213, July 7, 1913. CHEM. FABRIK GRIESHEIM-ELEKTRON. Mfg. anthraquinone by treating anthracene in the presence of a solvent (e. g., glacial HOAc), first at temps. below 60° , with HNO_3 , and then converting the intermediate product to anthraquinone, in the presence of HNO_3 at higher temps. (90 – 105°). The product is exceptionally pure.

Ger., 283,482, Feb. 3, 1914. AKT.-GES. FÜR ANILIN-FABRIKATION. Mfg. di-anthraquinone oxides by heating α -nitroanthraquinones with alkali carbonates in indifferent solvents (PhNO_2). At first a portion of the nitroanthraquinone is converted into hydroxyanthraquinone which combines with nitroanthraquinone, with the splitting off of HNO_3 , to yield dianthraquinone oxide.

Ger., 283,632, July 8, 1914. R. KOPPISCH. Process and app. for collecting dyes running off with the H_2O in dyeing operations.

Ger., 283,690, Dec. 12, 1913. F. A. BAYER. Variegated designs on paper, textiles, and the like, by applying to the whole surface, or to portions thereof, a mixt. of colors of different sp. grs., and then passing the material over an uneven, heated cylinder or plate. The color is uniform where the material comes in contact with the raised portions of the roll, while the colors at other points do not mix.

Ger., 283,716, Dec. 24, 1912. Addition to 275,570. R. WEDDING & Co. Dyeing with mordanting-colors insol. in H_2O . Cf. C. A. 8, 1676.

Ger., 283,822, Mar. 3, 1914. K. KRANTZ. Treating textile materials with the elec. current for the purpose of bleaching, loosening, dissolving the fat, and cleaning them. The material is led over rolls through the electrolytic bath, back and forth, in such manner that between the reciprocating bands of material are suspended electrodes, which are connected alternately with the + and the - pole. If the salt and soda solns. composing the bath are decomposed by d. c., the deposits of saponified fats on the cathode, in increasing thickness, interfere materially with the treatment of the goods. This objection is overcome by using a. c.

26. PAINTS, VARNISHES AND RESINS.

A. H. SABIN.

Studies of varnish with mirror condenser. P. POOTH. *Mikrokosmos* 3, 59-60 (1915).—Glass plates were covered with an enamel containing ZnO. When the plates were immersed in dil. H_2SO_4 , the ZnO was gradually dissolved, leaving a clear film. When this clear film was washed with H_2O and again treated with dil. H_2SO_4 , further quantities of Zn were detected in the soln. By a microscopic exam. of the clear film particles of ZnO were detected. Microscopic exams. were also made using the "Kosmos" mirror condenser. Treatment of films of ZnO enamels with dil. H_2SO_4 resulted in continual reduction in size of the particles of remaining ZnO until particles of "ultramicroscopic" size resulted. White enamel was thinned with turpentine and a drop of the clear, supernatant soln. was examd. under the microscope with transmitted light. No particles of ZnO were detected. With a dark field and mirror condenser a Brownian movement was seen in the drop. Although it cannot be stated with certainty that this movement was due to particles of ZnO, exam. of drops of varnish containing no ZnO showed no Brownian movement. The phenomena offer an interesting field for ultramicroscopic investigation.

E. W. BOUGHTON.

The resistance of modern lacquer products to alkalis. M. BOTTNER. *Kunststoffe* 5, 157-8(1915).—M. discusses briefly the prepn. and properties of enamel lacquers (e. g., ZnO, lithopone, and other compns. used in hospitals, schools, fermentation cellars, etc.). To det. resistance to alkalis a coat (on glass plates) several weeks old is exposed to the action of cold 10, 20, 25, and 30% solns. of Na_2CO_3 for 6, 12, and 24 hr. periods; finally the solns. containing the plates are warmed to 80-90°. Instead of the above procedure, the plates may be placed in 15 and 30% Na_2CO_3 solns. at 18° for $\frac{1}{2}$ -3 hrs., the temp. then slowly raised (about 30-35 min.) to 80-90°; in another test the temp. is rapidly (within 6 min.) raised to 100° (i. e., to the b. p.). After boiling a few min., the plates are placed in cold 30% NaOH soln. for 40 hrs.; the coat is then examd. as to gloss, color, etc. On washing off with cold H_2O no color should be dissolved or removed in the case of high grade products, which are designated "soda fast." To det. action of NH_3 , squirt 10 and 12.5% NH_3 solns. on the dry plates, cover with a watch glass, and let stand; if the coating after 3-4 hrs. is only slightly dulled on the wetted spots, the enamel is considered satisfactory. If the material softens so that it may be removed by rubbing with a glass rod, it is rejected. To det. resistance to NH_3 gas, an exposure of 15 min. suffices. The luster, color, etc., should not be affected by these treatments. It is noted that NaOH is used very little for cleaning these surfaces, but is used in 5 and 10% solns. as a disinfectant; in this case, the bacterial cultures, which have dried on the coated plate, are rubbed off with cotton wads moistened with 5% NaOH or other disinfectant. The "aspoil" color, white, of Rosenzweig and Baumann, Cassel, conforms to the above requirements and when applied to a smooth surface gives a hard and resistant coating (a substitute for tile). Oil colors, of course, cannot be used under alk. conditions.

F. W. SMITHER.

U. S., 1,147,848, July 27. C. ELLIS. Paint- or varnish-remover formed of light wood tar oil 50, C_6H_6 20, acetone oil 15, ceresin wax 3 and carnauba wax 0.5 parts.

U. S., 1,147,849, July 27. C. ELLIS. Paint- and varnish-remover formed of methylacetone 30, C_6H_6 25, glacial acetic acid 4 and ceresin wax 1 part.

U. S., 1,147,850, July 27. C. ELLIS. Paint- and varnish-remover formed of pyroxylin 5 dissolved in glacial acetic acid 20 and mixed with $PhOH$, acetone, C_6H_6 and wax, with or without various fillers such as flour, Irish moss or sawdust.

U. S., 1,147,851, July 27. C. ELLIS. Paint- and varnish-remover formed of a satd. soln. of dried Na soap in denatured alc. 5, additional alc. 5, CCl_4 9 and ceresin wax 1 part.

U. S., 1,147,852, July 27. C. ELLIS. Paint- and varnish-remover made by forming a soln. of $NaOAc$ 7, in denatured alc. 9, and Me Et ketone 2 parts, slowly adding concd. H_2SO_4 4 parts, to effect condensation of the mixt., and then adding CCl_4 11, crude terpeneol 4, paraffin 1 and NH_4 acetate 0.5 part.

U. S., 1,147,971, July 27. R. S. PERRY. Rust-inhibiting coating for iron and steel; formed of a viscous asphaltic base mixed with 2-20% its wt. of dry finely powdered Na_2CrO_4 , K_2CrO_4 or a dichromate.

U. S., 1,148,851, Aug. 3. K. MIYAZAKI. Lacquered tin plate is made by cleaning the tin plate with dil. alkali soln., neutralizing and then applying alc. followed by a lacquer which readily solidifies and which contains a small % of shellac. After being kept in a humid chamber for 24 hrs. the plate is dried at 120-180°.

U. S., 1,148,908, Aug. 3. E. J. KOONTZ. Coating wood or other thin materials with pyroxylin mixtures. The material is first covered with paint which is allowed to dry, then a soln. of pyroxylin, camphor and amyl acetate is applied, followed by a second coat after the first has dried and a sheet of previously softened pyroxylin also coated with the same mixt. is cemented onto the coated wood.

Brit., 8,126, Mar. 31, 1914. A. FINKLER. A metallic paint is prepd. by mixing Zn white, white Pb, and Al in powder form, adding a spirit soln. of shellac to form a thin pulp, and then adding celluloid dissolved in acetone. Any desired color is obtained by adding pigment to the shellac soln.

Brit., 8,479, Apr. 3, 1914. ERZVERWERTUNGS GES. In treating ores containing ZnO for the production of Zn-bisulfite soln. from which zinc oxide is subsequently obtained, the crude material is treated with combined SO_2 , such as Zn-bisulfite soln., and when all the oxide has thus been converted into monosulfite, the whole is treated with SO_2 gas to dissolve the monosulfite. This avoids the slow action of free SO_2 on ZnO. The Zn-bisulfite soln. for starting the process may be obtained by treating some of the crude material with SO_2 in excess; but for subsequent use, some of the Zn-bisulfite soln. produced in the process is used. Two methods of working are described. In one, a part of the ore to be treated, say 1 ton, is treated with SO_2 to obtain dil. Zn bisulfite; a second ton of ore is then added, the bisulfite reacting upon the oxide to form monosulfite, and SO_2 gas is then passed in to produce bisulfite. Two tons more of ore are then added to produce monosulfite as before, which is treated with SO_2 gas, each further addition of ore being equal to the total amt. previously treated. In the other method, material containing monosulfite is passed through a tower in counter-current with SO_2 gas, the liquor as it leaves the tower being returned to the top of the tower through a mixer to which material contg. oxide is continuously added. When a sufficient concn. is obtained, the liquor is led off to pptg. app.; but a part may be reserved for mixing with the initial liquor, or the Zn is not completely pptd. to avoid the contact of free SO_2 with the oxide material.

Holl., 3,994, Dec. 31, 1913. DE BATAAFSCHE PETROLEUM MAATSCHAPPY. Mfg. drying oils from mineral oil by chlorinating the distn. products of mineral oil and heating with the addition of a catalyzer, preferably Zn. Unsatsd. compds. with strong drying properties are obtained.

27. FATS, FATTY OILS AND SOAPS.

E. SCHERUBEL.

Manufacture of stearin without pressing. B. LACH. *Seifensieder-Ztg.* 42, 493-5 (1915).—A discussion of methods for obtaining stearin, among which are mentioned sepn. by means of differences in solubility in solvents such as alc., sepn. by centrifugals and sepn. by the "swetting process." The last-mentioned process consists in allowing the mass contg. stearin to stand at a temp. somewhat below its m. p. None of these methods is as good as the pressing method. E. SCHERUBEL.

Review of articles published in 1914 on fatty substances. G. FABRIS. *Ann. chim. applicata* 3, 349-71 (1915).—The topics reviewed include glycerides, fatty acids and their salts, general methods of analysis of fatty substances, vegetable fats and oils, animal fats, oils of marine animals, hardened or hydrogenated oils. S. LEVY.

Determination of the iodine number (Hübl index). ALFREDO PAGNIELLO. Turin. *Giorn. farm. chim.* 63, 505-15 (1914).—P. has studied the influence on the exactness of the detn. of the I no. of compds. such as $(\text{NH}_4)_2\text{CO}_3$ which are added to the $\text{Na}_2\text{S}_2\text{O}_8$ soln. in order to prevent decomp. of the latter. A soln. (A) was prepd. from 50 g. $\text{Na}_2\text{S}_2\text{O}_8$, 10 g. $(\text{NH}_4)_2\text{CO}_3$ and sufficient cold, boiled, distd. H_2O to give a vol. of 2 l., while a 2nd soln. (B) was prepd. in a similar manner with omission of the $(\text{NH}_4)_2\text{CO}_3$. The I no. of a series of fats (peanut, cottonseed, cod liver, sweet almond, hazel nut (roasted), poppy, tomato seed, castor, sesame and olive oils, suet, margarine and cacao, coconut and butter fats, etc.) was detd. by using each of the 2 solns. (A) and (B); the I no. indicated by the latter was in each instance considerably greater than that shown by the former. One g. $(\text{NH}_4)_2\text{CO}_3$ was found to be equiv. to 0.348 g. I (in the reaction between these compds. which takes place during titration with $\text{Na}_2\text{S}_2\text{O}_8$), so that 0.005 g. $(\text{NH}_4)_2\text{CO}_3$ (the amt. present in 1 cc. of soln. A) corresponds to 0.0017 g. I; 0.88 cc. of soln. A was, therefore, equiv. to 1.0 cc. of soln. B when referred to the same amt. of I in the titration of the blank (amt. of I present before reaction of the latter with the fat). Another error which is due to use of soln. A and which influences the final result in the same sense as the above is due to the action of $(\text{NH}_4)_2\text{CO}_3$ on fatty acids which may be present in the fat under exam. and also to the ready decomp. of $(\text{NH}_4)_2\text{CO}_3$ and consequent partial sapon. of the fat; in either case CO_2 is liberated and reacts with $\text{Na}_2\text{S}_2\text{O}_8$, thus increasing the titer. The influence of the foregoing 2 errors is well illustrated by the following example in which 37.35 cc. and 12.80 cc. of soln. B were required for titration of the original and residual amts. of I in the detn. of the I no. of a certain fat; the vol. of soln. A corresponding to the amt. of I absorbed was, therefore, 24.55 cc. The corresponding calcd. vols. of soln. A for the same wt. of the same fat were 32.86 cc. ($= 37.35 \times 0.88$) and 11.26 cc. ($= 12.80 \times 0.88$), resp.; the calcd. vol. of soln. A corresponding to the amt. of I absorbed was, therefore, 21.60 cc. The corresponding observed values of soln. A were, however, 33.00 cc. and 16.85 cc., resp., thus indicating a vol. of 16.15 cc. as equiv. to the amt. of I absorbed. The negative error due to reaction of $(\text{NH}_4)_2\text{CO}_3$ and I, therefore, appears to be const. in the titration of the blank, but is exceeded in the titration of the residual I by the positive error due to the action of $(\text{NH}_4)_2\text{CO}_3$ on fat and fatty acids, thus producing final errors in the titration of the original and residual I which act in the same sense and indicate a diminished

I no. When the method of the Swiss Pharmacopeia was used for detg. the I no. the indicated value of the latter was invariably greater when soln. A was used than when soln. B was employed. In this case the action of $(\text{NH}_4)_2\text{CO}_3$ on I, fats and fatty acids is prevented by the neutralizing action of the AcOH which is present, while the reaction between the latter and $\text{Na}_2\text{S}_2\text{O}_3$ is in turn impeded by the $(\text{NH}_4)_2\text{CO}_3$. The above discrepancy between the results obtained by use of solns. A and B is probably due to the excess of AcOH employed, the small amt. of fat which is used in the detn. and possibly to other factors. P., therefore, recommends that a simple soln. of $\text{Na}_2\text{S}_2\text{O}_3$ in distd. H_2O (freed from CO_2 by prolonged boiling and then cooled) be used for iodimetry in connection with detn. of the I no. of fats; this soln. should be protected from the light and kept in a cool place. The original method of Hübl, while requiring more time, is considered more exact than the modified methods which are often used. P. recommends the method employed by the chem. labs. of the Italian customs service (*Ann. lab. centr. Gabelle* 5, 394).

H. S. PAINE.

Emulsification and detergent action. S. A. SHORTER. *J. Soc. Dyers, Colourists* 31, 64-9 (1915).—A small amt. of oil shaken up with a much larger amt. of water will be broken up into small drops which will rise or fall through the water and coalesce to form a continuous mass of oil at the top or bottom when the shaking ceases. Addition of certain substances to the water modifies the process in 2 ways: (1) by preventing the coalescence of the oil into droplets, (2) by causing the oil to be split up into smaller drops by the same degree of shaking. Some emulsifying agents produce both of the above effects, others only the first. Emulsification is closely connected with the stability of bubbles and films. Plateau ascribes the property of forming durable films (1) to viscosity, (2) low surface tension of liquid; this explanation is unsatisfactory since many liquids with high viscosity and low surface tension do not form durable films, while the converse is sometimes true. Marangoni first gave an explanation in accordance with modern views, ascribing foaming power to a surface pellicle. In the case of a foaming soln. the surface pellicle is formed from the dissolving substance. If the addition of a solute lowers or raises the surface tension of the solvent, the solute will exist in higher or lower degree of concn. in the surface layers than in body of the soln. (proved by Gibbs). S.'s expts. with solns. of saponin, peptone, and albumin in the case of which a thickening of the surface layer proceeds for several weeks without sign of equil. indicates that the process is thermodynamically irreversible and, therefore, outside the scope of Gibb's theory. Donnan's explanation of how adsorption layers contribute to the stability of an emulsion by preventing the coalescing of 2 droplets of oil already emulsified when they collide with or touch a layer containing double the amt. of absorbed substance is unsatisfactory. The true explanation is that non-coalescence is due to the quasi-solidity of the surface layer. When a little olive oil is poured upon a dil. soln. of NaOH, long cylinders of oil are projected into the soln.; they become very thin and break up into small drops, the process of emulsification being almost spontaneous, due (1) to the rapidity of formation of soap layer, and (2) the plasticity of the layer. The stability of emulsions upon diln. depends upon the chem. reversibility of the process of adsorption. Alkali and soap emulsions are easily made but are unstable. Many colloids which form stable adsorption layers, will make an emulsion more stable if added to it. Other interesting problems connected with emulsification are: (1) the effect of concn. of the emulsifying agent on the emulsifying power, (2) the interchangeability of the inner and outer phases, *i. e.*, the possibility of emulsifying water or an aq. soln. in an oil. The study of detergent action involves not only the question of emulsification but also a knowledge of the properties of suspensions, such as d. of particles, elec. charge, and "Brownian motion." S. is conducting expts. to det. the relative parts played by the hydrolysis alkali and undecomposed soap in producing emulsification. Two sub-

stances are used, one pure benzene, the other benzene and oleic acid, and surface tension measurements and direct measurement of the emulsification power are made. Detn. already made show that though the addition of oleic acid to benzene lowers the tension against water it has no effect on the tension against soap soln.; therefore, hydrolysis alkali has no specific surface action similar to that exerted by ordinary alkali. S. hopes that expts. will lead to a standard method for detg. what may be termed "detergent neutrality of soap."

L. A. OLNEY.

Methods of purification of sulfide oils and of industrial oils in general. F. CANZONERI. Bari. *Ann. chim. applicata* 3, 344-9(1915); cf. C. A. 8, 3510.—Oils may be decolorized by special treatment alternately with animal C and Florida earth or fullers earth, or by agitating at intervals during 24 hrs., first with Al hydrosilicates and then with C, washing the product and filtering under pressure, taking account of the temp., the condition of the hydrosilicates and C, and the proper quantities. For strongly colored olive oils, called common or pressure oils, agitate with $\frac{1}{4}$ vol. NO in presence of H_2O (on the walls of the contg. vessel), later washing thoroughly with slightly alk. H_2O . Satisfactory results may also be obtained by warming the oil to 90-100°, and agitating strongly after adding about 0.5% K_2CrO_4 dissolved in a little H_2O , in presence of conc. HCl (5-6% of the wt. of the oil), washing and filtering. Oil so treated has a hardly observable yellow color and is not altered; no wt. is lost. The lower the acidity of the oil, especially of the sulfide oils, the less difficultly is it decolorized. High acidity also makes neutralization difficult; in such a case there is formed a slime of alk. salts that emulsifies the oil and hinders the sepn. Often the oil will dissolve the soap and retain it strongly. Before neutralizing with KOH or NaOH, it is best to reduce the acidity of high acid oils by mixing with oils of low acidity. The concn. of soln. and the temp. are important. Brine should be added to avoid emulsification. To prevent losses when emulsions have been formed, the residual masses are used in the subsequent operations. When the acidity of sulfide oils is above 50%, the NaOH process is inapplicable, but good results can be obtained by employing $Ca(OH)_2$ (7 parts to 100 parts oil) upon the oil heated to 120-50°, and successive extn. of the resulting slime with petroleum ether or better with acetone. Neutralization and decolorization can be performed simultaneously by treating the warm oil with the calcd. amt. of $Ca(OH)_2$ and 2-3% fullers earth or C. Industrial losses of the extractives must be guarded against by the use of closed and continuous systems.

S. LEVY.

Plant oils. M. RAFFO AND G. ADANTI. Bologna. *Boll. chim. farm.* 53, 33-6 (1914).—Detn. of viscosity as a criterion for oils may be more advantageously applied to the volatile fatty acids derived from the oils than to the oils themselves; the differences which are thus obtained are much more significant and the method may be employed for the detection of foreign oils which may have been added. The viscosity values of the most important plant oils are shown in 1 table, while in a 2nd table is shown the influence of added foreign oils on viscosity in a number of instances.

H. S. P.

Heating of cottonseed—its causes and prevention. E. H. R. BARROW. *J. Ind. Eng. Chem.* 7, 709-12(1915).—The presence of moisture is conducive to germination and hence to rise of temp. The presence of microorganisms is another cause of deterioration of the seed. The keeping qualities can be improved by allowing access of air but this requires too much storage space; drying so as to bring down the moisture content is also effective but expensive and if carried too far may even spoil the product. After expts. with various chemicals, including $FeSO_4$, $NaNO_3$, $CuSO_4$, Na_2CO_3 , $CaCl_2$, CH_3O , $MgCO_3$, $NaCl$, pipe clay, salicylic acid, $Na_2B_4O_7$, $H_2B_4O_7$, B. has worked out a process whereby heating and decompn. are prevented by the addition of NaCl. In this process the initial temp. of the seed must not be too high, and the NaCl must be finely divided, dry and loose. About 5% by wt. of salt is used but fully 75% of this is removed in

cleaning. As far as can be seen up to the present, there is no increase in damaged seed and no falling off in the available oil yields. The meal from treated seed is as good as that from untreated. Most of the NaCl is found in the hulls and lint; the effect on the hull is, therefore, beneficial as it lowers the amt. of NaCl which must be added to the fodder. The quality of the lint is also improved. The effect on the crude oil is still problematical.

ISADOR MILLER.

The fatty oil from the seed of *Styrax japonica*. HARUKICH OKADA. *J. Pharm. Soc. Japan* 1915, No. 400, 657.—The seed, pressed in the cold, yields 45% of greenish yellow fluorescent oil, having an acid no. of 1.1, a sapon. no. of 190.5 and a Hehner value of 94.7%. The solid acids consist of equal parts of stearic and palmitic, while the liquid acids are oleic and linoleic. The unsaponifiable substance crystallizes in glistening needles, m. 116°.

H. L. OLIN.

Production, botanical composition and volatile strength of American wild mustard seed. A. L. WINTON AND J. H. BORNHANN. *J. Ind. Eng. Chem.* 7, 684-6(1915).—The first part of the article contains a general discussion of the subject. In the second part, analytical data are given on 2 samples of charlock, 3 of pure brown mustard and 14 of commercial wild mustard seed.

ISADOR MILLER.

A new oil-bearing nut in the Philippines. ANON. *J. Roy. Soc. Arts* 63, 800 (1915).—A tree, not yet fully identified but believed to belong to the genus *Amoora* or *Dysoxylum*, produces a seed from which may be expressed about 45% of a dark, fatty oil, suitable for soap making. It is not a drying oil and is not edible.

E. H.

Soft soaps without potassium carbonate. J. B. *Speisensieder-Ztg.* 42, 493(1915).—Two formulas are given. Linseed oil fatty acids are used and K_2CO_3 is replaced by Na_2CO_3 .

E. SCHERUBEL.

Manufacture of Turkey red oil (ERBAN) 25. Edible Fats and Oils Section of the Swiss Food Regulations (KREIS) 12.

Brit., 21,144, Sept. 18, 1913. C. NETZ & Co. and F. KOCH. Extracting fats. See Ger., 267,487 (C. A. 8, 828).

Brit., 7,670, Mar. 26, 1914. MÜLLER SPEISEFETTFABRIK AKT.-GES. A catalyst, particularly for converting unsatd. fatty acids or their glycerides into the satd. compds., is composed of Ni borate, or the substance obtained from Ni borate (e. g., Kahlbaum's prepn. $NiB_2O_4 \cdot 6H_2O$) by heating in dry H to 250-300°. Cf. C. A. 8, 1334.

28. SUGAR, STARCH AND GUMS.

A. HUGH BRYAN.

Decrease of sugar content of sugar beets on storage. G. FOTH. *Z. Spiritusind.* 38, 247(1915).—A sample of sugar beets of 14.9% sucrose showed only 9.8% after 5 months. The sample was well preserved and F. has no explanation for this great loss in sugar.

L. W. HAAS.

Determination of the viscosity of fillmasses. JOSEF ROUBÍNEK. Dobrovic. *Z. Zuckerind. Böhmen* 38, 578-87(1914).—Because of their great viscosity it is not practicable to det. the viscosity of fillmasses by means of viscosimeters based on the principle of the rate of flow. R. has, therefore, devised for this purpose a viscosimeter based on the principle of the detn. of the rate of free fall of a wt. through the liquid, the viscosity of which is to be detd. A hollow, flattened metallic ball weighing 150 g. is held by an attached, thick wire at a definite height through the action of an electromagnet; when the circuit controlling the latter is broken the ball falls through a definite,

const. distance (in this case 250 mm.). After falling this distance the ball is checked by means of a metallic disk (attached to the above mentioned wire) which comes in contact with a steel spring, thus closing the elec. circuit and actuating the electromagnet. An elec. light is flashed at the moment of closing the circuit so that the time of fall may be measured by means of a stop watch; a clock with elec. control may also be introduced in the circuit so that it is started and stopped at the moments of the beginning and end of the fall, resp. A H_2O -jacketed metallic vessel, 80 mm. in inside diam. and 240 mm. in height, is filled to a definite height with the fillmass and placed in a H_2O bath which is heated electrically to a const. temp.; the vessel containing the fillmass is placed directly beneath the ball when the latter is in an elevated position. After-product fillmasses which had been prepd. by boiling the sirup from the initial product and which had an av. actual quotient of purity of 76-79 were used for the 1st expts. The finally boiled product is usually stirred in the crystallizer for 4-7 days, the supersatn. coeff. and the viscosity being reduced by addition of calcd. amts. of H_2O at definite intervals during the course of crystn. so that the mother sirup has become molasses by the 7th day. The expts. were, therefore, planned so that the influence of both temp. and density on viscosity could be detd. The latter was detd. at 5° intervals between 90 and 55° inclusive for each definite diln. (6 in all) of the original fillmass with H_2O and the results were expressed in terms of the viscosity of the original fillmass at 90° (the temp. at which it entered the crystallizer) as unity. In addition it was possible to measure the viscosity of the 5th diln. at 50° and that of the 6th diln. at both 50° and 45° ; the viscosity at the other dilns. was too great for accurate measurement at temps. below 55° . The resulting data are both tabulated and expressed graphically; a composite curve showing the influence of changes of both temp. and density on viscosity during the course of crystallization is also given. The influence of temp. on viscosity is greatest at lower temps., an abrupt increase in viscosity taking place (with decreasing temp.) at approx. 75° ; in order to promote crystn. it is especially necessary, therefore, to add H_2O to the contents of the crystallizer at temps. under 75° . The temps. at which it is desirable to add H_2O in order to maintain the appropriate viscosity for rapid crystn. may readily be detd. from the tabulated data. Addition of H_2O may be avoided by employing a lightly boiled sirup, but in this case an insufficient boiling effect is obtained and the results are not so satisfactory. In case it is desired to obtain a molasses of approx. 60 coeff. of purity from a sirup with an actual coeff. of 77-80, it is necessary to reduce the coeff. of the mother sirup of the fillmass to 66-68 by boiling *in vacuo*; in this case the molasses would show an actual coeff. of 60-61 and an apparent coeff. of 58-60. On diln. of the boiled product to 10-11%, the coeff. of the mother sirup would be increased to 70 and a molasses with a quotient of 63 would be obtained; this is the disadvantage of the use of lightly boiled sirups. Various analytical data of the fillmasses and mother sirups (the viscosity of which had been detd.) are tabulated so as to be correlated with the temp. in the crystallizer, the duration of stirring and the time at which H_2O was added (also the amt. of the latter employed).

H. S. PAINE.

U. S., 1,149,067, Aug. 3. P. KESTNER. Brazilian or "areado" sugar is produced by flowing melted sugar containing a small % of H_2O in a thin layer over a horizontal plate or endless belt which is rapidly vibrated longitudinally while the sugar is allowed to solidify on it.

29. LEATHER AND GLUE.

LLOYD BALDERSTON.

Utilization of leather refuse. K. MICKSCH. *Kunststoffe* 3, 147-9, 161-3(1915).
—A general review.

F. W. SMITH.

Sumac industry in Sicily. E. ASCIONE. *L'industria* 29, 227, 253, 261, 278, 297 (1915); *Ann. chim. applicata* 3, 376(1915). S. LEVY.

Some chromium salts used in tanning. M. MARCHIONNESCHI. *Ann. lab. chim. cent. delle Gabelle* 7, 249(1914); through *Ann. chim. applicata* 3, 374(1915).—The author treats of combinations of basic Cr sulfates with Na_2SO_4 . S. LEVY.

Manufacture of technical fermented lactic acid, the so-called "leather lactic acid." W. HOFFMANN. *Chem. Zig.* 39, 525-6(1915).—H. gives directions for making the sugar from starch, the prepn. of the cultures, the carrying out of the fermentation and the purification and concn. of the acid. Cf. *C. A.* 4, 1648; 7, 2647. J. H. MOORE.

Brit., 7,467, Mar. 24, 1914. F. HIRSCH. Addition to 5,863, 1914 (*C. A.* 9, 2325. **Chrome tanning.** See Ger., 274,549 (*C. A.* 8, 3136).

Brit., 8,028, Mar. 30, 1914. BADISCHE. Decolorizing or bleaching leather by treating it with a synthetic tanning agent of the aromatic series described in one or other of the specifications 8,511, 1912 (*C. A.* 7, 3251), 24,216, 1912 (*C. A.* 8, 1357), 7,137, 1913 (*C. A.* 8, 2780), or 18,258, 1913 (*C. A.* 9, 393). In examples: (1) leather impregnated with darkly colored tanning agents is suspended in a soln. of the product obtained according to example (2) of 7,138, 1913 (*C. A.* 8, 2638) for a time sufficient to bleach or decolorize it, and is then washed, as by passing through lukewarm H_2O , and dried slowly in the dark; (2) leather which has been well exposed to the air and dried is brushed with the soln. of example (1) above, washed, and dried as before; (3) leather is suspended in a sumac ext., to which has been added a soln. of the product obtained according to example (2) of 24,216, 1912, for some time, and then washed and dried in the dark.

30. RUBBER AND ALLIED SUBSTANCES.

R. T. STOKES.

The presence of acetaldehyde and hydrocyanic acid in the latex of *Hevea brasiliensis* Müll. Arg. M. KERBOSCH. Tjinjirean. *Rec. trav. chim.* 34, 235-8(1915).—The fresh latex has a peculiar odor and expts. were made to det. the nature of these volatile substances. Three l. of the fresh latex having an acid reaction were steam-distd. to obtain 300 cc. of distillate. If the latex was not acid, tartaric acid was added before the distn. The 300 cc. were again distd. and the first 30 cc. tested at once. The distillate was neutral, and gave the fuchsin + SO_2 test for aldehydes, reduced $\text{Ag}_2\text{O}-\text{NH}_3$ soln., Fehling soln., and Nessler reagent, gave CHI_3 with $\text{I} + \text{KOH}$, a blue color with Na nitroprusside and piperidine, and Lewin's test (*Ber.* 32, 3388(1899)) for AcH. With $p\text{-O}_2\text{NC}_6\text{H}_4\text{NHNH}_2$ it gave a *p*-nitrophenylhydrazone, m. 128° , which is identical with that of AcH. The amt. of AcH in 3 l. corresponds to 0.0017 g. Heretofore AcH has been found very rarely in nature. It has been found by Blanksma (*C. A.* 8, 359) in the prepn. of certain essential oils and associated with EtOH in the green parts of plants under anaerobic respiration. The filtrate from the hydrazone was neutralized with CaCO_3 and the distillate examd. for EtOH; none was found. The AcH is, therefore, not a product of anaerobic respiration. Rosenthaler (*C. A.* 8, 2410) states that CH_3O and AcH are products of oxidation of a number of substances occurring in plants, like rhamnose and lactic acid. K. does not think that AcH could be formed by oxidation in this case, for it would be difficult to explain why the easily oxidizable caoutchouc is not oxidized also. The latex obtained while the leaves were falling contained less AcH. Gorter (*C. A.* 6, 3310) found phaseolunatin in the seeds of *Hevea*,

which led K. to test for AcH and HCN in the latex. The fact that the hydrazones obtained melted at 128° , and when mixed with the same deriv. of acetone (m. 148°) showed a sharp lowering of the m. p., indicated that acetone was absent. The presence of HCN was shown by the Prussian blue test. E. J. WITZEMANN.

Ger., 282,817, Jan. 3, 1912. BAYER & Co. Mfg. erythrene or its homologs and analogs by breaking down the double mols. of these hydrocarbons, in the undild. state, excepting dipentene, by heating, if necessary, with the addition of suitable catalyzers. E. g., the double mol. of α -Me-butadiene is gasified, drop by drop, and the vapors are conducted through a tube heated to $500-700^{\circ}$, α -Me-butadiene collecting in the receiver. Ag gauze, Cu gauze, or Pt wire mesh may be used as catalyzers. The heating can be effected catalytically. Cf. C. A. 9, 833.

Ger., 283,162, Sept. 20, 1913. Addition to 251,217 (C. A. 7, 427). BAYER & Co. Erythrene is obtained, according to the principal patent, by the breaking down of petroleum or petroleum fractions or residues, with the aid of hot contact bodies, etc. Better yields, are obtained when the heated contact bodies are placed in the liquid petroleum. Elec. heated contact bodies are used. Cf. C. A. 9, 1136.

Holl., 2,659, May 22, 1913. N. V. MAATSCHAPPIJ TOT EXPLOITATIE VAN HET TECHNISCH SANDERS-BIRNIE, S'GRAVENHAGE. Device for coagulating caoutchouc.

CHEMICAL ABSTRACTS

Vol. 9.

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No. 19.

I. APPARATUS.

L. C. JONES.

The development of the Bunsen burner. A contribution to the history of the laboratory heat supply. A. KISTNER. Karlsruhe i/B. *Chem. App.* 2, 185-7(1915).

J. H. MOORE.

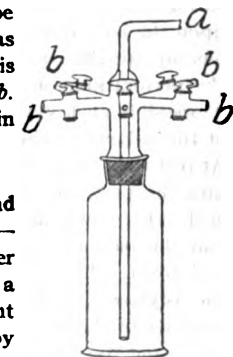
A study of the quality of platinum ware. GEORGE K. BURGESS AND P. D. SALE. *Bur. of Standards, Sci. Paper No. 254*, 28 pp.(1915); *J. Ind. Eng. Chem.* 7, 561(1915).—A method is given for detg. the purity of Pt ware without injuring in any way the article tested (cf. *C. A.* 8, 2539). The loss of wt. of a crucible upon heating was detd. by use of a graphite, porcelain-lined, elec. heated furnace at 1200°, the crucible being subjected to heating periods of 2 hrs., before and after which careful weighings were made. The loss of wt. per 100 sq. cm. of practically Fe-free crucible surface at 1200° ranged from 0.71 to 2.69 mg. per hr., the smaller losses referring to crucibles containing Rh and the larger losses to those containing Ir. Fe as impurity decreases the rate of loss of wt. but its presence is objectionable on account of the formation of the sol. oxide. Detns. of magnetic susceptibility did not give satisfactory indication of Fe content. It appears possible, however, by use of the tables and curves given, and by a simple thermoelec. and microscopic exam. of a crucible, to predict its probable loss of wt. on heating closely enough for analytical purposes. A good crucible should be of Pt with 3 to 5% Rh for stiffening, practically free from Fe and Ir, and containing no other detectable impurities. If these requirements are met the e. m. f. at 1100° against pure Pt is less than 8 and more than 5 millivolts (cf. *C. A.* 8, 2539). The cryst. structure as shown under the microscope is clearly that of Rh and not Ir, and chem. test of the surface of the crucible, after heating 2 hrs., fails to show presence of Fe.

PAUL D. FOOTE.

Gas wash bottle with several distributing tubes. ANON. *Z. angew. Chem.* 28, I, 316(1915); see fig.—To overcome disadvantages of T-tube connections, unequal pressure and irregular distribution of gas (e. g., H_2S), the app. shown in the cut was devised. Tube *a* is attached to the gas generator and connections are made at *b, b*. The distance between the inlet and outlet tubes is equal in each case, permitting a uniform pressure at all cocks.

F. W. SMITHER.

Apparatus for the study of reactions between gases and liquids. E. E. REID. *J. Am. Chem. Soc.* 37, 2112-4(1915).—The app. devised permits of introducing a highspeed stirrer inlet and outlet tubes and, if desired, a sampling tube through a comparatively small stopper, the whole being made gas-tight for both moderately increased and diminished pressures by means of a mercury seal. It has been satisfactorily used at temps. up to 220° with the stirrer revolving at the rate of 3000-4400 r. p. m. under a pressure of 3 ft. of H_2O .



CHAS. A. ROUTLER.

A thermobalance. KOTARO HONDA. *Sci. Repts. Tohoku Imp. Univ.* [2] 4, 97-103 (1915); 2 plates.—The balance is designed to study changes in wt. which are due to changes in temp., both wt. and temp. being measured during the change. The app. consists of a balance beam with silica-glass arms and central agate knife edge and plate: At one end of the beam a thin porcelain tube is rigidly attached, hanging vertically. It holds a Pt cup and extends into a small, porcelain tube, Pt-wound, elec. furnace. The height of the furnace is adjustable with rack and pinion and it has a Ni tube lining to secure even distribution of heat. At the other end of the balance is attached a spiral spring which is immersed in an oil bath in a Dewar flask and attached to the bottom of the flask. Thus the temp. of the spring is const. The flask is mounted on a system of levers, similar to a level trier, so that its vertical movement is controlled and measured by means of a micrometer screw and scale. The deflection of the balance beam is measured by mirror, telescope and scale; its motion is damped by a cylinder, with central partition, immersed in oil. Scale pans over either end of the beam allow for control and calibration. Within small limits the deflection of the beam may be used to measure changes in wt.; for greater accuracy, the null method, by raising or lowering the Dewar flask through measured distances. A Pt-PtRd thermocouple is inserted, through the thin porcelain tube, in the Pt cup in the furnace. Its cold junction is just above the central knife edge. Connection is made to the galvanometer by means of weak copper spirals, extending out from the beam on either side at right angles. Measurements were made on the dehydration of $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$; dehydration and decompn. of $\text{MgSO}_4 \cdot 4\text{H}_2\text{O}$; decompn. of CaCO_3 ; of the change of structure of CrO_3 at high temps. $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ begins to lose H_2O at 130° and is dehydrated by 260° . The rate of loss is about 0.0992 g. per hr. $\text{MnSO}_4 \cdot 4\text{H}_2\text{O}$ loses 3 mols. H_2O between 70° and 110° , the other mol. between 230 and 260° . The decompn. begins at 820° and is complete at 950° . Observed and calc. results agree within 2 to 5%. CaCO_3 begins to decompose at about 500° , the rate increasing with rise in temp.; it reaches a max. at 820° and terminates at 880° . Observed and calcd. wts. agree within 2.5%. The changes in CrO_3 take place as follows: $80\text{--}100^\circ$, slight loss due to moisture; $320\text{--}340^\circ$, $\text{CrO}_3 \rightarrow \text{Cr}_2\text{O}_3$; about 405° , $\text{Cr}_2\text{O}_3 \rightarrow \text{Cr}_2\text{O}_5$; 460° , $\text{Cr}_2\text{O}_5 \rightarrow \text{Cr}_2\text{O}_7$. In this last case the quant. agreement is not very good. F. A. HARVEY.

Heusser multiple weight attachment for chemical balances. W. HEUSSER. *Eng. Mining J.* 100, 314 (1915).—The balance, explained by illustrations, was designed to eliminate the tedious task of picking up and placing small wts. upon the pans, and arresting the balance each time for the purpose. The pan hanger on the right side carries a perforated plate or grid; back of this hanger a short column is solidly mounted upon the base plate, carrying 9 movable levers. The front end of each of these levers has an upright conically tipped staff, which moves centrally and vertically through the perforations of the grid. The levers are operated from the outside by means of depressible push keys arranged similarly to a typewriter keyboard and located in front of the balance. The wts. are in the form of disks, each having a central perforation. At rest they are supported by means of the conically tipped staffs, which extend partly into the perforations. When in use they are deposited in countersunk holes in the grid. These wts. may be deposited and again picked up independently of each other, and the balance-beam is free to swing, by simply pushing the depressible keys up and down. The value of each wt. is plainly marked upon an index plate placed above the keyboard, and the possibility of making mistakes is positively excluded. The capacity of the wts. for assay balances is 221 mg. and is divided into 1, 2, 3, 5, 10, 20, 30, 50 and 100 mg. For extremely delicate weighings (using 0.5 mg. rider), the capacity is only 110 mg. It is claimed that these balances will save 50% of the time consumed in weighing with an ordinary balance. For analytical balances, the wts. are 10 times heavier, or 2210 mg. in all. F. W. SMITHER.

Convenient weighing pipet. FRANK HALL. *J. Am. Chem. Soc.* 37, 2062-3(1915).

—An ordinary pipet body was fitted with a stopcock at the bottom, close to the main bulb, and a short neck of thick-walled glass with a small bulb blown in it. This bulb served as an overflow when filling, and prevented the neck from slipping through the supporting hook which hangs from a balance arm. E. B. MILLARD.

Simple apparatus for determining the melting point of substances which are poor conductors of electricity. IGNACIO GONZÁLEZ MARTÍ. Madrid. *Anales soc. españ. fis. quim.* 13, 160-2(1915).—A Cu vessel *A* is attached by means of a screw clamp to an upright rod *T* which is supported in an Fe base. An Fe vessel *B* is supported within the vessel *A* by 3 thick wires (attached radially to *B* at the top) which rest in notches in the upper rim of *A*. A thermometer and a Cu wire *V* 3 mm. in diam. are supported by a clamp attached to an upright rod *S* which is inserted in the same base as the rod *T*; the thermometer and wire pass nearly to the bottom of *B*, but do not touch the latter. Binding posts *M* and *N* inserted in the metallic base near *S* and *T*, resp., are connected with the wire terminals of an elec. circuit containing an elec. bell and storage battery or cells. The vessel *A* constitutes the heating bath and is filled with an appropriate liquid; *B* is almost completely filled with Hg and the wire *V* is coated (e. g., by dipping in the fused mass) with the substance the m. p. of which is to be detd. If this substance is a poor conductor of electricity the circuit remains open. The bath *A* is then heated and when the substance melts the circuit is closed by contact between the wire *V* and the Hg in *B*, thereby causing the bell in the circuit to ring; at this signal the thermometer is immediately read. H. S. PAINE.

Apparatus for hastening evaporation. B. FREEMAN. *Chem. Analyst* 14, 11(1915).—A current of air is passed through a coil of block tin tubing in a water bath, and allowed to blow across the surface of the liquid to be evapd. H. M. LANCASTER.

Platinum baskets for use in combustion furnaces. W. G. GRANT. *Chem. Analyst* 14, 24-5(1915).—Sheet Pt can be cut and folded into the form of a frustum of a hollow cone. The base is covered by folding in part of the wall, thus forming a conical vessel which can be filled with ignited asbestos. A glass tube is then closely fitted to the small end of the cone, and passed through the perforation in the stopper of a combustion tube, the Pt remaining just inside to protect the stopper. H. M. L.

Plug for combustion furnace. R. S. COCHRAN. *Chem. Analyst* 14, 9(1915).—To protect the stopper of the ordinary horizontal combustion tube, a plug of asbestos is much better than loose fibers. Moisten some ordinary asbestos with water, and squeeze in the hand into a roughly cylindrical form about 1.5 in. long and of same diam. as the tube. Wind a doz. turns of Nichrome wire (No. 4, B & S) in a spiral around the asbestos, and then about 10 turns lengthwise. Make a small loop at one end to serve as a handle. The finished plug slips loosely into the tube. H. M. L.

Flicker photometer attachment for the Lummer-Brodhun contrast photometer. E. F. KINGSBURY. *J. Frank. Inst.* 180, 215-23(1915).—Chiefly details of construction of a flicker attachment to replace the telescope of the ordinary L.-B. contrast photometer when it is desired to measure differently colored lights. A discussion of photometers in general has been included. E. B. MILLARD.

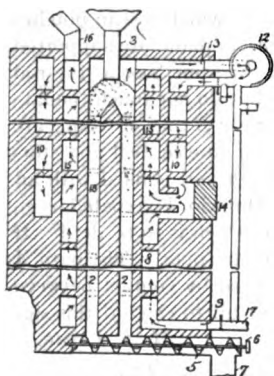
Practical apparatus for the filling of ampoules without employing a vacuum. MURAT AND A. LACOSTE. *J. pharm. chim.* 12, 22-4(1915).—Ampoules holding either 1 cc. or 1.5 cc. are filled from a 10 cc. buret on the principle of communicating tubes through a bent capillary tube in one piece with the buret. A reservoir tube is also attached to the latter, and one stopcock regulates the filling of the buret, another that of the ampoule. S. WALDBOTT.

Home-made still. ANON. *Elec. World* 66, 366(1915).—A 12-in. Fe pipe, flanged,

headed and set upright upon a tripod forms a cooler for a 35 ft. Cu coil. Cooling H_2O enters at the bottom and the overflow is near the top. The Cu coil, 10×35 , inside of the Fe pipe connects at one end to the station steam-header carrying 175 lbs. Valve adjustment in the steam and cooling H_2O lines regulates the flow of pure H_2O . A diagram is given.

W. H. BOYNTON.

Vacuum pans (KERR)₄28.



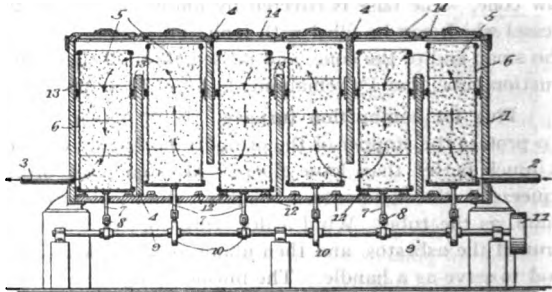
U. S., 1,147,706, July 27. W. R. CLYMER. Furnace for calcining granular carbon or other materials. The charge to be calcined passes from the hopper 3 downwardly through the vertical shafts 2 which are heated by burning gases produced from the charge itself, circulated through the passages 8, 10 and 15 by a blower, 12, or by gas from an outside source.

U. S., 1,148,259, July 27. F. SPARRE and W. E. MASLAND. Apparatus for chlorinating saturated hydrocarbons. The liquid to be chlorinated is charged with Cl in an opaque absorption chamber, then led through a series of glass tubes in which it is exposed to a Hg vapor light. HCl formed is recovered in an absorption tower.

U. S., 1,148,364, July 27. C. A. DUNCAN and G. L. SHOUP. Acetylene generator.

U. S., 1,149,440, Aug. 10. F. B. HAYS. Milk bottles or other receptacles are made by satg. sawdust with Na silicate soln., molding and pressing the jelly-like mass formed, slowly drying and then waterproofing with paraffin.

U. S., 1,148,501, Aug. 3. C. G. COLLINS. Apparatus for separating sulfur or other suspended solids from gases or fumes. See fig. Gases introduced through the pipe 2 are passed successively through the compartments which are sepd. by the vertical baffle plates 4. Each of these compartments is nearly filled by a body of filtering material, *e. g.*, excelsior or asbestos, held within a cage, and the cages are alternately agitated by rods operated by cams 10 on the shaft 9, causing the deposition of the sepd. solids in the bottom of the app.



U. S., 1,150,730, Aug. 17. W. BANWARTH. Acetylene generator.

Brit., 8,725, Apr. 7, 1914. J. S. OWENS. In testing air, an app. for measuring the amt. of suspended matter comprizes aspirating appliances, a filtering app. in which the filtering-member is a disk of paper of standard size, and a scale of shades of color for comparison with the discoloration produced on the filtering disk.

Brit., 9,344, Apr. 15, 1914. F. HABER and R. LEISER. Gas testing apparatus, for detecting variations in compn., comprizes 2 organ pipes of the closed labial type which are blown by the same gas current, one of the pipes being provided with a membrane and enclosing a vol. of a standard gas, and the other pipe being provided with

a membrane or not, and containing the gas to be tested. The variations in compn. in the gas are detd. by the "beats" when the pipes are sounded together.

Brit., 9,643, Apr. 18, 1914. N. G. BITHRIE. A filter for oil comprizes a chamber divided by a horizontal filter into 2 compartments, from the lower of which the oil is forced through the filter by H_2O introduced under pressure.

2. GENERAL AND PHYSICAL CHEMISTRY.

WILLIAM D. HARKINS.

Assistants: E. B. MILLARD and A. B. CARTER.

An interesting application of chemical theory. Presented to the Academy of Padua in 1788. G. BRUNI. *Atti Accad. Padova* 31, 3-4(1915).—Historical note.

L. T. FAIRHALL.

Choice of standard weights for elements. J. WADDELL. *Chem. News* 112, 50-2 (1915).—Explanation of the choice of at. wts., law of multiple proportions, etc., written "with a view of helping students, and possibly teachers also." E. B. MILLARD.

Interpretation of molecular weight results from measurements on solutions (with special reference to a paper by Beckmann and Maxim). W. E. S. TURNER. *J. Am. Chem. Soc.* 37, 2063-4(1915); cf. B. and M., *C. A.* 9, 1570.—T. objects to the statement by B. and M. that change of temp. (between 75.4° and 54.1°) had but little effect on the degree of association of $PhOH$ in CCl_4 , and that at the f. p. of CCl_4 (-23°) the degree of association was distinctly greater than at the higher temps. Since the change of dielectric const. with the temp. would tend partially to counterbalance an apparent change in association, the true effect cannot be ascertained. It will probably be greater than supposed by B. and M. Their results are in harmony with the rule that the higher the dielectric const. of the solvent the smaller the degree of association of the solute.

E. B. MILLARD.

Atomic weight of cadmium. G. A. HULETT AND E. L. QUINN. Princeton Univ. *J. Am. Chem. Soc.* 37, 1997-2000(1915); cf. *C. A.* 5, 1881; 7, 2149; 8, 845; Baxter and Hartman, *C. A.* 9, 735.—The paper is largely a reply to B. and H. on their criticism of the work of H. and Q. The test for Cd was not made in the presence of an excess of H_2SO_4 , and test expts. carried out with 0.00005 g. Cd in the presence of excess H_2SO_4 showed that the latter was so completely removed as not to interfere with a positive test with H_2S . This would lead to an error not greater than 1 in 100,000. Test expts. with the purest Cd dissolved in HCl and electrolyzed in the H. and Q. cell (amalgamated Pt) checked to ± 0.00004 g. The % Cd in $CdCl_2$ was 61.217 with a probable error of not over 0.002%. The Ag coulometer used was not at fault; inclusions in the deposit varied about 0.5 in 100,000 and were taken into account in computing the at. wt.

E. B. MILLARD.

Atomic weight of molybdenum. J. H. MÜLLER. *J. Am. Chem. Soc.* 37, 2046-54 (1915).— MoO_3 was converted to $(NH_4)_2MoO_4$ and 5 times recrystallized, volatilized in HCl gas, the middle portion was again converted into $(NH_4)_2MoO_4$, evapd. and ignited in quartz, fractionally sublimed in air, then again in HCl at 250° , dissolved in H_2O , added to NH_4OH in Pt dishes, ignited, and the latter sublimation repeated 4 times. This oxide was reduced to metal in a stream of carefully purified H in a quartz boat. The special quartz reducing app. was heated to 1000° by gas flames in a furnace. Sp. gr. detns. of Mo gave $d_{20}^{20} = 10.281$, and of MoO_3 , $d_{20}^{20} = 4.696$ as means of 3 expts. in pure toluene. The final MoO_3 was divided into 3 fractions, from which 9 samples of reduced Mo were finally obtained. These were reduced to const. wt. ± 0.00002 g. after heating about 20 hrs. in H at 1000° . The samples (averaging about 1 g. each)

were carefully oxidized, first in air, and finally in O, to MoO₃. As a mean of all 9 expts. the at. wt. Mo = 96.035 was obtained. Omitting one expt. on which the least confidence was placed, Mo = 96.029. It was shown that Mo does not absorb weighable quantities of H.

E. B. MILLARD.

Allotropic modification of lead. H. J. M. CREIGHTON. *J. Am. Chem. Soc.* 37, 2064-5(1915).—The observation of a gray modification of Pb by Heller (*C. A.* 9, 2339) has been confirmed by an expt. in which the powdery gray Pb appeared on a cathode in a soln. of HNO₃ after passing 2-3 amps. at 6 v. for 8 hrs.

E. B. MILLARD.

Solubility product constants of calcium and magnesium carbonates. JOHN JOHNSTON. *J. Am. Chem. Soc.* 37, 2001-20(1915); cf. Stieglitz, *C. A.* 3, 1740.—These consts. have been recomputed for calcite and MgCO₃·3H₂O from the best data available; the results are satisfactorily concordant over a partial pressure of CO₂ varying 10000-fold for CaCO₃. The recalculated results are: $[Ca^{++}][CO_3^{--}] = 0.98 \times 10^{-8}$ at 16° when the soln. is satd. with respect to calcite; $[Mg^{++}][CO_3^{--}] = 1.93 \times 10^{-8}$ at 12°, the soln. being satd. with MgCO₃·3H₂O; $[Ba^{++}][CO_3^{--}] = 7 \times 10^{-9}$ at 16°, the solid phase being BaCO₃. The solubility-product const. of MgCO₃·3H₂O at temps. up to 50° is $\log K_{Mg} = (2315/T) - 11.870$, which corresponds to MgCO₃·3H₂O = Mg⁺⁺ × CO₃⁻⁻ + 3H₂O + 10600 cal. evolved. CaCO₃ pptd. from solns. contg. Mg will probably be contaminated with it. Mixtures of Mg(OH)₂ and MgCO₃ will generally be obtained in pptg. Mg by a carbonate, and these basic carbonates are merely indefinite mixtures of carbonate and hydroxide. Both MgCO₃ and CaCO₃ can be obtained free from contamination by keeping the partial pressure of CO₂ above a certain limiting value which need not be greater than 1 atm. under suitable conditions of pptn. The const. $[HCO_3^-]^{1/2}/[CO_3^{--}][H_2CO_3]$ was 5600 *n* at 25°, where *n* (which is probably greater than 0.5) is the proportion of the total CO₂ in soln. which exists as H₂CO₃. There can be no real equil. in aq. solns. of carbonates except in the presence of a definite partial pressure of CO₂ in the atm. in contact with the soln.

E. B. M.

Vapor pressure of liquids in the presence of gases. F. H. CAMPBELL. *Trans. Faraday Soc.* 10, 197-206(1915).—The method of *C. A.* 9, 402-3 has been applied to ether, acetone, CS₂, MeOH, EtOH, and H₂O at temps. varying from 20 to 70°, in the presence of H₂, CO₂, air, and the satd. vapor of the liquid. Only 1 expt. has been made for each substance at a given temp. Et₂O has been measured at 2 temps., the other substances at 1 temp. each. The pressures are lowest in an atm. of CO₂, greater in air and H₂, and greatest in the absence of gases other than the satd. vapor. With any one gas, the lowering is related to the solvent power of the liquid. The amt. of gas dissolved was not sufficient to account for the observed differences, and the differences tend to disappear when the liquid is violently agitated. The concn. of a gas in the surface layer of an unstirred liquid was thought to be greater than that in a part of the liquid away from the gas.

E. B. MILLARD.

Vapor pressures of propane, propylene and normal butane at low temperatures. G. A. BURRELL AND I. W. ROBERTSON. *J. Am. Chem. Soc.* 37, 2188-93(1915).—Using the same method as in the earlier paper (*C. A.* 9, 2583), the vapor pressure of propane was found to range from 760 mm. at -44.1° to 3 mm. at -124.2°; that of propylene from 760 to 3 mm. at -47.8° and -127.4°; that of *N*-butane from 760 to 1 mm. at -0.3° and -99.9°, resp.

CHAS. A. ROUILLER.

Density and degree of dissociation of the saturated vapor of phosphorus pentachloride. ALEXANDER SMITH AND R. H. LOMBARD. *J. Am. Chem. Soc.* 37, 2055-62(1915).—The app. was the same as that used on NH₄Cl, etc. (*C. A.* 9, 748). Expts. in sets of 4 or 5 were made at 7 temps. between 90° and 160°. The wt. of PCl₅ in a large bulb which had been in equil. with liquid PCl₅ was detd. by pptg. the Cl as AgCl.

Above 110° the exptl. curve of vapor d. against temp. was practically parallel to the theoretical curve (assuming no dissociation) and slightly below it. At 90° and 100° the vapor appears to be slightly associated; it is dissociated to an approx. const. extent of about 4% from 110° to 160° . The latent heat of evapn. was calcd. as 15500 cal. per mol. An additional expt. on NH_4I (cf. C. A. 9, 748) confirmed the first conclusion that satd. NH_4I vapor is partly associated.

E. B. MILLARD.

Adsorption of acetylene by colloidal platinum, iridium and osmium, and by platinum black. C. PAAL AND A. SCHWARTZ. *Ber.* 48, 1195-1202(1915); cf. C. A. 7, 1312.—The Pt sols used contained 0.1 and 0.2 g. Pt per 10 cc. and an equal amt. of a protective colloid, Na protalbuminate. Adsorption proceeds rather rapidly at first, and becomes slower and slower as satn. is approached, because the adsorbed C_2H_2 forms liquid or solid condensation products which surround the metal particles, at first diminishing its adsorptive power, and finally destroying it entirely. New expts. on the adsorption of C_2H_2 by Pt black gave very much smaller values than those in the earlier expts. (*Ber.* 37, 126 (1904)), though the values were far from concordant. The amt. adsorbed by 0.5 g. Pt black was 10.51 cc.; that by 0.25 g. was nearly as much as for 0.5 g., namely 9.09 cc. Os and Ir hydrosols did not adsorb C_2H_2 in measurable quantity.

E. B. MILLARD.

Interpretation of maxima on viscosity curves. S. ENGLISH. *Chem. Trade J.* 56, 488(1915).—The accepted interpretation that viscosity maxima indicate mol. compds. and minima are due to mutual dissociation has been cast into doubt by recent work. This simple explanation of the deviations from the mixture law is inadequate, for, though mixts. of H_2O , MeOH and EtOH with HCONH_2 give sagged curves, n - PrOH gives a sinuous curve and n - BuOH and *iso*- $\text{C}_4\text{H}_9\text{OH}$ give curves contg. both maxima and minima. This would indicate that HCONH_2 combines with n - BuOH and *iso*- $\text{C}_4\text{H}_9\text{OH}$, but not with the lower, more active alcs. F. p. measurements show that in the case of mixts. of the lower aliphatic acids with HCONH_2 , there is no close agreement between the indications of the equil. diagrams and the viscosity curves. HOAc and HCONH_2 have a viscosity max. at 66 mol. % but form a compd. contg. 33 mol. % HCONH_2 ; HCOOH and HCONH_2 do not give a viscosity max., but form an equimol. compd. which is quite stable.

E. B. MILLARD.

Alcoholic solutions of cadmium iodide. F. H. GETMAN AND V. L. GIBBONS. *J. Am. Chem. Soc.* 37, 1990-6(1915).— CdI_2 (dried, but not otherwise purified) was dissolved in MeOH or EtOH , and the cond. of the solns. measured at 25° by the Kohlrausch method in a cell of the "ordinary Arrhenius form." Some of the solns. were made by direct weighing, the others by diluting these solns. The conductance curve for MeOH solns. (13 concns. between 2.0 and 0.0005 M) indicated complex conditions in the soln. The values in EtOH (9 concns. between 2.0 and 0.005 M) were lower than those of Jones and Carroll (*Bull. Carnegie Inst.* 80, 41-73(1907)); moisture in the solns. would have caused higher values. Certain similarities were observed between these curves and those for AgNO_3 (cf. C. A. 8, 3261). Further expts. were made to det. κ at 20.5° for 8 solns. in MeOH and 11 in EtOH . Plotting κ and d. against concn. showed the relationship in each case to be linear. The sp. refraction in MeOH calcd. on the assumption that the soln. vol. of the salt was zero, was nearly const. in the concd. solns., but increased rapidly with diln. in the less concd. solns. The sp. refraction in EtOH showed no constancy whatever.

E. B. MILLARD.

Potential of the rubidium electrode. G. N. LEWIS AND W. L. ARGO. *J. Am. Chem. Soc.* 37, 1983-90(1915); cf. C. A. 5, 238; 6, 1088; 7, 2341.—The method used consisted in detg. first the normal electrode potential of a dil. amalgam of the metal toward an aq. soln. of the ion of the metal, and second, the difference in potential between the amalgam and the metal in a soln. of a salt of the metal in a

mixt. of EtNH_3 and liquid NH_3 . EtNH_3 alone did not dissolve RbI or RbNH_2 . A mixt. of NH_3 and C_6H_6 sepd. into 2 phases when either Rb or RbI was added, and the phase rich in C_6H_6 contained neither metal nor iodide in measurable amt. The cell for measuring the Rb-RbHg_2 potential was similar to that of Lewis and Kraus, except that an arrangement like a Na wire press was added to produce a fresh Rb surface during the measurements. The normal electrode potential of Rb amalgam was measured in the app. previously used on the other alkali metals. From the two values so obtained, Rb , $\text{Rb}^+(\text{1M}) \parallel \text{N.E.}$; $E = 2.1308 + 1.0745 = 3.2053 \text{ v. at } 25^\circ$. Since there appears to be little hope of detg. the Cs potential in the same way (for the metal is more sol. and the iodide less sol. than in the case of Rb for the solvents investigated), the available normal electrode potentials at 25° are, $\text{Li } 3.305$, $\text{Rb } 3.205$, $\text{K } 3.203$, $\text{Na } 2.993$, and the corresponding potentials against H are 3.027 , 2.928 , 2.925 and 2.715 .
E. B. MILLARD.

Indexes of migration of the ions and transport of ammonia in ammoniacal solutions of cupric sulfate. A. RUYCHLER. *Bull. soc. chim. belg.* 28, 227-9(1914).—Electrolysis of 2 approx. 0.25 N ammoniacal CuSO_4 solns. containing 4 NH_3 per Cu and 4-5 NH_3 per Cu , resp., followed by analysis of the cathodic deposit and the intermediate and cathode liquids showed that the indexes of migration of the ions were the same for ammoniacal as for aq. solns. of CuSO_4 ; the migration of each atom of Cu caused the transport of at least 4, and perhaps even 5, mols. NH_3 .
H. S. PAINE.

Coagulation of arsenious sulfide sol by electrolytes. JNANENDRANATH MUKHOPADHYAYA. *J. Am. Chem. Soc.* 37, 2024-31(1915).—The sols were prepared according to the method of Linder and Picton, and contained 32.9 and 3.54 millimols. As_2S_3 per l. Two others were prepared by dilg. No. 1. The time for coagulation by several salts of various types at different concns. was detd. With diln. of sols of As_2S_3 the stability increases. Fine sols are less stable than coarse ones of the same As_2S_3 content. Coagulation of colloidal As_2S_3 by electrolytes is mainly a coalition of the particles; this takes place all through the substance of the sol with formations of definite clot-like structures. Sedimentation plays an extremely minor part. The rate of coalition is detd. by the concn. and nature of the electrolyte. With concd. sols and relatively dil. electrolytes the coagulation proceeds in stages. Dissolved H_2S stabilizes As_2S_3 against electrolytes to a marked extent. Adsorption of electrolytes does not take place to any considerable extent, as was shown from cond. expts. The order of relative coagulative power of the electrolytes for As_2S_3 was $\text{Al}_2(\text{SO}_4)_3$, $\text{Ba}(\text{ClO}_3)_2$, BaCl_2 , SrCl_2 , MgSO_4 , HCl , NH_4Cl , KCl , KNO_3 , KBr , NaCl , KI , NaNO_3 , LiCl . E. B. M.

Dilution law at higher concentrations. C. A. KRAUS. *Z. Elektrochem.* 20, 524-9(1914).—A claim of priority over Sakhanov and Prsheborovskii (*C. A.* 8, 1371) and a criticism of the use made by Sakhanov (*Z. physik. Chem.* 88, 144(1913)) of the viscosity detns. of Sprung (*Ann. Phys. Chem.* [ii] 159, 1(1876)) in correcting elec. cond. detns. for the influence of viscosity. See also Kraus and Bray, *C. A.* 8, 854. E. B. M.

Equilibrium between carbon oxydisulfide, carbon monoxide and sulfur. G. N. LEWIS AND W. N. LACHY. *J. Am. Chem. Soc.* 37, 1976-83(1915).—In order to calc. the free energy of formation of SO_2 from its reduction to S by CO , the free energy of formation of the intermediate product is required, according to the reaction $\text{CO} + \text{S} = \text{COS}$. About 100 cc. of CO was heated with an excess of S in an app. wholly of glass at 302° in a bath of boiling Ph_2NH . The bath liquid carbonized somewhat on long boiling, but this seemed to have no effect on the temp. of the vapor. COS was absorbed in alkali and titrated with I after adding HCl . The uncombined CO (about 1% of the original gas) was detd. by solidifying the COS with liquid air and drawing off the uncondensed gas. This gas was found to contain some CS as well, and this CS was removed by passing the gas over a Pt wire plated with Cu and electrically heated to

dull redness. $K = [\text{COS}]/[\text{CO}] = 201$. If $S_{\lambda\mu}$ represents liquid S in equil., $S_{\lambda\mu} + \text{CO(g)} = \text{COS(g)}$; $\Delta F_{171} = -6070$ cal., and for $S_R + \text{CO(g)} = \text{COS(g)}$; $\Delta F_{171} = -6410$ cal. Other expts. at 260° gave as a preliminary value $K_{171} = 435$. The presence of CS , CO_2 and CS_2 was mentioned.

E. B. MILLARD.

Equilibrium in the system: hydrogen ion-alcohol-water. H. GOLDSCHMIDT. *Z. Elektrochem.* 20, 473-9(1914).—If the elec. cond. of a soln. of an acid in aq.-alc. is known for 3 different H_2O concns., the value of the equil. const. of the system $\text{H}^+ - \text{H}_2\text{O} - \text{EtOH}$ can be calcd. Expts. are given which include equivalent conductivities at 0.1 N and Δ_0 for HCl , 5-sulfosalicylic, picric, CCl_3COOH , trinitrobenzoic, trichlorobutyric, dichloroacetic, and salicylic acids. The equil. const. for alc. with varying % of H_2O has been calcd. from the conds. taken.

E. B. MILLARD.

Changes of phase under pressure. II. New melting curves, with a general thermodynamic discussion of melting. P. W. BRIDGMAN. *Phys. Rev.* 6, 94-112(1915); cf. *C. A.* 8, 2295; 9, 2479.—The conclusion of a previous paper is confirmed, namely, that unless there is a reversal at high pressures of the effects found up to 12000 kg., the m. p. curve continues to rise with pressure and temp. indefinitely, with neither a maximum nor a critical point. The equation of the melting curve has been obtained in terms of the difference of compressibility, thermal expansion and sp. ht. between the solid and the liquid. On account of certain exptl. inequalities an approx. value of the difference of compressibility between solid and liquid may be obtained by assuming that the difference of sp. ht. is zero. The liquid and solid approach each other more rapidly in compressibility than they do in vol. A suggestion as to the mechanism of melting is found in the fact that the equation of the melting curve involves the properties of both liquid and solid.

E. B. MILLARD.

Kinetics of the bromate-nitrite reaction. A. KURTENACKER. *Monatsh.* 36, 451-6(1915).—The HOAc concns. of *Monatsh.* 35, 925(1914) (cf. *C. A.* 9, 744) should be decreased 4%, on account of an error in calcn. of the first results. In this series of expts. the influence of pressure on the velocity of reaction of KBrO_3 and KNO_2 (in the presence of HOAc) has been investigated. Decreasing the pressure to about 40 mm. decreased the speed of the reaction 15%, indicating that the bromate was reduced by NO and not by HNO_2 , since pressure could have no effect on the concn. of the latter substance. Another factor must be considered, since the vacuum caused an increase in the speed of formation of NO from HNO_2 , thus increasing the speed of bromate reduction. The "true speed of the reaction" was calcd., after taking the NO into account. Further expts. at 20, 30, 40 and 50° were made, and the results discussed in the light of the Arrhenius equation in the integrated form, $\log(K_1/K_2) = A(T_1 - T_2)/T_1T_2$. Values of A decreased with increasing temp. in place of remaining const. as required by the equation.

E. B. MILLARD.

Catalyses with weak acids. VI. Rate of conversion of cinchonine into cinchotoxine. H. C. BIDDLE AND O. L. BRAUER. *J. Am. Chem. Soc.* 37, 2065-82(1915); cf. *C. A.* 7, 3872.—Using the polarimetric method, detns. were made of the rate of conversion of 0.1 M cinchonine (a) at $99.7^\circ \pm 0.2^\circ$ in 0.15-8.0 M AcOH , 0.2-0.8 M HCO_2H , 0.2-0.8 M EtCO_2H , 0.2-0.3 M $(\text{CO}_2\text{H})_2$, 0.15-0.175 M HCl , 0.1-0.21 M $\text{HCl} + 1.0 M$ AcOH , of 0.25 M (a) in 0.50-2.50 M AcOH and of 0.01 M (a) in 0.05-0.80 M AcOH . In the AcOH expts. the values of the sp. reaction velocity, K_1 , are arranged in order of increasing AcOH concn. in 3 tables; in the 1st, the AcOH concn. is expressed in terms of the total AcOH added, in the 2nd in terms of the AcOH in excess of that necessary for the formation of a monoacetate, and in the 3rd in terms of the AcOH in excess of that required for the formation of a diacetate. Exam. of these tables leads unavoidably to the conclusion that the rate of reaction is more correctly represented as a function of the acid concn. in excess of that required for the formation of the mono-

acetate; in the 2nd table, where the reaction is assumed to be monomol. with respect to (a) monoacetate and the AcOH in excess of that required for the formation of this salt is regarded as expressing the concn. of the catalyzer, the values for K_1 increase in general with increasing concn. of the AcOH, and these increasing values correspond with fair uniformity for the 3 different concns. of (a) studied. The expression K_2/acid , representing the relation between the speed of the reaction and the concn. of the acid in excess of that required for the formation of the monoacetate, gradually decreases with increasing concn. of the acid. The expts. with other acids showed that the rate of reaction decreases with increasing dissociation consts. of the acids; with EtCO_2H , AcOH and HCO_2H , the speed of conversion increases with increasing concn. of acid; with HCl and $(\text{CO}_2\text{H})_2$, the reverse is true. With the 1st three, the rate of increase in speed with equal increments in concn. is greatest with the acid of lowest and least with the acid of highest dissociation const. In the AcOH + HCl expts. it was found that, keeping the AcOH concn. const. (1.0 M), the value for K_2 fell from 0.0566 for 0.0 M HCl to 0.00 for 0.3 M HCl, while keeping the HCl concn. const. and increasing that of the AcOH produced an increase in the speed of reaction of the monoacetate, mono- and di-hydrochlorides of (a); for any given concn. of AcOH, the speed is greatest for the 1st and least for the 3rd salt. Moreover, the ratios between the speeds for different salts with equal concns. of org. acid seem to approach a const. value, the ratio *speed mono-HCl salt; speed di-HCl salt* being 11.5, 11.5, 12.7, 11.3 in 0.1, 0.2, 0.4 and 0.8 M AcOH, resp. B. and B. conclude that the function of the org. acid is that of a true catalytic agent, accelerating but not causing the reaction. The effect of H ions is to inhibit the reaction. As shown below, the rate of reaction is a linear function of the concn. of undissociated org. acid. VII. Rate of conversion of cinchonidine into cinchotoxine. H. C. BIDDLE AND R. H. BUTZBACH. *Ibid* 2082-7.—Expts. with cinchonidine (b) like those carried out with (a) (above) gave entirely analogous results. Comparison of the values obtained in equal concns. of acid shows that in general (a) reacts slightly (about 1.21 times) more rapidly than (b). VIII. Nature of the catalysis in the conversion of the cinchona alkaloids into their toxines. H. C. BIDDLE. *Ibid* 2088-112.—Assuming that in an aq. soln. containing cinchonine (a), HCl and an org. acid there is no undissociated (a) salt or HCl, the H ion concn. can be calcd. (see original for formulas) in terms of the dissociation const. k_3 of the org. acid, the 1st and 2nd dissociation const., k_1 and k_2 , of (a), and the ionization const., k_w , of H_2O . k_w at 100° was taken as 48×10^{-14} (Noyes, C. A. 2, 614), k_3 as 1.11×10^{-8} for AcOH (N., C. A. 4, 854) and 1.31×10^{-4} and 0.86×10^{-8} for HCO_2H and EtCO_2H , resp. (calcd. on the assumption that the values of k_3 for the 3 acids bear the same relation to each other at 100° that they do at 18°). By a method not yet published, k_2 was found to be 1.11×10^{-9} ; k_1 may be neglected. Knowing the H ion concn., that of the undissociated org. acid and of the uni- and bivalent (a) ions can readily be calcd. Applying these calcns. to the expts. reported above, it is found that the graph obtained by plotting the sp. reaction rates against the concn. of H ion, for solns. of const. concn. with respect to the undissociated org. acid, is a regular curve in which the sp. reaction rates change the more rapidly the lower the concn. of the H ion. The sp. reaction rate at const. concn. of the catalyzing acid in solns. of const. concn. with respect to the alkaloid is directly proportional to the concn. of the univalent (a) or (b) ion. The sp. reaction rate at const. concn. of the univalent (a) or (b) ion is a linear function of the concn. of the undissociated org. acid, showing that an undissociated mol. (in this case an electrolyte) in homogeneous soln. can act as a direct catalytic agent through a wide range of concn. The abs. reaction rate for org. acids appears to be directly proportional to the mol. wt. of the acid, as found with HCO_2H , AcOH and EtCO_2H ; this relationship, however, is probably accidental. The sp. reaction rate, which, under like conditions, should theoretically be independent of the initial concn. of the (a) or (b), increases slowly

with increasing concn. of the alkaloid, a phenomenon similar to that encountered in the inversion of cane sugar and the hydrolysis of esters. The const. difference (1.21:1) in the rate of sp. reaction of (a) and (b) under like conditions is apparently to be attributed solely to the stereoisomeric difference existing between the 2 alkaloids. A tentative suggestion as to the mechanism of the reaction involved in the conversion of the tertiary cinchona alkaloids into their toxins containing a secondary N atom, a reaction shown to be catalyzed by org. acids, is that a cinchotoxine acyl deriv. is formed as an intermediate product, a hypothesis strengthened by the ease with which the alkyl halides of the alkaloids are converted into toxins and by the influence exercised by the concn. of the AcOH in the conversion of PhNH_2 into PhNHAc . The mathematical proof of the reaction given in this paper does not necessarily exclude the possibility that partially ionized cinchonine salt may take some part in the reaction. Furthermore, no account has been taken of the role played by the undissociated salt, which is undoubtedly present. These factors will doubtless largely explain the deviations in the reaction rate occasioned by varying initial concn. of the alkaloid. These and other factors will be taken up in a subsequent paper.

CHAS. A. ROULLER.

Melting point of tungsten. IRVING LANGMUIR. *Phys. Rev.* 6, 138-57(1915).—Observations on evacuated and on gas-filled W lamps indicate that the intrinsic brilliancy of solid W at a temp. just below the m. p. is about 7200 international candles per sq. cm., which, according to the Rasch equation, should correspond to 3540°K . for the m. p. This m. p. has also been detd. by means of a Holborn-Kurlbaum pyrometer as 3532°K ., corresponding to an emissivity of 0.46 for $\lambda 0.667 \mu$; and from the brilliancy of the molten surface of an a. c. W arc in an atom of N as 3566°K ., corresponding to an emissivity of 0.425 for $\lambda = 0.667 \mu$. The most probable value is $3540^\circ \pm 30^\circ \text{K}$.

E. B. MILLARD.

Researches on ammonia. IV. Determination of the heat of formation of ammonia at high temperatures. F. HABER AND S. TAMARU. Kaiser Wil. Inst. *Z. Elektrochem.* 21, 191-206(1915); cf. *C. A.* 9, 1423, 2013.—A continuous flow method was used. NH_3 gas was decomposed, with the aid of granular Fe as catalyzer, within an elec. furnace, and the heat required was supplied electrically in a form convenient to measure. The possible sources of error are very elaborately discussed. The "decomposer" was so poorly insulated thermally from the copper vessel in which it was contained that when the gas stream was at rest the temp. of this vessel was said to be given more accurately by the temp. of the decomposer than by a thermoelement inserted in the wall of the vessel. Nevertheless, by means of observations on non-decomposing gases the authors estimate that they have reduced the uncertainty from this cause to 2 per mille or less in the final result. A lack of uniformity in the temp. of the decomposer produces a further uncertainty which is estd. as not over 0.5%. Yet another uncertainty comes from decompn. in other parts of the hot app. than in the decomposer. By taking out the decomposer and running through gases of different compn. upper and lower limits of the error from this cause were found, ranging from 3 to 10% at 554° and higher. At 503° and 466° there was very little decompn. except in the decomposer. No estimate of the final accuracy appears to have been made, but the results of different groups of observations nearly always agree to 2% below 500° , and to 4% above that. The results are: For atmospheric pressure, heat of decompn. per mol. at 659° , 13000 cal.; the mean value in the range of temp. $466-554^\circ$ is 12700 cal. **V. Heat of formation of ammonia at ordinary temperatures.** F. HABER, S. TAMARU AND L. W. ORHOLM. *Ibid* 206-228.—Using the continuous flow method NH_3 was decompd. by heat with the catalytic aid of Fe and Os within a vacuum-jacketed vessel containing water. In the electrically heated decomposer the temp. probably reached a red heat, but the in-going and out-coming gas was near

room temp. For reasons not given the authors chose to put in an excess of heat, removing it by a stream of water, flowing through a fine coiled pipe. The errors are carefully discussed; chief among these was that in measuring the elec. energy. The heat of decomp. per mol. is believed to lie between 10950 and 11000 cal. This is 8 to 10% below results of Thomsen and Berthelot, a difference not surprising in view of the possible errors of their methods. VI. The specific heat of ammonia. F. HABER AND S. TAMARU. *Ibid* 228-241.—The sp. heat was detd. by heating the gas electrically as it ran through a heated vessel. Errors due to conduction within the vessel, and other systematic errors, were learned by detg. the sp. known heats of other gases. The method thus amounts to calibrating the app. empirically by means of other gases, detd. by other investigators. As far as the accidental errors go, the results agree to 1%, and are not given closer. The results are: At 309°, 10.3; at 422°, 11.0; at 523°, 11.8. These results are found to be not inconsistent with the quantum theory. VII. The action of uranium as catalyzer in the synthesis of ammonia from its elements. F. HABER AND F. C. GREENWOOD. *Ibid* 241-5.—Uranium carbide was made in an arc furnace from the oxide and an excess of resin lampblack. This compd. caused the formation of NH_3 under pressure at about 500°. The active agent was found to be a compd. of the probable compn. U_2N_4 , which forms gradually from the carbide as the gas flows. In presence of O or H_2O the mass becomes compacted and less effective, owing probably to the cementing action of the oxide. Admixture of graphite diminishes this action, but also diminishes the catalytic action. Metallic uranium made in several different ways (in all cases containing some oxide) also gave catalytic action, but less effectively than the carbide. A body of catalyzer of given size works most effectively in a rapid stream of gas and at high pressure, though the proportion of gas changed is less than in a slower stream. Practically, since the active compd. must be small in dimensions on account of the high pressure and rather high temp. desirable, the rate of working for a given sized body is the more important thing. The equil. constant near 537°, that is, the ratio of the partial pressure of NH_3 to the product of (p. p. of N)^{1/2} and (p. p. of H)^{3/2} was found to be from 24.6×10^{-4} to 28.7×10^{-4} . A lecture app. for demonstrating the direct union of N and H is described.

W. P. WHITE.

Theory of dielectrics. Reply to M. Born. K. CZUKOR. *Verh. deut. physik. Ges.* 17, 214-6(1915); cf. *Ibid* 17, 73(1915); and Boguslavski, *C. A.* 9, 264.

E. B. MILLARD.

Specific heat of metallic alloys composed of solid solutions. L. ROLLA. *Genoa. Nuovo cimento* 9, 215-32(1915); see *C. A.* 8, 3390.

S. LEVY.

Electrons and heat. O. W. RICHARDSON. King's College, London. *Engineering* 99, 631-2(1915).—This is the report of a lecture on "Electrical Evaporation," dealing with the liberation of positive ions and electrons from bodies by the action of heat. The following facts, though not new, are conveniently brought together: (1) Positive ions are given out at dull red heat from metals and negative electrons in increasing ratio at higher temps. (2) The amt. of electron evapn. from W followed an ordinary vapor tension formula of fluids through a temp. interval where the amt. of evapn. increased 300 billion times. (3) The elec. evapn. consumes heat, shown, with closely concordant results, in 3 different ways. (4) The velocities of the escaping electrons obey Maxwell's distribution law. In fact, their measurement was the first exptl. verification of that law ever made. It was effected by finding the varying number of electrons that were able to travel a given distance against different opposed voltages. Evidence was also given that elec. evapn. is not a chem. phenomenon, but this part of the report appears to be a little confused.

W. P. WHITE.

Thermoelectric properties of carbon. W. C. MOORE. *J. Am. Chem. Soc.* 37, 2032-7 (1915).—Five pieces of C were clamped in turn against a single specimen; leads were fastened to the free ends, and the circuit was completed through a millivoltmeter used as a galvanometer. The clamped ends were heated, and in every case except the one in which the 2 pieces of C were of the same material, a considerable e. m. f. was developed. Expts. were also made on C-Cu junctions in a C tube from which air was removed. The study of the thermoelectric properties offers evidence that amorphous C is not a single definite substance. The properties vary with temp., and are detd. by the kind of raw material used and the manufacturing history of the specimen. The fact that with some varieties of arc carbons a considerable temp. range of const. e. m. f. was found indicates the possibility of a transition interval of these carbons.

E. B. MILLARD.

Photo-electric phenomenon exhibited by liquid dielectrics. L. STRAMP. Louvain. *Bull. soc. acad. roy. belg.* 1914, 45-62.—S. has shown that ultraviolet rays influence the elec. discharge of liquid paraffin, petroleum, shale oil and Russian mineral oil; this discharge is more rapid for a positive charge in the case of the 2 former and for a negative charge in the case of the 2 latter. This effect is due to a photo-elec. surface phenomenon and it is shown that it cannot be caused by ionization of the air or by a vol. phenomenon.

H. S. PAINE.

Number of atoms involved in the emission of spectrum lines. R. LADENBURG. *Verh. deut. physik. Ges.* 16, 765-79 (1914).—Theoretical. The value of the ratio $H/\mathfrak{M}$ has been shown by several independent methods to be a universal constant. If an electron is the oscillator, the ratio is $C = 8\pi^2 e^2 / mc = 0.67 (\text{cm}^2/\text{sec.})$. The ratio is that of the energy H of an oscillator of vibration frequency ν to the specific intensity $\mathfrak{M}$, of a "Hohlraum" of the same temp. and vibration number. From Gouy's measurements on Na flames it appears in the light of these calcns. that from 100 Na atoms there are emitted 40 electrons which are concerned with the D-line. E. B. MILLARD.

Experimental verification of the Lorentz-Einstein formula for cathode rays of high velocity. C. E. GUYE AND C. LAVANCHY. *Compt. rend.* 161, 52-5 (1915).

E. B. MILLARD.

Index of refraction of gases. J. T. HOWELL. *Phys. Rev.* 6, 81-93 (1915).—Expts. have been made on O_2 (98 to 99%), H_2 (99.8%) and CO_2 (commercial grade, not tested for purity) by means of interferometer plates nicked by cathode discharge, a Fabry and Perot interferometer, and a quartz spectrograph, extending the dispersion curve to $\lambda 2753$ for these gases and to $\lambda 2652$ for air. Over the region previously investigated the curves agreed well with those of other observers. The ratio of the charge of an electron to the charge of an ion, as calcd. from the H curve, was 0.94.

E. B. MILLARD.

New experiments in the ultra-red spectrum. W. H. WESTPHAL. *Die Naturwissenschaften* 2, 621-6 (1914); *Chem. Zentr.* 1914, II, 858.—Review of the most important work in the extreme red spectral range during the last year. The review treats of short-wave and long-wave ultra-red, emission and absorption spectra, interferometric measurements of wave length in the long-wave ultra-red, generation of long ultra-red radiation over any desired range of wave length by methods of selective dispersion, absorption, reflection or emission, and the analogies between long-wave ultra-red radiation and elec. waves.

E. B. MILLARD.

Resistance measurements and optical measurements on thin platinum films. BELA POGÁNY. *Physik. Z.* 15, 688-90 (1914); *Chem. Zentr.* 1914, II, 563; cf. Planck, *C. A.* 8, 2841.—P. has detd. the sp. resistance of very thin Pt films and found that below $7\mu\mu$ this resistance increases very greatly. The films were prepd. by cathodic

disintegration; the thickness was detd. by means of a chem. microbalance. This change in elec. conductivity shows itself in the optical behavior of the films (* and absorption index), the change in these quantities with the thickness following essentially the theory developed by Planck. E. B. MILLARD.

Application of the quantum theory to the ultra-red absorption spectrum of water vapor. A. EUCKEN. *Verh. deut. physik. Ges.* 15, 1159-62(1913).—From the assumption that energy radiation is discontinuous, E. has calcd. the positions of lines in 2 series of the ultra-red absorption spectrum of H₂O vapor. The agreement with observed values was satisfactory enough to show the correctness of the discontinuity assumption, rather than some other assumption. Cf. Planck, *C. A.* 5, 1697. E. B. MILLARD.

Comparison of wave length of the neon line (λ 6402) with that of the cadmium line (λ 6438) by the method of coincidence of interference points. TOSHIO TAKAMINE. *Proc. Tokyo Math.-Phys. Soc.* [2] 8, 9-12(1915).— λ'_m (mean of λ') = 6402.2395 $\pm$ 0.00009 for the neon line, which confirms the results of Priest (*C. A.* 7, 1323) by a different method. W. H. FRY.

The structure of some spectrum lines of bismuth and cadmium. TOSHIO TAKAMINE. *Proc. Tokyo Math.-Phys. Soc.* [2] 8, 51-8(1915).—Lines λ 5086, λ 4800, λ 4678, Å. of Cd were examined by an echelon crossed with a Lummer-Gehrcke plate and positions of satellites found to agree with the results of previous investigators. Lines λ 6438, λ 5155, λ 4663 Å. always appeared simple. Bi λ 4722 was found to have 5 satellites and Bi λ 4122 was resolved into 4 components. λ differences and relative intensities are given. W. H. FRY.

Optical rotatory power of derivatives of succinic acid in aqueous solutions of inorganic salts. II. G. W. CLOUGH. *J. Chem. Soc.* 107, 96-104(1915); *Proc.* 30, 307-8; cf. *C. A.* 8, 1569.—The rotatory powers of Me H *d*-tartrate and Na H *d*-tartrate have been detd. at various temps. in H₂O and in aq. solns. of NaCl. Me H tartrate is dextrorotatory in aq. soln.; the sp. rotation is increased by dilution or by rise of temp., but is decreased by the presence of NaCl. This ester resembles tartaric acid and the neutral Me ester in this behavior and in that it exhibits levorotation in a concd. soln. of BaBr₂. The curves for Me H tartrate bear considerable resemblance to those for tartaric acid. Na H tartrate has been studied in H₂O and in NaCl solns. at various temps. for 3 wave lengths: Hg-green, Hg-yellow and Na-yellow. The sp. rotation is almost independent of concn. and the influence of temp. is the same for all solns. The sp. rotatory power attains a max. value which is const. from 40° to 70°; it is depressed by the presence of NaCl, but the relative depression is much less than that produced by NaCl on tartaric acid or its esters. The optical rotatory dispersive ratios appear to be practically independent of the temp. and concn. for solns. of Na H tartrate. The behavior of the Na or K neutral tartrates toward NaCl or KCl is in striking contrast to that of the acid, the esters or acid salts, and it has even been shown that NaCl decreases the rotation of di-Na tartrate while KCl increases the rotation of di-K tartrate. Na salts decrease, and K salts increase, the rotation of Na K tartrate. Na and Ba halides (and probably most inorganic salts) in aq. soln. exert a specific effect on hydroxy derivs. of succinic acid contg. —CO— or carbalkyloxy groups, the effect being usually opposite to that caused by dilution. Work on amino derivs. is in progress. E. B. MILLARD.

Extinction of ultraviolet light in the earth's atmosphere. E. KRON. *Ann. Physik* 45, 377-98(1915).—Discussion of the numerous measurements of the limits of ultraviolet solar radiation recorded at various zenith distances to det. the degree of extinction of ultraviolet radiation by the atm. The limit of effective rays is near λ 3250. E. B. MILLARD.

Metamagnetic alloys. KURT OVERBECK. *Ann. Physik* 46, 677-97(1915).—

Most specimens of Cu-Zn alloys show diamagnetic properties which are normal in increasing field strengths. Some alloys were found, however, which showed an initial weak paramagnetism; the paramagnetism becomes weaker with increasing field strength, and finally becomes diamagnetism. Expts. have been made on alloys starting with pure Cu and going gradually to pure Zn, in field strengths up to 12000 gauss. The behavior of the alloys suggests that of Fe, where the susceptibility depends to a certain extent on field strength, and to study this similarity, expts. were made with Cu-Fe, Zn-Fe, and brass to which borax, Al, Al and Fe, and Fe alone had been added. This change from para- to diamagnetism (called metamagnetism) was not found in the brass-Al alloy, but was produced artificially in brass by the addition of 0.0233% Fe. Metamagnetism was indirectly shown to be due to the presence of traces of Fe, and was not found in the alloys contg. no Fe.

E. B. MILLARD.

3. RADIOACTIVITY.

WILLIAM H. ROSS.

Advances in the field of radioactivity in 1913 and 1914. F. HENRICH. *Z. angew. Chem.* 28, I, 297-303, 305-8, 313-5(1915).—A thorough review with bibliographic references.

E. J. C.

The photographic action of alpha, beta and gamma rays. R. R. SAHNI. Manchester. *Phil. Mag.* 29, 836-41(1915).—Photomicrographs are reproduced showing the effect on a sensitive Wratten and Wainwright's lantern plate of the rays from Th active deposit, Po and Ra C deposited on the tips of fine needles touching the plate. Alpha rays show straight tracks radiating from the needle tip and forming a circular nucleus on longer exposure. An occasional track is bent as the result of "scattering." The tracks from Th active deposit are noticeably longer than those from Po. The β - and γ -rays give no straight tracks or radial traces. Their impressions are scattered and the nucleus is irregular.

G. L. WENDT.

Ionization by positive rays. NORMAN CAMPBELL. Leeds. *Phil. Mag.* 29, 783-94(1915).—When positive rays from a layer of heated phosphate are allowed to fall on a polished Cu plate the number of electrons emitted by the plate increases rapidly with the potential through which the positive particles fall, up to 10,000 v., then more slowly, with a max. at 38,000 and a rapid decline thereafter. In analogy with a similar effect for cathode rays at 11 v., it is suggested that at 38,000 v. the positive rays begin to resemble α -rays and are able to penetrate the atoms. Somewhere below 100,000 v. they should acquire the great ionizing power of α -rays and the electron emission should increase.

G. L. WENDT.

U. S., 1,149,829, Aug. 10. C. R. HEBERLING and A. H. LOW. Generator for treating liquids to render them radioactive. It is formed of an outer casing of perforated material containing an inner closed receptacle of cloth in which the radioactive material, e. g., pitchblende, is placed.

4. ELECTROCHEMISTRY.

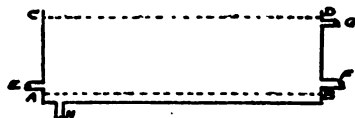
COLIN G. FINK.

Electric furnace melting of ferro alloys. R. S. WILE. *Trans. Am. Electrochem. Soc.* 28 (advance copy) (1915).—A resistance furnace of the 3-phase type, 1 bottom and 2 top electrodes, is described (without fig. or photo). The spacing of the electrodes is such that they compose an equilateral triangle. To start, the 2 top electrodes are lowered to the floor of the furnace, some granular graphite is sprinkled in and

when this glows the slag-making materials are added. After melting the slag, the top electrodes are raised slightly. The alloy is then charged into the furnace and is melted beneath the slag, the heat being regulated by the depth of the electrodes in the slag. Extensive tests were carried out to prove that there is no change in the alloy while melting. The following conclusions are based on an 80% ferro-manganese: The av. power consumption is nearly 800-kw. hrs. per ton. The C electrode consumption is never over 12 lbs. per ton. Lining cost is 10 and 25 cts. per ton depending upon the rapidity of melting. Besides, there is a considerable saving in Mn as compared with other processes. In the case of ferro-Cr the total saving is even greater than in the case of ferro-Mn. The Wile furnace has also been tried out successfully in the smelting of Bolivian Sn ores and concentrates. An acid slag was used with a loss of only 1.89% Sn or 0.5% of the Sn content. The product ran 98.75% Sn as compared with 95% and 96% by older methods. The power consumption was less than 450 kw.-hrs. per ton of concentrates. Analysis of concentrates: Sn 66.96, SiO₂ 5.24, Fe 0.92, S 1.14%.

C. G. F.

Solution stratification as an aid in the purification of electrolytes. FRANCIS R. PYNE. *Trans. Am. Electrochem. Soc.* 28 (advance copy) (1915).—In the electrolytic refining of Cu the tendency of the electrolyte to stratify or form layers of various compn. is one of the attendant evils. To overcome this P. and Green have invented a new tank (U. S. pat. No. 1,148,798; cf. *C. A.* 9, 2488). In the old method the tank



house electrolyte first passed through tanks containing insol. anodes to remove a portion of the Cu; requiring high power consumption and giving a product of inferior quality; thence to a second set of insol. anode tanks to remove the remainder of

the Cu and some of the impurities, after which the soln. was treated in any desired manner. In the present method, the tank house electrolyte is drawn directly from the new stratification tanks, requiring no increase in power and avoiding the production of inferior grades of product; thence to the final insol. anode tanks, as above. In the Fig. is shown a sectional elevation of the tank. 'AB' is the slime line, H the outlet for removal of slime from the tank, and CD the soln. line. After proper regulation has been made the regular tank room soln. enters at E; a soln. high in Cu is withdrawn through F while the soln. from G is low in Cu and passes directly to the final insol. anode tanks. A uniform deposit on the cathode is obtained. The net saving is the operation of one set of insol. anode tanks.

C. G. F.

Overhead electrolysis and porcelain strain insulators. S. L. FOSTER. *Proc. Am. Inst. Elec. Eng.* 34, 1549-58 (1915).—Conditions of atm. electrolysis in San Francisco and the remedies applied are given. There is a slight leakage from trolley wires to earth through the insulated supports on all overhead construction. If not checked this results in electrolysis of H₂O and the rapid corrosion of any adjacent metal parts. This electrolytic effect may also take place over strain insulators where the creepage distance is not great enough. The electrolytic action removes first the galvanizing upon the surface and then rapidly attacks the Fe. This is prevented by painting or oiling all galvanized wires and supports which are alive. Another form of electrolysis met with in overhead work is due to the use of dissimilar metals in contact. In this case, H₂SO₄ and other fumes in the air or O₂ is supposed to form the electrolyte. It was found that porcelain insulators gave the best all-round results under the conditions of fog and rain met with locally. Under severe conditions a creepage distance of 2" did not prevent the rapid corrosion of the galvanized support cables.

W. E. RUDER.

Experimental researches on skin effect in conductors. A. E. KENNELLY, F. A.

LAWES AND P. H. PIERCE. *Proc. Am. Inst. Elec. Eng.* 34, 1749-1818(1915).—After a brief historical sketch and a description of the app. employed, the authors give the results of about 100 series of tests each covering a range of frequency up to 5000 cycles per sec. These tests were made on round, rectangular solid and stranded Cu and Al cables and tubular conductors. The skin-effect impedance-ratios of solid round wires of Cu or Al were found to be in close agreement with the Bessel-function Heaviside-Kelvin theory up to the frequency limit of tests made. Below 100 cycles the *proximity* effect is relatively small. Stranded Cu or Al conductors without twists have the same skin-effect impedance-ratio as their equi-sectional solid conductors. Twisting or spiraling causes a slight increase in skin-effect. Cu strips have a much larger skin-effect resistance-ratio than corresponds to the theory for indefinitely wide strips. Cu tubes have a lower skin-effect than any other form of equal section. Half tubes have a much greater skin-effect than whole tubes. The theory of skin-effect in solid cylindrical uniform conductors with remote return is fully discussed and a complete bibliography of the subject is appended.

W. E. RUDER.

Eliminating fumes with electricity. ANON. *Elec. World* 66, 429(1915).—A high voltage discharge removes Cu from the fumes of a reduction plant. A 10 h. p., 3-phase motor drives a d. c. generator, whose voltage is stepped up to 62,500 v.

W. H. BOYNTON.

Melting point of tungsten (LANGMUIR) 2. Thermoelectric properties of carbon (MOORE) 2.

U. S., 1,148,343, July 27. E. TROYE. Preventing punctures in electric arc furnaces for making nitrogen oxides. See fig. Air or other gas under treatment is conducted at a suitable temp. and pressure through the openings 3 to a space between the wall around the arc and the outer furnace casing and then passes to the arc.

U. S., 1,149,203, Aug. 10. J. G. MARSHALL. Electric furnace for making carbide, with a hearth and a spout for drawing off the carbide. The spout is formed of chilled carbide reinforced by a block of metal beneath it.

U. S., 1,149,210, Aug. 10. H. R. NELSON. Electrolytic cell for treating sodium chloride solutions, etc.

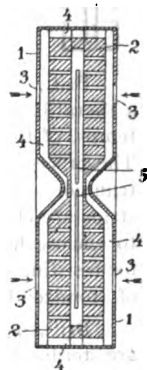
U. S., 1,149,211, Aug. 10. H. R. NELSON. In electrolyzing alkaline earth and alkali metal salts, the cation, e. g., Na produced by the electrolysis of NaCl soln., is withdrawn from contact with the electrolyzed soln. and treated with steam to form NaOH and H. The steam is not allowed to condense in the reaction zone.

U. S., 1,149,238, Aug. 10. R. H. WHITE. Electric apparatus for regulating the position of electrodes in electric furnaces.

U. S., 1,149,254, Aug. 10. H. DUMARS. Apparatus for obtaining ozone by reducing the temp. of air below the liquefying point of O₃, subjecting to electrification to form O₃, sepg. the liquid O₃ from the gaseous N and using the latter to cool the air and keep the liquid O₃ at a low temp.

U. S., 1,149,665-6, Aug. 10. F. N. MASON. Primary electric battery (structural features).

U. S., 1,149,701, Aug. 10. O. M. THOWLESS. Ductile filaments are made by flashing a deposit of W, Mo, Ta or W-Ti alloy on a core of Mo, Ta, W or other metal



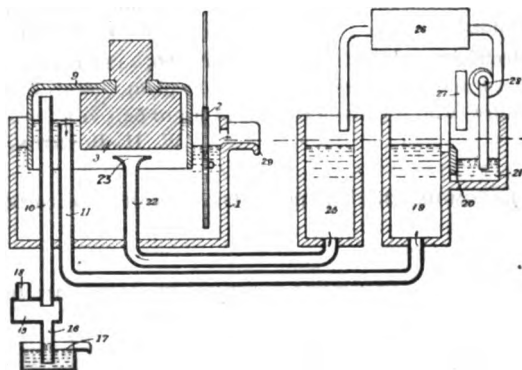
of high m. p., removing the core by dissolving in acid, and then drawing down and heating and working the tube of refractory metal until a solid filament is obtained.

U. S., 1,150,021, Aug. 17. G. FAVIER. **Electrodes for metallurgical furnaces, etc.**, are formed by molding mixts. of different degrees of porosity in concentric zones. The electrode is molded around a wood core, the outer portion being of graphite and the inner portion of a mixt. containing sawdust or other combustible material which leaves a porous material when burned. During the burning the wood core is converted into charcoal and serves as a chimney for the escape of gases.

U. S., 1,150,023, Aug. 17. B. FORD. **Storage battery (structural features).**

U. S., 1,150,271, Aug. 17. W. MCA. JOHNSON. **Electric reduction of zinc ores.** See Can., 154,573 (C. A. 8, 1709).

U. S., 1,150,370, Aug. 17. H. C. JENKINS. **Electrolytic cell for treating chloride and nitrate solutions.** Soln. is



supplied to the cell 1 through the pipe 22 and current is supplied to the electrodes 2 and 3, the anode 3 being placed within the bell in the upper part of the cell. Liquid is drawn off through the pipe 11.

U. S., 1,150,670, Aug. 17. G. GÜR-ZEHNDER. **Pure malleable ductile tungsten** is made by fusing W in an elec. furnace "to a perfectly fluid state" and then rapidly cooling the metal by a blast of cold air.

Brit., 9,367, Apr. 15, 1914. GEN. ELEC. CO. In a process of coating metals, a sherardized coating having a sp. gr. of not less than 6.5 is obtained by working at temps. of from 350 to 375° with Zn dust containing from 80 to 92% of metallic Zn. The process is carried out in an elec. furnace consisting of a rotating box mounted on trunnions and provided with resistance strips on all sides exposed to the charge. The strips are clamped in position and insulated by sheets of mica. A casing is provided to enclose heat-insulating material, such as asbestos. The capability of the coating for resisting the corrosive influence of sea-water may be tested by exposure to a spray of atomized brine, etc.

Brit., 9,567, Apr. 17, 1914. P. H. DAWE. In a process of electrolysis, liquids are sterilized by passage of current, preferably alternating, between electrodes arranged in a chamber through which the liquids pass, so as to restrict the area of the current zone and to produce a high and uniform c. d.

5. PHOTOGRAPHY.

LOUIS DERR.

Retarding action of sugar on development and permeability of gelatin to developer containing sugar. J. MALDINEY. *Compt. rend.* 161, 73-6(1915).—A normal metol-hydroquinone bath, functioning regularly in 5 sec. on bromide paper, was found capable of retardation 3-5 min. by addition of sugar. To test whether the retardation was due to increased viscosity, the lower edges of strips of plate were dipped in developing solns. containing varying proportions of sugar, and the rate of imbibition measured

by the rise of the liquid into the gelatin. Observation was facilitated by adding a trace of phenolphthalein to the emulsion, which produced a red tint in the absorbed liquid. The rate of penetration decreased with increasing conc. of sugar, from which it appears that the retardation of development is largely a matter of viscosity.

L. DERR.

Comparative studies on color rendering of photographic gelatin plates. III. E. STENGER. *Z. Reproduktionstechnik* 17, 2-4, 22-4, 31-3, 38-41, 46-9, 54-7(1915); cf. *C. A.* 9, 31, 180, 564.—Spectroscopic studies of plate sensitiveness, largely in the form of curves and tables which cannot usefully be given in abstract. Pinachrome violet is slightly better in conferring red-sensitiveness than pinacyanol, but is much the same otherwise; in association with pinaverdol, orthochrome and pinachrome, the best mixture is that with orthochrome, the bath being: alc. 100 cc., water 200 cc., 1% pinachrome violet 3 cc., 1% orthochrome 3 cc. The plates are bathed 3 min., and dried in total darkness. Compared with similar pinacyanol mixtures, pinachrome violet shows no superiority. A new isocyanine, *m*-toluquinolinequinaldine diethylisocyanine iodide, even in best conc., is far inferior to ethyl red, and its usefulness seems limited, as emulsion-dyed plates show much less color sensitiveness than bathed plates.

L. DERR.

6. INORGANIC CHEMISTRY.

H. I. SCHLESINGER.

New crystalline variety of silver. T. C. CHOUDHRI. *J. Am. Chem. Soc.* 37, 2037-9(1915).—Spongy Ag, prepd. by igniting Ag tartrate, was treated at ordinary temps. with HNO_3 (1.42) from which lower oxides of N had been removed by boiling with carbamide. At first some action took place, but after a time the soln. of Ag stopped, and on allowing the mixt. to stand with occasional shaking for 2 weeks, the remaining Ag was converted into long needle-shaped crystals easily visible to the naked eye; slender needles which are at first formed appear floating on the surface of the acid liquid. As the conversion into a cryst. variety takes place at ordinary temps. in a heterogeneous system, Smit's dynamic theory of allotropy does not apply.

E. B. MILLARD.

Sodium silicates. ALFR. ERDENBRECHER. *Chem. Ztg.* 39, 583(1915).—E. has isolated a new hydrate, $\text{Na}_2\text{SiO}_3 \cdot 4\text{H}_2\text{O}$, m. 89.2° . Cf. *C. A.* 8, 3539. J. H. M.

The ferrocyanides of bivalent and trivalent vanadium. G. LEVI. *Atti accad. Padova* 31, 1(1915).—Reduction by electrolysis is unsatisfactory in obtaining trivalent V, but $\text{Na}_2\text{S}_2\text{O}_4$ will reduce penta- or tetravalent V to the trivalent stage without carrying the reduction to the divalent stage, even if present in excess. The acid soln. of tetravalent V is treated with an excess of $\text{Na}_2\text{S}_2\text{O}_4$, boiled for a few min. in an atm. of CO_2 and pptd. (at $30-40^\circ$) with the calc. amt. of $\text{K}_4\text{Fe}(\text{CN})_6$. The ppt. is rapidly filtered and washed in an atm. of CO_2 , then decomposed with concd. H_2SO_4 and the residue fused with Na_2CO_3 and KNO_3 . The Fe is detd. as Fe_2O_3 and the V as V_2O_5 . Detns. of Fe/V gave 0.832, 0.840, 0.829 (theor. = 0.821). $\text{V}_4[\text{Fe}(\text{CN})_6]_3$ loses C_2N_2 on drying, oxidizes on exposure to air and is insol. in acids except concd. H_2SO_4 . $\text{V}_3\text{Fe}(\text{CN})_6$ (?) is prepared by the electrolysis of an acid soln. of tetravalent V and pptn. as above. The brown ppt. is insol. in acids except concd. H_2SO_4 and resembles $\text{V}_4[\text{Fe}(\text{CN})_6]_3$ in most respects.

L. T. FAIRHALL.

The action of nitric acid on aluminium. A. TRILLAT. *Bull. soc. encour. ind. nat.* 122, 547-54(1915).—The character of the action varies with the purity of the Al, the nature of the impurity, the conc. and purity of the HNO_3 , the temp. and the absence

or presence of air. T. in his expts. used acid of 3 concs., (1) 99.7%, (2) 63.3%, (3) 21.6% HNO_3 . The Al, 99.7% pure, was cut in bars $100 \times 28 \times 1$ mm., one side of which was polished, the other rough. Immersed in acid (1) at 0° for 15 days in the absence of air, the loss in wt. was 0.54%, at 28° , 4.3%. In acid (2) at 8° the loss was 8.8%, at 28° 31.1%. In acid (3) at 18° the loss was 11.8% and at 28° 46.1%. The bars immersed in the conc. acid preserved their initial appearance while those in the dil. solns. became more or less encrusted. In the presence of air corrosion was more marked. The presence of Cu, Na, Mg, Cl, and HCl accelerated the attack.

H. L. OLIN.

Catalysis of hydrogen peroxide (decomposition) by acids and alkalis in a homogeneous medium. GEORGES LEMOINE. *Compt. rend.* 161, 47-51(1915); cf. C. A. 9, 401.—The expts. were on 3% H_2O_2 at 65° in the presence of HCl and H_2SO_4 , following the discovery (1912) that H_2O itself could catalyze the decompn. if it was present in sufficient excess. Decompn. was slower in the presence of increasing quantities of acid, but the retardation was not proportional to the acid concn. This retardation was explained on the assumption that the acids had great affinity for H_2O , and that they therefore removed the "water," as such, from soln., thus virtually concentrating the H_2O_2 and slowing down its decomp. LiOH, KOH and NaOH accelerate the decompn. of H_2O_2 , the speed increasing with the concn. of alkali. A very small amt. of Na_2O_2 also accelerated the decompn. The acceleration produced by alkalis was connected with the intermediate formation of a peroxide.

E. B. MILLARD.

The action of chlorine on sodium thiosulfate. P. A. W. SELF. *Pharm. J.* 95, 133-4(1915).—HCl and H_2SO_4 being set free, Na_2CO_3 is added to prevent their formation in the mixt. designed as a protection against inhaling Cl. S. found that in a mixt. of $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ 60, $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ 52, and H_2O 100 parts, the two salts are used up at about the same rate by Cl gas. A good proportion of glycerol should be added to keep the respirators wet. In a French formula, $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ 1000 g., $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ 200 g., H_2O 800 g., glycerol 150 g., the whole alkali was used up and the soln. turned acid when about 35% of the thiosulfate was decomposed by Cl. S. WALDBOTT.

Dehydration and decomposition results with a new thermobalance (HONDA) 1. Uranium as catalyzer in the synthesis of ammonia (HABER) 2.

7. ANALYTICAL CHEMISTRY.

E. G. R. ARDAGH.

Choice of indicators in titrimetry. R. VAN MELCKEBEKE. *Pharm. Weekblad* 1914, 1579-86; LANGSLOW, *J. Gas Lighting* 1914, 501; *Schweis. Apoth. Ztg.* 53, 421-4 (1915).—The classification, uses and limitations of a number of indicators are given.

S. WALDBOTT.

Arsenious oxide as an alkalimetric standard. A. W. C. MENZIES AND F. N. McCARTHY. *J. Am. Chem. Soc.* 37, 2021-4(1915).—To prepare 500 cc. of 0.1 N soln., 2.47 g. of As_2O_3 was weighed, oxidized with concd. HNO_3 , 3 times evapd. to dryness to remove HNO_3 and taken up in the required vol. or weight of H_2O . To a 30-40 cc. sample of the acid, 3-4 cc. satd. BaCl_2 soln. and the phenolphthalein are added and the titration completed after the appearance of a characteristic lustrous, silky, cryst. ppt. of BaHAsO_4 . Cf. Menzies and Potter, C. A. 6, 3250.

E. B. MILLARD.

Standardization of sodium thiosulfate solution for copper determination. W. G. GRANT. *Chem. Analyst* 13, 21(1915).—Weigh 10 g. pure Cu foil, dissolve in HNO_3 , evap. and allow to crystallize. Dissolve in water and dil. to 1000 cc. in standard

flask, taking pains to allow the soln. to come to room temp. before final diln. Use 10 cc. of this soln. for standardization.

H. M. LANCASTER.

The determination of lead as sulfite. G. S. JAMIESON. *Am. J. Sci.* 40, 157-60 (1915).—An exptl. study. Pb can be pptd. quantitatively from a slightly acid soln. with NaHSO_3 or $(\text{NH}_4)\text{HSO}_3$, or with aq. SO_2 , if the acidity of the soln. is carefully controlled. When a soln. contains much acid it should be almost neutralized with NH_4OH before attempting to ppt. the Pb (not applicable in the presence of H_2SO_4). To measured quantities of a $(\text{AcO})_2\text{Pb}$ soln. containing 10 g. of AcOH per l. add an excess of a 2% soln. of NaHSO_3 , stir thoroughly and allow to settle for an hr. or more, filter on gooches and wash with cold H_2O , taking care not to allow all the liquid to pass out of the crucible until the washing is completed. Dry crucibles + PbSO_3 for an hr. at about 150° and calc. to Pb. Working with a $\text{Pb}(\text{NO}_3)_2$ soln. containing 5 g. of HNO_3 per l. and pptg. with SO_2 soln. (36.8 g. SO_2 per l.), it is advisable to add about 10 cc. of 10% AcONa soln. after pptg. the PbSO_3 . Too great an excess of SO_2 will exert a solvent action on the PbSO_3 . Time of standing 10 min. to 1 hr. Similar results are obtained by nearly neutralizing the HNO_3 with NH_4OH and then adding NaHSO_3 . To sep. Cu and Pb, filter within 1 hr. leaving as much as possible of the ppt. in the beaker; wash once by decantation with about 10 cc. of H_2O , heat for about 5 min. with 10 to 15 cc. of $(\text{NH}_4)\text{HSO}_3$ soln. (prepared by passing SO_2 into NH_4OH (1:1) until strongly acid and then adding NH_4OH to neutralize the soln.). Transfer the ppt. to the gooch, wash with H_2O , dry, and weigh as PbSO_3 . In the presence of Ca, the PbSO_3 ppt. carries down CaSO_3 , although a Ca soln. gave no ppt. with NaHSO_3 , even after standing 2 days. Pb can be readily sepd. from Zn. Expts. indicate that Pb can be sepd. by means of NaHSO_3 without special precautions from those metals (except the alkali earth metals) which are not reduced by the sulfite. Attempts to titrate PbSO_3 with KIO_3 in the presence of strong HCl gave low results. Results of expts. reported show excellent agreement between amts. taken and found. Cf. Ivanov, C. A. 8, 2132.

F. W. SMITHER.

Analysis of some platinum minerals from the Urals and the method of separation of the platinum metals. IDE KOIFMAN. *Arch. sci. phys. nat.* 40, 22-38 (1915).—A new method for the analysis of native Pt, worked out as a thesis by V. THURINGER, is described. It is based on the sepn. of the elements into the groups: Os + Ir, Pt + Ir, Pd + Au, Rh + Cu, and Fe. Take a sample of about 12 g.; treat first with HNO_3 + HCl , Os and Ir remaining insol. Remove excess of acid from the soln. and ppt. the Pt and Ir with NH_4Cl ; these 2 metals can be sepd. by ignition of the ppt. and extn. by dil. HNO_3 + HCl , which dissolves the Pt. Treat the filtrate from the Pt and Ir with dimethylglyoxime, which ppts. Pd and Au; these can be sepd. by dissolving in HNO_3 + HCl , removing traces of Pt with NH_4Cl , and treating with $(\text{NH}_4)_2\text{C}_2\text{O}_4$, which ppts. Au. Treat the filtrate from the Pd and Au with Zn and HCl ; Rh and Cu, together with traces of Pt and Ir ppt. After ignition treat the metals with dil. HNO_3 , which dissolves Cu, leaving the others, which can be sepd. by fusion with $\text{K}_2\text{S}_2\text{O}_7$. Finally, oxidize the Fe and ppt. as basic acetate. This method was tried on known mixts. of the metals and found to give accurate results, and then extended to natural specimens from 6 localities, tables of the analyses of these being given. E. T. WHERRY.

The colorimetric determination of copper. G. DENIGÈS AND E. SIMONOT. *Bull. soc. pharm. Bordeaux* Aug.-Dec., 1915; *Répert. pharm.* 27, 172-3 (1915).—The process depends upon the production of a red-violet color by transforming Cu salts into CuBr_2 , dehydrating with H_2SO_4 and adding excess of KBr . To prepare the reagent, add 100 g. KBr free from BrO_3^- to 150 cc. boiled H_2O ; shake, transfer to a 200 cc. vol. flask, fill with warm H_2O , cool and make up to the mark with cold H_2O . To 20 cc. of this soln. in a beaker in an ice bath add slowly 10 cc. H_2SO_4 (d. = 1.84); cool and

filter off the K_2SO_4 with glass wool. Add 2 cc. of this soln. to 2 cc. of the Cu soln. to be tested, to which has been added 20% of its vol. of H_2SO_4 . Compare the color produced with that from a standard Cu soln. The reagent is unstable and should be kept in brown glass. Cu in complex compds. must first be electrolyzed. The method is adapted to detg. small amts. of Cu.

H. L. OLIN.

A rapid method for determining manganese in iron ores. C. H. FLECKINGER. *Chem. Analyst* 14, 7(1915).—*Soln. 1:* 350 cc. H_2O , 1400 cc. HCl (1.20), 350 cc. H_2SO_4 (1.84). *Soln. 2:* 1600 cc. H_2O , 400 cc. HNO_3 (1.42), 25 cc. of stock $AgNO_3$. *Soln. 3:* 200 g. $(NH_4)_2S_2O_8$ to 2000 cc. H_2O . *Soln. 4:* Weigh 3.225 g. $Na_4As_2O_8$ into a beaker and add approx. 100 cc. H_2O . Dissolve on steam or hot plate and dil. to 1250 cc. and keep as a stock soln. Dil. 125 cc. of this stock soln. to 2000 cc. and use for titration. Weigh 0.200 g. ore into a 250 cc. Erlenmeyer flask, add 15 cc. of soln. 1, cover with watch glass and boil on hot plate until dissolved. Remove watch glass and evap. until fumes of SO_2 are given off for 15 min. Remove to table and cool, add 100 cc. H_2O . Put on hot plate and boil. Add 20 cc. soln. 2, using a 250 cc. dispensing buret when required for detn. in large numbers. Allow to boil for 2 or 3 min. and add 20 cc. of soln. 3. Allow to foam for 10 seconds. Remove and cool. When cool, titrate with soln. 4, until pink disappears and is replaced by a pea green, which suddenly appears. It is more convenient to carry through this detn. in one flask. Many ores will probably not go into soln. in soln. 1. In such case, use 10 cc. HCl (1.20), then add 5 cc. of a soln. consisting of 1 part H_2O and 1 part H_2SO_4 (1.84). In ores containing between 2 and 6% Mn 0.100 or 0.050 g. should be taken, and standardized with an ore of the same percent.

H. M. LANCASTER.

A method for the separation of aluminium and zinc in aluminium alloys. H. C. WEIRICK. *Chem. Analyst* 13, 5-6(1915).—This method is based on the pptn. of Zn by H_2S from a soln. slightly acidified with H_2SO_4 , the amt. of Zn being approx. known. Dissolve alloy in dil. H_2SO_4 , neutralize with NH_4OH (Me-orange) and add dil. H_2SO_4 to make following amts. of acid, taking into consideration the H_2SO_4 liberated by the H_2S . In vols. less than 200 cc. 0.55 g. H_2SO_4 should be present per 100 cc.; 0.450 g. per 100 cc. in vols. of 300 cc., and 0.350 g. per 100 cc. in vols. of 500 cc. The amt. of H_2SO_4 liberated by H_2S can be calcd. by multiplying the approx. amt. of Zn by 1.5. Through the cool soln. pass a very rapid current of H_2S (at least 8 bubbles per sec.) for 40 min. Filter off the ZnS on a tared gooch, wash with cold H_2O , ignite in elec. muffle at 900° , and weigh as ZnO , or dissolve in HCl and titrate with $K_4Fe(CN)_6$. The Al can then be pptd. from the filtrate with NH_4OH , and detd. as Al_2O_3 in the usual way.

H. M. LANCASTER.

Analysis of aluminium. D. CHERCASS. *Chem. Analyst* 13, 12-4(1915).—Details for detn. of SiO_2 , Si, Cu, Fe, and Mn. Powdered Al used as a paint contains 2-5% stearic acid which acts as a binder. This may be extd. with ether in a soxhlet and weighed.

H. M. LANCASTER.

The determination of spelter coating on sheets and wire. J. A. AUPPERLE. *Am. Soc. Testing Materials; Metal Ind.* 13, 329-30(1915); *Iron Age* 96, 132(1915).—The Preece $CuSO_4$ test is unreliable. The $(AcO)_2Pb$ method yields accurate and satisfactory results, but the time required for making the test limits the scope of its usefulness. Proposed method for sheets: Cut several samples (usually 5) $2\frac{1}{4} \times 2\frac{1}{4}$ in. from various parts of the sheet, weigh together and immerse singly for one min. in 100 cc. of HCl (d. 1.20), to which has been added 5 cc. of $SbCl_3$ (20 g. Sb_2O_3 dissolved in 1 l. of HCl (d. 1.20)). The same 100 cc. of HCl can be used for at least 5 samples, but 5 cc. of the $SbCl_3$ soln. must be added for each sample. The samples are washed and scrubbed under running H_2O , dried with a towel, laid in a warm place for a few secs.,

and again weighed together. The number of g. lost is divided by the number of samples taken; each g. = 1 oz. of coating per sq. ft. The method is very accurate and more rapid than the Preece test. *Wire*: Strip a small section of the galvanized wire in HCl containing SbCl_3 . Then carefully measure the diam. of the black wire so that the length of wire to use may be detd.; it should be such that the number of g. of coating will represent the number of ozs. per sq. ft. of surface. These lengths are given in a table for 0 to 18 gage wire; in the lighter wires, it will be more convenient to use some fraction of these lengths. First clean the wire with CCl_4 or gasoline, weigh, place in a tall glass cylinder containing HCl (d. 1.20), to which has been added 2 to 3 cc. of the above SbCl_3 soln. After immersing the entire length of wire for one min. pour the acid soln. into another cylinder to facilitate removing the wire; scrub under running H_2O , dry, and weigh as above. Each g. lost = 1 oz. of coating per sq. ft. For direct comparison with the wt. of coating as expressed on galvanized sheets (2 sides), this figure should be doubled.

F. W. SMITHER.

A rapid method for washing gold beads. E. J. HALL. *Eng. Mining J.* 100, 149-50 (1915).—The method of Black (*C. A.* 9, 573) is modified by inserting a vacuum regulator in the line beyond the suction bottle, and by the use of a liquid-dispensing bottle (an inverted bottle with bottom cut off and a valve made from a glass rod and tube cemented into neck).

F. W. SMITHER.

Zinc dust precipitation tests. N. HERZ. *Bull. Am. Inst. Mining Eng.* 1915, 1507-13.—Sharwood's method (cf. *C. A.* 6, 1415) consists in digesting 0.5 g. of the sample in 250 cc. of a soln. contg. 15 g. $\text{KAg}(\text{CN})_2$ and 1.5 g. KCN per l., agitating frequently for 2 hrs., filtering, adding test Pb, scorifying and cupelling. $\text{Mg Ag} \times 0.0606 = \% \text{ pptg. efficiency}$. H. advises using a soln. of double this strength in Ag, adjusting to 0.2% free NaCN, adding a slight excess $\text{Ca}(\text{OH})_2$ soln. to causticize carbonates, filtering, and then by addition of acid bringing the protective alkalinity to equivalent of 0.01 to 0.015% NaOH. With soln. so prepd., the test is made as described by Sharwood. Results are more uniform and more in accord with actual practice. Efficiency should be over 40%. Most of the dust (95 to 99%) should pass 200-mesh. ZnO should be low (well under 15%). Over 1% Pb should be present; as high as 4% may do no harm. Cd may partially take the place of Pb. The dust sometimes contains oil which may be detected or detd. by extn. with ether. It makes the action slow; a partial remedy is to expose the moistened dust to air for some hrs. When dry, the dust does not oxidize, but it may easily be ruined by long exposure to moist air.

E. WALLER.

Detection of various mineral and alkaloidal poisons in waters. P. BRETEAU. *J. pharm. chim.* 12, 68-73 (1915).—A scheme is given for the systematic sepn. of certain alkaloids (brucine, colchicine, atropine, morphine, strychnine, veratrine) from Cu, Sb and As in one sample of 500 cc. of H_2O with test for each substance named; and the sepn. of Ba, cyanides, Hg, Pb and Zn in another 500 cc. of the same H_2O . S. W.

Characterization of hydrocyanic acid in toxicology by the ferric thiocyanate test. P. LAVIALLE AND L. VARENNE. *J. pharm. chim.* 12, 74-81 (1915).—To the cold soln. containing HCN or its alk. salts, add an amt. of $(\text{NH}_4)_2\text{S}$ sufficient to give a distinctly yellow color to the subsequent evapn. residue. Boil gently for 5 min. in a porcelain dish and then evap. on a water bath to about 1 cc. Add about 9 cc. of H_2O , 10 drops of concd. HCl, stir and add 20 cc. of Et_2O . Shake, and decant the Et_2O into a porcelain dish. Repeat this twice with 10 cc. of Et_2O . Evap. the united Et_2O exts. rapidly at ordinary temp. and test with FeCl_3 immediately to avoid evapn. of HCNS. Add the official FeCl_3 soln., dild. 1:10, drop by drop by means of a glass rod until the red coloration no longer deepens. Add at once 1 or 2 cc. of Et_2O , stir and pour into a test tube; observe the violet-red soln. of $\text{Fe}(\text{CNS})_3$ in Et_2O . Ferric meconate, similar in

color, is insol. in Et_2O , and is not decolorized, as is $\text{Fe}(\text{CNS})_3$, by a 1:10 soln. of AuCl_3 . The method detects 0.00005 g. HCN in 10 cc., and is about 20 times as sensitive as the Prussian blue test.

S. WALDBOTT.

Estimation of raffinose by enzymotic hydrolysis. C. S. HUDSON AND T. S. HARDIN. *J. Am. Chem. Soc.* 37, 2193-8(1915); cf. *C. A.* 9, 1342.—The method depends upon the conversion of the raffinose by invertase (ext. from top yeast, rich in invertase and quite free from melibiase) into melibiose + fructose and accurate measurement of the conversion of melibiose into galactose + glucose by the melibiase obtained from bottom yeast, which is free from maltase, cellulase, lactase, trehalase, inulase or diastase. The only known substance which may interfere is melibiose itself, but since it reduces Fehling soln. and raffinose does not, it may be excluded from consideration in some cases. The soln., clarified if necessary with neutral $\text{Pb}(\text{OAc})_2$ and freed from excess of Pb as oxalate or sulfide, dild. so as not to contain more than 13% total sugars, accurately neutralized and then made slightly acid with 1-2 drops glacial AcOH per 100 cc., is treated, for every 95 cc., with 5 cc. of top yeast invertase soln. and a few cc. toluene and kept at room temp. until the rotation is const. (usually 12-24 hrs.); to 95 cc. is now added 5 cc. of bottom yeast ext. and the change in rotation from the instant of mixing accurately detd. from day to day, the temp. being carefully controlled for the readings (the data in this paper were obtained at 20°). Each degree Ventzke change in rotation corresponds to 0.239 g. melibiose or 0.352 g. anhydrous raffinose per 100 cc. in a 2 dcm. tube. Careful manipulation and several days' waiting are required, but this is fully repaid by the accuracy and certainty of the results. The method has been found quite accurate with mixts. of sucrose and raffinose containing even as little as 0.5 part of the latter to 100 of the former, and also in mixts. with sucrose + glucose, invert sugar, lactose, maltose, cellose or trehalose. C. A. R.

Determination of formic acid in the presence of acetic acid. R. LAUFFMANN. Freiberg. *Chem. Ztg.* 39, 575(1915).—L. finds that in Heermann's method the AcOH is not quite all expelled even by several evapns. with HCO_2H . J. H. MOORE.

The quality of platinum ware (BURGESS) 1. Sampling in colliery work (GREGORY) 21.

8. MINERALOGICAL AND GEOLOGICAL CHEMISTRY.

EDGAR T. WHERRY.

Analyses of rocks and minerals from the laboratory of the United States Geological Survey, 1880 to 1914. F. W. CLARKE. U. S. Geol. Survey, *Bull.* 591, 376 pp. (1915).—A tabulation of 2789 analyses, 714 of which are of minerals. R. C. W.

Bournonite crystals of unusual size from Park City, Utah. FRANK R. VAN HORN AND W. F. HUNT. Case School and Univ. Mich. *Am. J. Sci.* 40, 145-50(1915); cf. *C. A.* 8, 3281.—The crystallography of 3 large crystals of bournonite from the Silver King Coalition Mine is given. Analysis by W. R. Veazey of a specimen found at the Daly West Mine gave Pb 43.18, Cu 13.14, Sb 25.03, S 19.59, sum 100.94; sp. gr. = 5.829; this agrees closely with the theory for PbCuSbS_4 . L. W. RIGGS.

A manganese diopside from Radautal in Harzburg. J. UHLIG. Bonn. *Neues Jahrb. Min. Geol.* 39 (Beil.-Bd. *Bauer Festschrift*) 446-9(1914).—Analysis of pale red pyroxene gave SiO_2 51.92, TiO_2 0.31, Al_2O_3 2.54, FeO 6.16, MnO 1.08, MgO 12.49, CaO 24.76, loss on ignition 0.44. Sp. gr. = 3.30-3, $n = 1.68$, double refraction high, pleochroic rose, to almost colorless, to reddish lilac. W. H. FRY.

Plumbojarosite and other basic lead-ferric sulfates (vegasite) from the Yellow Pine District, Nevada. ADOLPH KNOPF. U. S. Geol. Survey. *J. Wash. Acad.* 5, 497-503 (1915).—The plumbojarosite previously noted (*C. A.* 9, 1591) is fully described. A very complete analysis by R. C. Wells is given; the most noteworthy features are the low Fe_2O_3 , the high Bi_2O_3 (6.34%) and the presence of CuO (1.97%). On removing impurities and recalcd. to 100%, and then considering the CuO to be present as beaverite, some grains of which could be recognized under the microscope by their n ($\omega = 1.84$) being less than that of the plumbojarosite ($\omega = 1.872-6$), the mineralogical comp. of the material was found to be 80.58% plumbojarosite and 20.01% beaverite. *Vegasite*: Named from Las Vegas, the principal town near which it occurs; pronounced Văgasit; color, straw yellow; luster, ochreous; structure cryptocrystalline; H., not detd. Sp. gr. = 3.458; under microscope, pleochroic brownish to pale yellow with absorption $\omega > \epsilon$; $\omega = 1.82 \pm 0.01$, $\epsilon = 1.755 \pm 0.002$, opt. + uniaxial; system, hexagonal; habit, minute tabular 6-sided plates, appearing like fibers in end view, qualitatively behaves like plumbojarosite, giving reactions for Fe'' , Pb and SO_3 ; analysis, by R. C. Wells: SiO_2 1.14, Fe_2O_3 38.90, Al_2O_3 3.33, H_2O (—) 0.94, H_2O (+) 10.77, SO_3 24.60, PbO 18.44, Na_2O 0.76, K_2O 0.10, CaO 0.45, MgO 0.49, sum 99.92; this is probably best interpreted as a basic sulfate, $\text{Pb}[\text{Fe}(\text{OH})_2]_4(\text{SO}_4)_2 + 10\%$ colloidal $(\text{Fe}, \text{Al})(\text{OH})_3$.
E. T. W.

Geological anatomy of a Tennessee zinc mine. FRANK L. NASON. West Haven, Ct. *Eng. Mining J.* 100, 259-62 (1915).—Continuation of *C. A.* 9, 1591. The position of the ores in the New Prospect Mine is described in detail and shown to agree with the profound-fissure theory of origin previously advocated.
E. T. W.

Nitrate deposits in southern Idaho and eastern Oregon. G. R. MANSFIELD. U. S. Geol. Survey, *Bull.* 620B, 19-44 (1915).—At Homedale, Idaho, NaNO_3 and KNO_3 are found in veinlets 1-8 mm. thick in rhyolite rock over a considerable area. Other localities of the region have similar deposits. These deposits at the best, however, amount to only about 1% of the whole rock. No positive statement can be made about the extent of the nitrates until more work has been done in opening up the nitrate-bearing zones. The presence of certain other salts suggests that the deposits are due to the action of percolating waters but whether the N was conc. by organic agencies or came from a volcanic source as nitrides cannot be definitely stated.

R. C. WELLS.

Anticlinal structure in parts of Cotton and Jefferson Counties, Oklahoma. C. H. WEGEMANN. U. S. Geol. Survey, *Bull.* 602, 108 pp. (1915).—A report of geol. exploration of a region not yet known but suspected to contain oil or gas, pointing out especially the anticlines and domes which are without doubt one of the important factors conditioning the presence of hydrocarbons in commercial quantities.
R. C. WELLS.

Crystallization of haplobasaltic, haplodioritic and related magmas. N. L. BOWEN. Geophys. Lab. *Am. J. Sci.* 40, 161-85 (1915); cf. *C. A.* 7, 2735; 8, 2856, 3543.—"Though 5 oxides enter into the comp. of the mixts. studied, yet all the phases appearing can be expressed quantitatively in terms of 3 components. . . . From the phase rule point of view, then, the mixts. studied constitute the ternary system diopside-anorthite-albite. In this research the quenching method was used exclusively, and was calibrated against the following fixed points: gold—1062.5°, Li_2SiO_3 —1201°, diopside—1391.5°, anorthite—1550°. Three binary systems were first studied, viz., anorthite-albite, anorthite-diopside, and albite-diopside; and the findings shown in tables and by curves. The results of a study of the ternary system albite-diopside-anorthite are shown in 9 equilateral triangle diagrams and several tables. The facts detd. for haplodiorite, etc. (*haplo* = simple) are applied to their natural analogs, and it is shown

that there can be little reason to doubt that crystn. controls the differentiation of the subalk. series of igneous rocks." L. W. RIGGS.

Granite from Tatra. Review of results obtained so far. J. MOROZEWICZ. *Kraukau. Neues Jahrb. Min. Geol.* 39 (Beil.-Bd., *Bauer Festschrift*), 290-345 (1914).—M. gives 16 analyses of granite, oligoclase, orthoclase, biotite, muscovite, biotite-oligoclase-pegmatite, oligoclase-orthoclase-pegmatite, oligoclase-albite-pegmatite, albite-microcline-pegmatite, and albite-orthoclase-pegmatite. W. H. FRY.

Northfieldite, pegmatite, and pegmatite schist. B. K. EMERSON. Amherst, Mass. *Am. J. Sci.* 40, 212-7 (1915).—*Northfieldite* is the name given by E. to an igneous rock composed of quartz and mica occurring in Pelham and Northfield, Mass. Analysis by E. T. Allen of av. rock from Pelham gave SiO_2 93.38, Al_2O_3 3.09, Fe_2O_3 + FeO 0.72, TiO_2 0.12, CaO 0.34, MgO 0.43, Na_2O 0.50, K_2O 1.32, sum 99.90. The rock is regarded as a differentiation product of a magma, though unlike pegmatite in the absence of feldspar. L. W. RIGGS.

The elaeolite syenite laccolith of Serra de Monchique, southern Portugal. ERICH KAISER. Giessen. *Neues Jahrb. Min. Geol.* 39 (Beil.-Bd., *Bauer Festschrift*), 225-67 (1914).—A discussion of some hot springs and their waters is included. W. H. FRY.

The noselitephonolites of the Schellkops near Brenk. W. ZANTINI. Bonn. *Neues Jahrb. Min. Geol.* 38, 587-642 (1915).—The rocks show the typical structure of noselitephonolites and vary in color from light yellow to deep brown. Masses of blue black noselite and clear colorless sanidine are apparent to the eye while microscopic exam. reveals the presence of nepheline, leucite, pyroxene and very small amts. of biotite and magnetite. Zeolites and calcite are secondary minerals formed by the action of H_2O and the atmosphere. Analyses are given, the striking feature being the high % of alkalis present. In a yellowish brown phonolite, poor in leucite, the percentages of Na_2O and K_2O were 8.88 and 9.53, respectively; in a dark bluish gray sample, rich in leucite, they were 8.83 and 9.10, respectively. H. W. DAUDT.

The basalts of the Marburg region. ARTHUR SCHWANTKE. Analyses. KARL GUYOT. *Neues Jahrb. Min. Geol.* 39 (Beil.-Bd., *Bauer Festschrift*), 531-67 (1914).—Analyses are given, which prove the near relationship of several basalts and dolerites to each other. W. H. FRY.

Nepheline basalt in the Fort Hall Indian Reservation, Idaho. GEORGE R. MANSFIELD AND ESPER S. LARSEN. U. S. Geol. Survey. *J. Wash. Acad.* 5, 463-8 (1915).—The field occurrence of the rock is described and an analysis given, the relations to previously described rocks being discussed. In the C. I. P. W. system its systematic position is (III) IV.1.(2), '2.(1).2; Rossweinese. Comparison of the norm (the minerals which ought to be present, according to the C. I. P. W. interpretation of the analysis) with the mode (the minerals shown by microscopic exam. to be actually present) "indicates that the norm shows more magnetite, forsterite and feldspar than the mode and less biotite, diopside and nepheline." E. T. W.

Scapolite-bearing eruptives from the Lake Laach region. R. BRAUNS. Bonn. *Neues Jahrb. Min. Geol.* 39 (Beil.-Bd., *Bauer Festschrift*), 79-125 (1914).—B. gives several analyses of the rocks of this area. W. H. FRY.

Alcyonaria as a factor in reef limestone formation. L. R. CARY. Princeton Univ. *Proc. Nat. Acad. Sci.* 1, 285-9 (1915).—C. presents a study of those species of *Alcyonaria* whose limy secretion, in the form of minute spicules, is set free at the time of disintegration of the tissues of the living colony, leaving no recognizable skeleton. Members of the family Gorgonaceae are more abundant on coral reefs than those forming a massive skeleton. It was found that by dissolving the organic matter in 25% NaOH , the dried spicules in 12 detns. avd. 27.4% of the wt. of the wet colonies. Observations

on reefs about Tortugas, in which the gorgonian colonies on 20 representative sq. yds. were counted, showed that the spicule content of the living gorgonians amounted to 5.28 tons per acre. Overgrowth of gorgonian tissue by other organisms causes death by chem. means or by exclusion of food and O. The rate of addition of the spicules to reef formation is varied by storms. After the hurricane of Oct. 17, 1910 the amt. set free reached 25 lbs. per sq. yd. L. W. RIGGS.

A peculiar oolite from Bethlehem, Pennsylvania. EDGAR T. WHERRY. *Proc. U. S. Nat. Museum* 49, 153-6(1915).—The material described occurs in a quarry in magnesian limestone. In one layer the ooids are divided parallel to the bedding into a light and dark portion, the latter being the lower. Analyses show the limestone of this bed to contain CaO 33.10, MgO 17.84, FeO 0.25, CO₂ 45.70, Al₂O₃ 0.23, Fe₂O₃ 1.33, SiO₂ 0.52, H₂O 0.32, C 0.79, sum 100.08; while the ooids which have weathered out contain CaO 30.40, MgO 19.71, FeO 0.11, CO₂ 45.57, Al₂O₃ 0.32, Fe₂O₃ 1.90, SiO₂ 0.68, H₂O 0.44, C 1.21, sum 100.34. By calcg. the mineral comps. from the above analyses, and also the comp. of the matrix, assuming that the ooids make up half of the rock, it is shown that the ooids are higher in dolomite, quartz, kaolin, limonite and carbon, and lower in calcite and siderite than the matrix. This oolite has probably formed by soln. of original aragonite, causing the insol. C and nuclei to fall to the bottom of the cavities; secondary dolomite subsequently filled the latter, and still later the C pptd. some pyrite, which has altered to limonite. Figures are given to bring out the various stages of the process. L. W. RIGGS.

Platinum minerals from the Urals (KOIFMAN) 7.

9. METALLURGY AND METALLOGRAPHY.

WILLIAM BRADY, WILLIAM T. HALL.

Table for rapid method of calculating furnace additions. J. W. BUMGARDNER. *Chem. Analyst* 13, 19-20(1915).—Convenient for furnace foremen in foundry work, facilitating calculations. H. M. LANCASTER.

The metal mixer. F. C. THOMPSON. *Iron Coal Trades Rev.* 91, 33-5(1915).—T. points out the disadvantages of using direct blast-furnaces and cupola melted metal in the Bessemer and outlines the history of the mixer. The modern type of mixer has become practically an open-hearth tilting furnace of large size and deep bath of metal in which some of the reactions of the open-hearth furnace take place. In the new types 80% of the S is removed, combining with Mn to form a light slag. The remarkable uniformity of mix obtained increases the output of the converter greatly and causes the linings and bottoms to last 30% longer. Used in open-hearth practice, the preliminary purification, in which most of the Si, P and Mn are eliminated at relatively low temps. (1400°) leaving only C to be oxidized in the furnace proper, increases the efficiency of the process. H. L. OLIN.

Selecting refractories for the foundry. W. H. KELLEY. *Chem. Eng.* 22, 82-4 (1915); see C. A. 9, 47. E. J. C.

Roasting and leaching concentrator slimes tailings. L. ADDICKS. *Bull. Am. Inst. Mining Eng.* 1915, 1471-84.—The original ore consists of pyrite and chalcocite disseminated through the gang and contains approx. Cu 2.35, S 3, Fe 1.5, Al₂O₃ 13, SiO₂ 70%, Ag 0.05 oz., Au none. The concentrates by flotation are of high grade. Tailings consist of about half sand running 0.3% Cu (discarded) and half slimes carrying about 1% Cu. Exptl. runs were made on these slimes. The wet slimes could not be thickened beyond 45% H₂O without some segregation and unevenness of classifica-

tion. Details as to expts. in drying by sun and wind are given. Burying hot steam-coils in the cars of material when loaded for transportation to the plant brought the moisture down to 25%, and in that form it was charged into the roaster. This is a 6-hearth, 18-ft. MacDougall app. oil-fired at the 3rd hearth. Max. temp. on any hearth is 950° F. The hot calcines are discharged into the spent liquor from electrolyzing tank containing about 3% H_2SO_4 in a 30-ft. triangular trough which conducts to Dorr thickeners in which wood has been substituted for metal in the under-liquor parts. About 90% of the leaching took place in this trough. In the thickeners a diaphragm pump was tried, and the remaining air lifts were arranged to return a part of the underflow to the same tank; otherwise the air lifts work irregularly and unsatisfactorily. Leached out as sulfates in lbs. per ton of slimes Cu 10, Fe 4.3, Al_2O_3 16.2. Acid used was 49 lbs. indicating that the equiv. of about 20 lbs. H_2SO_4 came from the calcines, which was much better than had been shown by lab. tests. Some of the Cu was sepd. as cement to keep the Fe and Al in the electrolyzed liquor down to the desired point.

E. WALLER.

Low-grade complex ores of Park City, Utah. S. S. ARENTZ. Univ. Utah. *Mining Eng. World* 43, 252-5(1915).—A discussion of the methods by which values can be recovered from various low-grade ores and tailings from the treatment of high-grade ones.

E. T. WHERRY.

Flotation at Washoe Reduction Works, Anaconda. E. P. MATHEWSON. *Mining Sci. Press* 111, 312-3(1915).—An illustrated description.

E. J. C.

Flue dust sintering plant at Gary. *Iron Age* 95, 1168-70; *Iron Trade Rev.* 56, 1020(1915).—Two 9 X 90 ft. rotary kilns, revolving 1 r. p. m., burning coke oven gas and sinter dust from all furnaces.

H. V. MAIN.

Blast furnace slag handling system. F. L. PRENTISS. *Iron Age* 95, 1396-8(1915).—In the Croxton system chains placed in slag beds are pulled up through cooled slag, breaking it enough to be handled by a crane. This method reduces the H_2O content as compared with granulation, eliminates danger and reduces shipping cost.

H. V. MAIN.

The Tonapah plant of the Belmont Milling Co. A. H. JONES. *Bull. Am. Inst. Mining Eng.* 1915, 1731-58.—Ore is crushed to pass 1 in. apertures in trommel before feeding to the stamps where it is stamped wet (5 pts. of soln. to 1 of ore). Soln. has strength of 5 lbs. KCN and 1 lb. CaO. By grinding in tube mills it is brought to a condition such that 75% passes 200-mesh. At this stage, CaO and 0.15 lb. Pb acetate per ton are added. Then it is run onto Wilfley tables. The concentrates, which contain about 30% each of Fe, S and insol. and 1.6% Au and Ag, are partly dried out and shipped to the smelter. The slimes from the classifiers, Dorr thickeners and concg. tables are treated in thickeners, the overflow from the first of these going to circulating tank or pptn. supply tanks, the underflow to the air agitators. After passing the 6th agitator, the pulps are diluted with partially pptd. soln. and then, thickened. To the No. 1 agitator KCN is added to bring the strength up to 6 lbs. per ton of soln.; also 0.18 lb. Pb acetate is added. Filtration is effected with vacuum filters. After clarifying, one portion is completely pptd., another only partially, the soln. being used on concg. tables, tube mill feed, etc. Zn consumption is 0.7808 oz. per oz. of bullion. The pptn. presses are cleaned every 15 days. The ppt. is briquetted. The flux consists of borax 2.45, Na_2CO_3 6.05 and SiO_2 6%; it is fused in corundum-lined Rockwell oil furnace. The completely pptd. product contains Au and Ag 74.23%, Pb and Cu over 2% each, Zn 4.70, Se 1.40. Bullion contains Au and Ag 93.23, Pb 2.41, Cu 1.02, Se 1.80%. Pb acetate gave much better results than PbO or $Pb(NO_3)_2$. Pb tends to aid extn. by forming PbS with sulfides of the ore; Zn seems to act similarly to some extent. Nevertheless some KCNS always appears in the mill solns. Re-

pptn. of Au and Ag will occur when the alkalinity is too great or too small. Between 0.8 and 1.5 lbs. per ton of soln. was found to be a safe limit. Refinery slags are ground in a ball mill, and concd. on a Wilfley table. The concentrates are briquetted with the product for the next melt. Tailings are sent to the smelter. When fed into the mill circuit, they caused an undesirable accumulation of Cu in the solns. E. WALLER.

The Engels mine and mill. T. T. READ. *Mining Sci. Press* 111, 167-71 (1915).—The important primary minerals in the ore are bornite and chalcopyrite, with associated magnetite; secondary chalcocite and covellite have been derived by upward secondary enrichment; near the surface the ore has been oxidized to malachite, though azurite, cuprite, and native Cu are also found. Flotation yields a 40% Cu concentrate from a mill feed averaging slightly less than 4% Cu, the magnetite going into the tailing. The ore, after being crushed to such a fineness that only 5% remains on 100-mesh and 65% of it will pass 150-mesh, goes to a 12-cell standard Minerals Separation flotation machine. 0.4 lb. of oil per ton of ore is added, half to the tube mill and remainder to the different cells. The froth from the first 3 cells is drawn off as a finished concentrate; that from the remaining cells is returned to the first cell for retreatment. Total extn. averages 84%. Cu sol. in dil. H_2SO_4 ranges from 0 to 0.4%, about $\frac{2}{3}$ of which is recovered. The concentrate froth is sent to a settling tank and the thickened froth then goes to an Oliver filter, producing a cake averaging 10 to 12% H_2O . This concentrate is dried to 5 to 6% H_2O basis, sacked, and shipped to smelter.

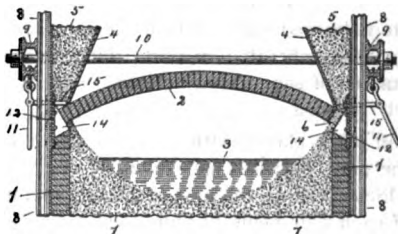
F. W. SMITHER.

Fatigue of copper alloys. E. JONSON. *Chem. Eng.* 22, 55-7 (1915); see C. A. 9, 2372. E. J. C.

Metamagnetic alloys (OVERBECK) 2. Severe boiler corrosions (HEINZELMAN) 14. Preventing corrosion and scale formation in boilers (JONES) 14. Zinc dust precipitation tests (HERZ) 7. Determination of spelter coatings on sheets and wire (AUPPERLE) 7. Blast furnace gas in steam production (MARSHALL) 21. Eliminating fumes with electricity 4. Electric furnace melting of ferro alloys (WILE) 4.

U. S., Reissue 13,961, Aug. 10. F. ZIMMERMANN. Alloy of platinum with 0.5-30% osmium. See original pat. 1,055,119 (C. A. 7, 1347). The alloy is more resistant to acids than Pt and is equal to Ir-Pt in hardness and strength.

U. S., 1,149,495, Aug. 10. G. C. CARSON. Metallurgical furnace. See fig. The material under treatment, e. g., Fe ore or scale in making steel, flows by gravity from the hoppers 5 down past the ends of the furnace roof 2 to the sides and bottom of the furnace so that it forms the lining of the furnace.



U. S., 1,149,754, Aug. 10. J. HARRIS. Charging ore-roasting furnaces so that accumulation of dust in the furnace is prevented by clearing the discharge portion of the hearth of each charge before another charge is deposited upon it.

U. S., 1,149,850, Aug. 10. O. I. METZGER. Alloy for jewelry, pins, springs, etc., composed of Cu 15, Ag 5 and Zn 10 parts.

U. S., 1,150,113, Aug. 17. E. HAYNES. Alloy for tools, etc., composed of Co 25, Cr 20 and Fe 55%. Mo 2-3%, may be added to vary the color. Using more Cr

increases the hardness; more Fe renders the alloy more fusible, more malleable and softer.

U. S., 1,150,191, Aug. 17. E. W. HOFFMAN. Amalgamating apparatus for treating ores.

U. S., 1,150,201, Aug. 17. J. E. JOHNSON, JR. Removing oxygen from cast iron. A bath of the metal is heated in an elec. furnace to a temp. considerably above that at which it comes from a coke furnace and is maintained under a reducing atm. while the O is permitted to react with the other constituents of the bath, such as C and Si.

U. S., 1,150,263, Aug. 17. M. C. GODBE. Ore-leaching apparatus.

U. S., 1,150,367, Aug. 17. W. A. HOFFMAN. Apparatus for filtering solutions leached from ores.

U. S., 1,150,369, Aug. 17. W. E. HOLDERMAN. Tank and filtering leaves for filtering solutions from ores.

U. S., 1,150,401, Aug. 17. B. TALBOT. Sound iron or steel ingots are formed by pouring the molten metal into a mold, stripping the mold after the lower portion of the ingot has solidified but while the interior of the upper portion is still sufficiently fluid to permit diffusion of the segregated portions and pressing to remove the pipe. The mold is so formed as to maintain the upper portion at least 100° hotter than the lower.

U. S., 1,150,511, Aug. 17. C. L. ERICSON. Apparatus for hardening thin steel articles, *e. g.*, hacksaw blades.

U. S., 1,150,512, Aug. 17. J. H. FRYER. Apparatus for annealing malleable iron castings.

U. S., 1,150,669, Aug. 17. J. A. FLEMING. Apparatus for leaching ores. The app. includes a double-walled revolvable drum with filtering material placed between the walls. Ore under treatment is placed in the inner portion of the drum (which is perforated) and leaching liquid is supplied through a pipe passing through one of 2 trunnions supporting the drum and soln. is withdrawn by a pipe through the other trunnion after passing through the filtering material.

U. S., 1,150,787, Aug. 17. H. D. RANKIN. Extracting copper or other metals from sulfide ores. The ore is treated with CO₂ under pressure and the soln. of bicarbonates is drawn off. The residue is then treated with HNO₃ at 125° under pressure and the NO given off is reconverted into HNO₃ for further use in the process.

U. S., 1,150,841, Aug. 17. H. L. DOHERTY. Smelting zinc sulfide ores. The ore is burned with air to form ZnO, the latter is mixed with coal or coke and smelted by heat generated in part from combustion of fresh sulfide and in part from combustion of gases given off from the mixt.

Brit., 8,826, Apr. 7, 1914. D. R. JAMES. Coating metals such as Fe, steel, Cu, and other plates, with Sn, terne, or other metal or alloy, on one side only, by passing the plate between pairs of rolls, one roll of each pair being of steel or other material which picks up the molten coating metal and applies it to the plate, and the other roll of each pair being of china, glass, marble, granite, or other stone or material to which the coating metal does not adhere. The lower rolls are immersed for part of their depth only in the molten metal, and the upper rolls of glass, etc., are wholly immersed in palm oil, resin, or other flux. The plates pass out of the pot through finishing-rolls, one roll of each pair being of steel, etc., and rotating in troughs containing coating-metal, and the other roll of each pair being of material to which the coating-metal does not adhere.

Brit., 9,049, Apr. 9, 1914. AMALGAMATED ZINC (DE BAVAY'S), LTD. In con-

concentrating ores, sulfide ores, especially blende and galena, after treatment by a flotation process for the removal of most of the gang are sepd. from one another by a flotation process in a dil. soln. of Na_2CO_3 , whereby the galena is wetted and a froth rich in blende and a residue rich in galena are obtained. If an organic frothing-agent has been used in the preliminary flotation process, the concentrates may be subjected, before sepn. in the Na_2CO_3 soln., to agitation with a soln. of H_2S , Na_2S , or NaHS , to which may be added weak Na_2CO_3 soln. The sepd. products may be subjected to a repetition of the treatment.

Brit., 9,535, Apr. 17, 1914. W. BORCHERS. In smelting ores, etc., containing Ni, Fe and Cu sulfides, for the production of nickel-iron alloys, the carbonaceous reducing agent is caused to act slowly so as first to reduce Fe and subsequently Ni, while Cu is left in the slag. For this purpose, the ore is melted down with an excess of lime in an elec. furnace lined with C; poor ores may first be converted into mat to increase the Cu-Ni content.

10. ORGANIC CHEMISTRY.

C. A. ROUILLER.

Nitration of dimethyl-*m*-phenetidine. F. REVERDIN. *Arch. sci. phys. nat.* 40, 15-21(1915); see C. A. 9, 2228. E. J. C.

Biochemical synthesis of *d*-glucosides of monovalent alcohols. II. α -Glucosides. EMIL BOURQUELOT. *Ann. chim.* 3, 287-337(1915).—A collective article. L. E. W.

Glucosidification of glycerol by means of α -glucosidase. E. BOURQUELOT, M. BRIDEL AND A. AUBRY. *Compt. rend.* 161, 41-3(1915).—Just as emulsin acting upon glycerol-glucose mixts. leads to the formation of a mixt. of monoglucosides, α -glucosidase ("bottom yeast") acting upon a mixt. of glycerol and glucose (in the presence of PhMe) gave rise to a mixt. of α -monoglycerides. The proportions used in the synthesis and the methods of isolating the monoglyceride mixt. (A) were very similar to those previously used in the prepn. of the β -glucosides (cf. C. A. 9, 2521). The mixt. (A), when dried at 100° , was slowly hydrolyzed by concd. "bottom yeast" preps., as shown by the gradual change in $[\alpha]_D$ and the amts. of glucose liberated. Judging by the polarimetric readings made at intervals during the hydrolysis of (A), B. and A. conclude that (A) probably contains 2 monoglucosides, one having $[\alpha]_D > 129^\circ$, the other $[\alpha]_D < 120^\circ$. No direct method of sepg. the glucosides in (A) proved available. LOUIS E. WISE.

Symmetrical bitertiary glycols. M. BOUVET. *Bull. soc. chim.* 17, 202-16(1915).— $[\text{Me}_2\text{C}(\text{OH})\text{CH}_2\text{CH}_2]_2$ (A), rectangular leaflets with $2\text{H}_2\text{O}$, m. 59° , anhydrous, m. 92° , was prepd. by treating MeMgI in dry Et_2O with Et adipate (Zelinski, *J. Russ. Phys. Chem. Soc.* 38, 931, gives 94°). When HCl gas acts upon (A) in ice-cold, dry PhMe or in abs. alc., 2,7-dichloro-2,7-dimethyloctane (B), m. 49° , possessing an odor suggesting musk, is formed. Diacetate of (A), b. $150.5-1.0^\circ$. $\text{C}_8\text{H}_{18}\text{N}$ when heated with (B) in alc. on the H_2O bath for 10 hrs. gave rise to 2,7-dimethyl-2,7-octadiene, $(\text{Me}_2\text{C}:\text{CH}.\text{CH}_2)_2$, b. $163.5-4.5^\circ$, whose CHCl_3 soln. absorbs 4 atoms Br. The following diols were prepd. by the action of suitable alkyl or aryl Mg halides upon Et adipate: $[\text{Et}_2\text{C}(\text{OH})\text{CH}_2\text{CH}_2]_2$, rhombohedrons, m. $72-3^\circ$ (cf. Valeur, *Compt. rend.* 132, 834); 4,9-dipropyl-4,9-dodecanediol (tetrapropylhexanediol), $[\text{Pr}_2\text{C}(\text{OH})\text{CH}_2\text{CH}_2]_2$, m. 93° ; 1,1,6,6-tetraphenyl-1,6-hexanediol (C), m. 211.5° (without decompn.), giving an orange-red color with H_2SO_4 . Ph_2 was an important by-product in the synthesis of (C). When boiled under reflux with AcOH or AcOH-HCl, (C) is dehydrated with the formation of 1,1,6,6-tetraphenylhexane-1,6-diene (D), $[\text{Ph}_2\text{C}:\text{CH}.\text{CH}_2]_2$, crystals

with green reflex, m. 108° , readily adding Br with the formation of a tetra(?) - Br deriv., m. 140° (decompn.), in striking contrast to $[\text{Ph}_2\text{C}:\text{CH}]_2$ which adds no Br (cf. Valeur, *Compt. rend.* 136, 694). By reducing (D) in AmOH with Na is obtained 1,1,6,6-tetra-phenylhexane, m. 104° , adding no Br. On oxidation with KMnO_4 , (D) in acetone gives rise to a mixt. of BzPh and $[\text{CH}_2\text{CO}_2\text{H}]_2$, a reaction which shows the possibility of forming a dibasic acid of lower C content, $(\text{CH}_2\text{CO}_2\text{H})_2$, from a higher homolog, $(\text{CH}_2\text{CH}_2\text{CO}_2\text{H})_2$, by passing through the intermediate products (C) and (D). 1,1,6,6-Tetrabenzylhexane-1,6-diol, needles from acetone, m. $181.5-2.0^{\circ}$. 1,1,6,6-Tetracyclohexylhexane-1,6-diol, m. 158° , cyclohexene, b. $83-4^{\circ}$, $\text{C}_6\text{H}_{11}\text{OEt}(\text{?})$, b. 149° , and a mixt. of unidentified products possessing an odor suggesting H_2S were formed by the interaction of $\text{C}_6\text{H}_{11}\text{MgCl}$ and Et adipate.

LOUIS E. WISE.

Structure of magnesium-organic complexes and mechanism of their formation. V. CHELINTZEV. Moscow. *J. prakt. Chem.* 89, 86-92(1914).—A critical discussion in which C. refutes the claims of G. Stadnikov regarding the mechanism of the formation of Mg-org. complexes. Cf. C. A. 7, 983.

D. BREESE JONES.

p-Cyano- and *p*-carboxymalachite green. BERTHOLD RASSOW AND HERMANN GRUBER. *J. prakt. Chem.* 91, 341-57(1915).— $\text{p-NCC}_6\text{H}_4\text{CHO}$ (a), previously prepd. by Reinglass (*Ber.* 24, 2423) and Hantzsch (*Z. physik. Chem.* 13, 522), is obtained more smoothly in the following manner: To 50 g. *p*- $\text{NH}_2\text{C}_6\text{H}_4\text{CHO}$ in 200 g. HCl (d. 1.19), after shaking well during 4 hrs., 600 g. H_2O are added and the cold soln. diazotized, adding the pulverized NaNO_2 in 1.0-2.0 g. portions. The soln. is then filtered, freed from the excess of HNO_2 with $\text{CO}(\text{NH}_2)_2$ and then added slowly with continuous stirring at -2° to a soln. of $\text{KC}(\text{CN})_2$ at -2° to -5° , prepd. from 119 g. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, 625 g. H_2O and 131 g. KCN. Ice is added during this operation, which requires 2 to 2.5 hrs., the mixt. then packed in ice 12 hrs., (a) extd. with Et_2O after adding NaCl or a little concd. HCl to facilitate sepn., completely dried over CaCl_2 , the Et_2O removed, and the red oil distd.; it b. 133° ; yield, 45%. 4 g. (a) condenses with 10 g. PhNMe_2 in 4 g. 93% alc. in the presence of POCl_3 (ZnCl_2 gives only about a 60% yield). On making alk. with NaOH, 4',4'-di[*dimethylamino*]-4'-nitrotriphenylmethane (b) seps. in almost theoretical yield as a yellow oil, crystals on standing; yellow crystals from alc., m. $158-60^{\circ}$. (b) is oxidized by freshly prepd. $\text{MnO}(\text{OH})_2$ (*Ber.* 19, 744) at $40-60^{\circ}$ in the presence of 25% H_2SO_4 (3 mols.) to 4',4'-di[*dimethylamino*]-4'-nitrotriphenylcarbinol (c), which is pptd. by KOH, dried, extd. from inorganic substances with C_6H_6 , and pptd. by low boiling petr. ether; it m. 132° . (Twice the theoretical quantity of $\text{MnO}(\text{OH})_2$ should be employed, even though part of (b) is oxidized too far, for a mixt. of (b) and (c) is very difficult to sep.). Dihydrochloride (d), $\text{HOC}(\text{C}_6\text{H}_4\text{CN}) \cdot [\text{C}_6\text{H}_4\text{NMe}_2\text{HCl}]_2$, from (c) in abs. Et_2O with dry HCl, seps. as a grayish amorphous powder. The chloride of the dye base (e), $\text{C}(\text{C}_6\text{H}_4\text{CN})[\text{C}_6\text{H}_4\text{NMe}_2] \cdot \text{C}_6\text{H}_4\text{NMe}_2\text{Cl}$, seps. as a bronze-colored mass when (d) is dissolved in high % alc. and Et_2O added. The picrate of (c), which is pptd. in alc. soln., is greenish white and unstable. It decomp. almost immediately into the dye salt, bronze-colored leaves from alc., turning dark green in the air, which m. $188-90^{\circ}$. (c) forms an oxalate, when a soln. of anhydrous $(\text{CO}_2\text{H})_2$ in dry Et_2O is added to a H_2O -free soln. of (c); it is a greenish white salt, changing very quickly into the dye salt, which seps. on evapn. of the alc. soln. as a sticky, bronze-colored mass. It m. (decompn.) at a low temp., leaving a residue m. 172° . 4',4'-Di[*dimethylamino*]triphenylmethane-4'-carboxylic acid (f) is obtained in nearly theoretical yield when 5 g. (b) in 100 g. alc. are heated with 20 g. KOH in 100 g. alc. until nothing seps. on cooling; the alc. is then removed, the residue dissolved in H_2O , and (f) pptd. with a slight excess of H_2SO_4 , needles from abs. alc., m. 252° , sol. in H_2SO_4 with a yellowish green color; the potassium salt seps. from H_2O as a voluminous ppt. Malachite green *p*-carboxylic acid bisulfate (g), $\text{C}(\text{C}_6\text{H}_4\text{CO}_2\text{H})(\text{C}_6\text{H}_4\text{NMe}_2) \cdot \text{C}_6\text{H}_4\text{NMe}_2$.

$\text{NMe}_2\text{SO}_4\text{H}$, is formed when (f) is suspended in H_2O with sufficient 25% H_2SO_4 for both salt formation and decompn. of the oxidizing agent, treated in portions with twice the theoretical quantity of $\text{MnO}(\text{OH})_2$, suspended in H_2O , heated to 50° , let cool 2 hrs., filtered, salted out with Na_2SO_4 , dried, extd. from inorganic substances with abs. alc. and pptd. by Et_2O ; it seps. in dark flakes, which become bronze colored in the air. If, instead of adding Na_2SO_4 , the above soln. is carefully neutralized with KOH , the neutral sulfate (h), $[\text{C}(\text{C}_6\text{H}_4\text{CO}_2\text{H})(\text{C}_6\text{H}_4\text{NMe}_2)_2\text{C}_6\text{H}_4\text{NMe}_2]_2\text{SO}_4$, seps. as a grayish green powder, sol. in alc. and pptd. by Et_2O as a dark, bronze-colored solid. When (g) is decompd. by alkali in excess, (h) first seps., then $4^1,4^2$ -di[*dimethylamino*]- 4^2 -carboxytriphenylcarbinol (i), which then forms the sol. K salt. (i) is sepd. from (h) by soln. in alc., pptn. of (h) with Et_2O , filtering and cong., when (i) is obtained in colorless needles which become light green on exposure to the air, darken 230° , m. 268° ; the potassium salt seps. as a faintly yellow, opalescent mass from H_2O . The substitution of the CN and CO_2H groups in the *p*-position in malachite green produces the same gradation of color as has already been observed when NO_2 , SO_3H , Me, MeO and Cl are introduced; *o*-substitution produces a more blue-green, *m*- makes very little change, while *p*-substitution gives a more yellowish shade (*Ber.* 39, 2041). Both (e) and the salts of (i) dye mordanted wool and cotton a green color which is considerably more yellow than malachite green; the intensity of color is weaker than that of the mother substance. The *m*- CO_2H compd. has a still weaker intensity than either (e) or (i). (i) will dye wool without the use of a mordant.

NORMAN A. SHEPARD.

p-Chloro- and *p*-bromo-*m*-cresols. L. R. F. VON WALTHER AND W. ZIPPER. *J. prakt. Chem.* 91, 364-414 (1915).—Halogenated cresols have powerful antiseptic properties; *p*-chloro-*m*-cresol surpasses all other analogous phenol derivs. in this respect and therefore derivs. of this substance are of special interest. While the chlorination of *o*- and *p*-cresol with the formation of monosubstitution products proceeds with comparative ease (cf. *Ber.* 16, 1598), *m*-cresol shows a great tendency to take up 2 atoms of Cl and it is only by protecting the OH group or observing special precautions as to temp. and diln. that the formation of dichloro-*m*-cresol can be avoided. By chlorinating *m*- $\text{HOC}_6\text{H}_4\text{Me}$ (a) in glacial or 90% AcOH both at room temp. and at 100° , the following compds. were isolated by W. and Z.: 2,4,6-trichloro-*m*-cresol (b), 1-methyl-2,4,5-trichloroquinone dichloride (c), 1-chloromethyl-2,4,5-trichloroquinone dichloride (d), and 2,4,5-trichlorotoluquinone (e). (b) seps. in prisms when (a) in glacial AcOH is satd. cold with Cl; faintly yellow needles in clusters, m. 45° (cf. *C. A.* 6, 354; 7, 2546). When the filtrate from (b) is again satd. with Cl and allowed to stand, (d) seps.; prisms from alc., m. 117° . (e) is obtained when (a) is satd. at 100° with Cl. Some (d) seps. on cooling, which is filtered off, the soln. again satd. with Cl, cooled, and dild. with H_2O , when an oil seps. which deposits (e), yellow leaves from alc., m. 238° (decompn.). This m. p. is somewhat higher than that ascribed by previous investigators (cf. *Ann.* 168, 268; 172, 210; 237, 145) and lower than that of Michaelis (*Ann.* 293, 275). When (a) in the least quantity of 90% AcOH is satd. with Cl at 100° , a yellow oil and a cryst. solid sep. on cooling. The latter consists of (c), (d) and (e), which may be sepd. by crystn. from alc. 4,6-Dichloro-3-cresol (f), probably the dichloro-*m*-cresol obtained by Claus and Schweitzer (*Ber.* 19, 927) on chlorinating (a) hot and considered to be the 2,4- Cl_2 compd., was obtained by W. and Z. from 6-chloro-3-cresol (*p*-chloro-*m*-cresol) (g), when treated in warm aq. Na_2CO_3 with the calcd. quantity of Cl and allowed to stand. The yellow oil which seps. on diln. with H_2O is probably a mixt. of mono-, di- and trichloro-*m*-cresols; on long standing (f) crystals from this mixt., needles from Et_2O , m. 45 – 6° ; FeCl_3 gives no phenol reaction. Contrary to the finding of C. and S., neither this product nor any other dichloro-*m*-cresol was ever

obtained by W. and Z. by the direct chlorination of (a) in AcOH. *6-Bromo-3-cresol* (h) is obtained smoothly in 83% yield when (a) in CCl₄ is treated slowly with the calcd. amt. of Br at -5° to -10°; needles from H₂O or ligroin, volatile with steam, m. 62°; 100 cc. H₂O dissolves 0.1713 g. at 19°. *Benzoyl derivative*, from BzCl in C₆H₅N, needles from alc., m. 83-83.5°. *6-Chloro-4-bromo-3-cresol* (i) is obtained in needles when (g) in CCl₄ is treated with Br in CCl₄ in portions and the solvent evapd.; needles from petr. ether, m. 70-70.5°. When (g) in glacial AcOH is treated with Br until the red color persists, a brownish red oil seps., from which *6-chloro-2,4-dibromo-3-cresol* (j) is extd. by 50% AcOH; needles from petr. ether, m. 70°-70.5°, b₁₇ 177°; yield, 67%. *6-Chloro-3-hydroxy-4-toluic acid* (*p*-chloro-*m*-cresotinic acid) (k), previously prepd. by Gattermann (*Ber.* 26, 1851), is obtained in 95% yield when dry Na (g) is heated at 160-75° with an excess of CO₂ at high pressure for 6 hrs. The brown product is dissolved in NaOH, largely dild., decolorized hot with SnCl₂, filtered and pptd. by HCl; leaves from CHCl₃, needles from alc., m. 206-7°; it is volatile with steam and sublimes readily; 100 cc. H₂O dissolves 0.0120 g. at 12°. (The Na salt of (g) is much more readily decompd. than PhONa; in the presence of a trace of H₂O, it chars as low as 180°.) (k) is also formed in almost quant. yield by the action of Cl (calcd. amt.) on *m*-cresotinic acid (l) in glacial AcOH. (c), (d) and (e) are also formed in small quantities, but there was no tendency to form polyhalogenated cresotinic acids when AcOH, CCl₄, CHCl₃, C₆H₆ or Me₂CO were used as solvents. Alc., AcOEt, Et₂O, ligroin and CS₂ are not suitable mediums; H₂O leads to the formation of (e). *Sodium salt* of (k), seps. in leaves from 96% alc.; *potassium salt*, needles from H₂O; *lithium salt*, clusters of needles from alc.; *ammonium salt*, needles from alc.; *neutral calcium and neutral barium salts*, leaves from H₂O; *silver salt*, fine needles; *lead, mercury and aluminium salts*, all very difficultly sol.; *magnesium salt*, leaves from H₂O; *manganese salt*, bright violet needles from H₂O; *basic copper salt*, green leaves, insol. in H₂O; *bismuth salt*, very difficultly sol. With FeCl₃ (k) gives a violet coloration; when the chloride is in excess a brownish red ppt. seps. *Hexamethylenetetramine p-chloro-m-cresotinate*, (CH₂)₆N₄C₆H₇O₃Cl, prisms from alc., m. 170° (decompn.) and gives a weak blue fluorescence in aq. NaOH; *antipyrine salt*, C₈H₇O₃Cl.C₁₁H₁₃ON₃, needles from H₂O, m. 128°; *quinine salt*, C₈H₇O₃Cl.C₂₀H₂₁O₂N₃, an oil from H₂O, crystg. in indefinite form; *cinchonine salt*, C₈H₇O₃Cl.C₁₉H₂₁ON₃, indefinite crystals from H₂O. *Methyl ester* of (k), (m), leaves from MeOH, m. 55°; *ethyl ester* (n), faintly yellow leaves from 96% alc., m. 52-3°; *propyl ester* (o), prisms, m. 21°, b₁₈ 168-70°. *Methyl 2-methoxy-4-methyl-5-chlorobenzoate* (p), from the Na salt of (m) with EtI or from the Na salt of the (l) with Me₂SO₄ in NaOH soln., faintly yellow needles from MeOH, m. 53-4°, b₁₄ 160°. *Methyl 2-ethoxy-4-methyl-5-chlorobenzoate*, b₁₁ 170°; pptd. from MeOH by H₂O in faintly yellow needles, m. 54°. *Methyl 2-propyloxy-4-methyl-5-chlorobenzoate*, b₂₁ 188°. *Methyl 2-isopropyloxy-4-methyl-5-chlorobenzoate*, a highly refractive oil, b₁₉ 173°. *Methyl 2-butyloxy-4-methyl-5-chlorobenzoate*, faintly yellow refractive oil, b₂₀ 194°. *Methyl 2-isobutyloxy-4-methyl-5-chlorobenzoate* (q), refractive oil, crystg. in prisms, b₁₄ 187°. *Methyl 2-isoamyloxy-4-methyl-5-chlorobenzoate*, faintly yellow refractive oil, b₁₈ 197°. *2-Methoxy-4-methyl-5-chlorobenzoic acid*, obtained by sapon. of (p), prisms from alc., m. 130°; *sodium salt*, needles; the salts of the alkali metals and the ammonium salt are sol.; *calcium, barium, lead, silver, the yellow ferric and the blue copper salts* are all difficultly sol. *2-Ethoxy-4-methyl-5-chlorobenzoic acid* (r), needles from H₂O, m. 143°, *2-propyloxy-4-methyl-5-chlorobenzoic acid*, broad prisms from CCl₄, m. 112° (*sodium salt*, needles), *2-isopropyloxy-4-methyl-5-chlorobenzoic acid*, long prisms from ligroin, m. 121°, *2-butyloxy-4-methyl-5-chlorobenzoic acid*, needles from ligroin, m. 96.5°, and *2-isoamyloxy-4-methyl-5-chlorobenzoic acid*, leaves from ligroin, m. 94°. are all obtained by sapon. of the corresponding esters. Sapon. of (q) with alc. NaOH gave a mixt. of *2-isobutyloxy-4-methyl-5-chlorobenzoic acid* and (r), m. 117°, which

could not be sepd. 3-Methyl-4-chlorophenyl salicylate, $C_6H_4(OH)CO_2C_6H_4MeCl$, is formed when $o-HOC_6H_4CO_2H$ is heated at $135-40^\circ$ with (g) in the presence of $POCl_3$; fine needles from alc., m. 74° . 3-Methyl-4-chlorophenyl *p*-chloro-*m*-cresotinate, from (k), (g), and $POCl_3$ at 140° , small needles from MeOH, m. 142° . Phenyl *p*-chloro-*m*-cresotinate (s), needles from MeOH, m. 88° . β -Naphthyl *p*-chloro-*m*-cresotinate, prisms from Me_2CO , m. 137.5° . Sapon. of these new "salols" shows a behavior similar to $C_6H_4(OH)CO_2Ph$; their therapeutic application is thus possible. Acetyl-*p*-chloro-*m*-cresotinic acid, clusters of needles from CCl_4 , m. 146° . 5-Chloro-4-methyl-2-hydroxybenzoyl chloride (t) is easily obtained on heating (k) with $SOCl_2$ at 80° ; long needles from petr. ether, m. 48° ; it cannot be distd. without decompn. Treated with $PhOH$, (t) gives (s). The amide of (k), leaves from alc., is formed when (t) is treated in Et_2O with dry NH_3 ; anilide, leaves from alc., m. 222° ; *p*-phenetidine, from (t) and $p-NH_2-C_6H_4OEt$, leaves from 96% alc., m. 215° . 6-Bromo-3-hydroxy-4-toluic acid (*p*-bromo-*m*-cresotinic acid) (u) is obtained in theoretical yield when 106 g. Br in 300 g. CCl_4 is slowly dropped into 100 g. (l) in 1 kg. CCl_4 and let stand 24 hrs.; prisms from 96% alc., which give a bluish violet coloration with $FeCl_3$ and m. 221° (not 211° , as Gattermann, *Ber.* 26, 1851, gave it); ammonium salt, needles from H_2O ; the alkali, cobalt and magnesium salts are all easily sol. while the barium, silver, mercury, lead, gold, bright yellow platinum, brownish violet ferric and yellowish green copper salts are all difficultly sol. Both (k) and (u) are more powerful antiseptics than $o-HOC_6H_4CO_2H$. Methyl 2-methoxy-4-methyl-5-bromobenzoate, formed when (u) is treated with Me_2SO_4 and $MeONa$, seps. from dil. MeOH in leaves, m. $45-6^\circ$; the yield is small as the chief product is methyl 2-hydroxy-4-methyl-5-bromobenzoate, needles from MeOH, m. 48° . Acetyl-*p*-bromo-*m*-cresotinic acid seps. in leaves from $CHCl_3$, m. 155° . When (g) in 80% AcOH is treated cold with dil. HNO_3 , a yellow substance seps. from which 6-chloro-4-nitro-3-cresol (v) is obtained on crystn. from alc. in yellow leaves, m. 133.5° ; ammonium salt, orange yellow leaves from H_2O , m. 146° (decompn.); sodium salt, red needles; potassium and barium salts, red leaves; calcium salt, orange-red needles; mercury salt, brownish yellow leaves; copper salt, bright green leaves; lead salt, brick red; ferric salt, yellowish to dark brown, featherlike crystals; aluminium salt, yellow featherlike crystals; chromium salt, bright green; silver, gold, and platinum salts, yellow leaves; aniline salt, yellow leaves from alc., m. 134° ; *p*-toluidine salt, bright yellow leaves, m. 133° ; *o*-toluidine salt, yellow leaves, m. 132° . On evapg. the alc. mother liquors from (v), 6-chloro-2,4-dinitro-3-cresol (w) seps.; yellow leaves from ligroin, m. 69° . If heat is applied during the nitration of (g), (w) is the only product of the reaction. Ammonium salt, orange needles, m. $190-224^\circ$ (decompn.); sodium salt, orange; potassium salt, orange needles; calcium salt, golden yellow scales; barium salt, microscopic orange needles; mercury salt, reddish brown needles; copper and lead salts, brown needles; ferric and aluminium salts, brown leaves; chromium salt, leaves; silver, gold and platinum salts, yellow needles; aniline, *p*-toluidine and *o*-toluidine salts, orange needles, m. 136° , 145° and 78° , resp. Reduced with H_2SO_4 in boiling H_2O , (v) is converted into 6-chloro-4-amino-3-cresol, which seps. on cooling in leaves, m. 143° ; yield, 80%.

NORMAN A. SHEPARD.

Alcoholysis of esters. ANTONIO MADINAVEITIA. Madrid. *Anales soc. españ. fis. quim.* 12, 426-8(1914).—Willstätter observed that the alc. (phytol) produced in the alcoholysis of chlorophyll with EtOH did not remain free, but formed a mixed ether by reaction with EtOH. M. attempted to ascertain if this phenomenon is of frequent occurrence in the alcoholysis of esters. Methanolysis of castor oil was effected by boiling 150 g. castor oil for 9 hrs. with 450 cc. MeOH containing 3% HCl; the liquid was then poured into H_2O and the aq. layer was sepd., neutralized with NaOH and concd. to a small vol. Abs. alc. was added and the filtrate from the pptd. NaCl

was heated to remove alc. and then subjected to fractional distn. under reduced pressure; almost all the liquid b₁₆ 172-3°. This distillate was characterized by means of its product of benzoylation. The alcoholysis of almond oil, butter fat, triacetin and AcOPh was studied in the same manner and the ethanolysis of spermaceti, isomyl acetate and cyclohexanyl acetate was investigated by a similar procedure. The free alc. was obtained from the ester in each instance, so that the behavior of chlorophyll toward alcoholysis is an exception to the general rule. H. S. PAINE.

The preparation of sarcosine. LOUIS BAUMANN. State Univ. of Iowa. *J. Biol. Chem.* 21, 563-6(1915).—Dissolve 1 g. mol. of MeNH₂.HCl in 120 cc. of com. HCHO and add 1 g. mol. of KCN, dissolved in the least amt. of H₂O at 40°, until the temp. of the mixt. reaches 70°. Maintain that temp. by means of ice while adding the rest of the KCN. After 3 hrs., ext. the mixt. 5 times with Et₂O, dry with Na₂SO₄, filter and distil the Et₂O. Remove the last traces of Et₂O and some of the excess of the HCHO by blowing air into the flask. Suspend the residue in 400 cc. of H₂O containing 125 g. of Ba(OH)₂.8H₂O and sapon. the nitrile by boiling under reflux for 12 hrs. Add a little NH₄OH to the cold filtered soln. and remove the Ba with CO₂. Filter off the BaCO₃ with suction, wash and evap. the filtrate *in vacuo* to a thick sirup. Dissolve in the least amt. of boiling abs. alc. and place in a refrigerator for 24 hrs. Filter off the cryst. sarcosine with suction and wash with cold abs. alc. until nearly colorless. Yield, 25%. Prepare the MeNH₂.HCl according to the method of Brochet and Cambier (*Bull. soc. chim.* [3] 13, 533(1895)). *Sarcosine hydrochloride*, from sarcosine by evapn. with concd. alc. HCl and pptn. with Et₂O. *Methylureidoacetic acid*, obtained by heating sarcosine with an equal wt. of urea under reflux, m. 153° (uncor.). *Methylhydantoin*, from the ureido acid by boiling with 5 N HCl for 3 hrs. under reflux, m. 153° (uncor.). Treated with picric acid and 10% NaOH, it develops a color equal to 5% of that developed by creatinine. A. P. LOTHROP.

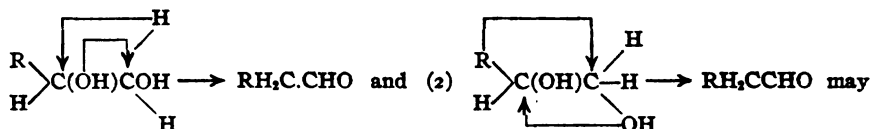
The abietic acids. P. POORH. *Farben-Ztg.* 20, 1056-9(1915).—A lengthy review of the literature is given, a consideration of which shows that the abietic acids are probably derivs. of retene or of a terpene. It is not possible to state which of these is more probably correct. The greater part of the published exptl. work supports the former view. E. W. BOUGHTON.

Physico-chemical study on the synthesis of chlorophyll. ALBERT MARY and ALEX. MARY. *Mon. sci.* [5] 5, 121-8(1915).—When strong HNO₃ is added drop by drop to strong alc. PhNH₂, there forms a white ppt. which quickly turns to a pale or bright rose color (leuco-aniline). An energetic reaction then sets in and a beautiful green soln. is produced: $6C_6H_7N + 15O = C_{24}H_{10}NO_4 + 6H_2O + 5NO$. A brown-red residue collects which yields a greenish fluorescent soln. when extd. with C₆H₆. This soln. on exposure to air gives a brownish resinous deposit. Evapn. of the C₆H₆ soln. yields needle-like plates of crystals joined in groups which are reddish or brownish by transmitted light and green by reflected light. One must work rapidly to stop the reaction when the green color develops. Synthetic chlorophyll, like the natural ext., is insol. in H₂O, sol. in alc., ether, petr. oil, and C₆H₆. Evapn. of the C₆H₆ soln. in both cases gives similarly cryst. bodies. The absorption spectrum of the synthetic product is the same as that of the natural chlorophyll—a max. in the red, a minimum in the less refrangible part of the visible spectrum and a 2nd max. in the violet. The spectrum of a C₆H₆ soln. of oxidized synthetic chlorophyll showed a minimum value in the red and changed progressively to a max. in the violet. A chlorophyll soln. (*Hedera helix*), when it was treated with Fe and AcOH for 4 hrs. and the Fe was removed with K₄Fe(CN)₆, gave a pale amber-yellow soln. The addition of a few drops of HNO₃ to this reduced soln. gave a green color while more acid caused the formation of a red-brown soln. These colors exactly sum up the stages in the formation and alteration of the synthetic

product. The pigments developed by bacterial chromogens in certain nitrogenous mixtures establish a connection between colored substances of the chlorophyll group and the aniline colors. The physical and optical properties of pigments developed by *S. cerevisiae* in an alc. soln. of aniline sulfate and cane sugar (1:20) and of *B. olearius fluorescens* in glycerol bouillon are identical. Fremy's reaction can be produced by freshly prepared synthetic chlorophyll thus: one adds 4 cc. C_6H_6 and 0.5 cc. $PhNH_2$ to 0.5 cc. HNO_3 and 4 cc. HCl and shakes gently. When a green color appears, one adds 2 cc. Et_2O and shakes, and the $Et_2O-C_6H_6$ layer is colored yellowish, while the acid is an intense greenish blue. The color changes rapidly to red-brown and at the end of 12 hrs., red-brown flakes are seen. A similar change is observed with natural chlorophyll ext. The soln. of synthetic chlorophyll in HCl has an absorption spectrum exactly comparable with that of *Polypodium vulgare*, of *Pinus sylvestris* and of *Viola tricolor*. The absorption begins in the red visible part of the spectrum. Chlorophyll solns. in alc., Et_2O or C_6H_6 showed an absorption spectrum whose bands vary between 715 and 700 μ . Confirmation of the theory of Willstätter (*Ann.* 1906, 48-82) that chlorophyll is a complex organomagnesium combination dissociated by acids, was not obtained, for, by vigorously shaking a C_6H_6 soln. of chlorophyll with an equal vol. of NH_4OH , upon sepn. of the liquids, the NH_4OH was almost opaque with a ppt. of $Mg(OH)_2$. This soln. was filtered and the process repeated 6 times to remove all the Mg . It was shown that the chlorophyll retained its characteristics and exists independently of Mg and its compds., for this soln. free from Mg showed an absorption spectrum identical with that of the original product.

R. L. SIBLEY.

Molecular transpositions in the α -glycols. S. A. KOOPAL. Univ. Leyden. *Rec. trav. chim.* 34, 115-78 (1915).—The transposition of α -glycols into aldehydes or ketones has long been known. In those in which a H atom is changed there has been agreement, but in those in which the C skeleton is changed the existence of the change has been contested or variously explained. Some have assumed the existence of intermediate compds.; Some denied them. The rules for detg. the product of the reaction of the α -acyclic glycols are: (1) *Sym. α -glycols* with 4 similar groups give only 1 transposition product. (2) In *sym. α -glycols* the transposition is detd. by the relative mobility of the groups. The order of mobility is thus: $4-MeC_6H_4 > 4-FC_6H_4 > Ph$ and $IC_4H_9 > 4-BrC_4H_9 > 4-ClC_4H_9 > H > Me >$ higher alkyls. (3) *Asym. α -glycols*: (a) In the primary-secondary aliphatic hydrocarbon group the OH groups change places with the H atom so that 2 products are formed simultaneously. In the primary-secondary aromatic group the primary OH changes place with the Ph group and the other OH with H. (b) In the primary-tertiary glycols the tertiary OH changes places with an H atom to give an aldehyde. (c) In the secondary-secondary glycols those having 2 different aliphatic hydrocarbon groups are unknown; in those having 1 aliphatic and 1 aromatic group the OH near the latter changes places with the H; those having 2 different aromatic groups are unknown. (d) In the pinacols $R'_2C(OH^a).C(OH^b)R_2$ the relative mobility of the OH's is important for when $R' = Ph$ and $R'' = Me$ or Et or when $R' = Me$ and $R'' = Et$ the OH changes its place. For the pinacols $R'_2C(OH)C(OH)R'R''$ only 2 are known and they are not regular in their behavior. The behavior of all known glycols in this respect is carefully reviewed under the proper headings. There are 5 of the type (1); 8 of the type (2); and 33 of the type (3). In concluding his review of the noncyclic asym. α -glycols of type (3) K. states that the relative mobility of the group bound to $>C(OH)C(OH)<$ is not the detg. principle for the direction of the reaction. By examples it was shown that the tertiary OH is more mobile than a secondary or primary OH, so that the tertiary OH always reacts. Whether a secondary OH group is more mobile than a primary OH cannot be detd. since (1)



both take place. When R is Me or Et the mechanism (1) is very probable. If (2) were true in this case the alkyl would have to be more mobile than the H. When R is Ph no choice can be made between (1) and (2). The bissecondary α -glycols $\text{ArHC}(\text{OH})\text{CHAlkOH} \longrightarrow \text{ArH}_2\text{CC}(\text{:O})\text{Alk}$ are rearranged in such a way that H and not Ph is transposed. The secondary OH group under the influence of Ph is more mobile than the other. In the cyclic α -glycols in which at least 1 OH is bound to C in the ring the relative mobility of the groups is not the only factor detg. the direction of the reaction. The greater or less possibility of a change of the ring is of great importance in this case as is shown from a number of examples. K. cites 12 reactions in which derivs. of α -glycols undergo intramol. transformations which are often interpreted as α -glycol transformations: glycerol $\longrightarrow$ acetol; formation of acrolein from glycerol; glyceric acid $\longrightarrow$ pyrotartaric acid; fermentation phenomena; hexoses $\longrightarrow$ levulinic acid. The purpose of K.'s expts. was to det. the influence of the character and of the place of halogen atoms on the pinacolic transposition in the disubstituted sym. halogenbenzopinacols. The following were prepd.: *sym.*-4,4'-diiodobenzopinacol (a) *sym.*-4,4'-difluorobenzopinacol (b), *sym.*-3,3'-dichlorobenzopinacol (c), *sym.*-3,3'-dibromobenzopinacol (d), *sym.*-2,2'-dichlorobenzopinacol (e), and *sym.*-2,2'-dibromobenzopinacol (f). All were prepd. by reduction of the corresponding ketones, which were obtained by Friedel and Crafts' method (halogenbenzoyl chloride + AlCl_3 + C_6H_6). The halogenbenzoyl chlorides were obtained from the acids. The reduction was done in 3 ways: (1) with EtOH in sunlight; (2) with EtOH in the light from a Hg lamp of Schott & Co., Jena; (3) with AcOH + Zn powder. The 3rd method is best because it is quicker and gives a better yield. Method (1) also gave good results but was slow. (2) was not efficient. All the pinacols treated with KOH + EtOH gave a bright blue color, which slowly disappears. The α - and β -pinacolins do not give this reaction. The transposition was studied thus: The pinacol was placed in a glass tube with AlCl_3 , the tube sealed and heated for some time at 100° . For the 4,4'-dihalogen derivs., of 100 mols., (a) Ph was transposed in 50 mols. and $\text{C}_6\text{H}_4\text{I}$ in 50 mols.; in 100 mols. (b) Ph and $\text{C}_6\text{H}_4\text{F}$ were transposed in 35 and 65 mols., resp.; in 100 mols. of the 4,4'-Cl₂ compd., 60 mols. Ph and 40 mols. $\text{C}_6\text{H}_4\text{Cl}$, resp., were transposed; in 100 mols. of the 4,4'-Br₂ deriv. 57-8 mols. Ph and 42-3 mols. $\text{C}_6\text{H}_4\text{Br}$ were transposed. The products in each case were $\text{XC}_6\text{H}_4(\text{Ph})_2\text{CC}(\text{:O})\text{C}_6\text{H}_4\text{X}$ and $(\text{XC}_6\text{H}_4)_2\text{PhCC}(\text{:O})\text{Ph}$, resp., in which X = halogen. Thus the introduction of F in the *p*-position increases the mobility of the Ph, and with Cl and Br it diminishes it; I has no effect. In (b) the substituted Ph is more mobile than the Ph. In (c) and (d) only 1 product is formed: only 3- $\text{C}_6\text{H}_4\text{X}$ is transposed, so that here Ph is much less mobile than 3- $\text{C}_6\text{H}_4\text{X}$. The same result was obtained for (e) and (f). With the *o*-substituted pinacols transposition is very slow, while with the *m*- and *p*-derivs. it is complete after 7 hrs. and with 1.5 parts by wt. of AlCl_3 . The *o*-derivs. were heated 64 hrs. with 12.5 parts of AlCl_3 . The hydrolysis of the product with EtOH + KOH gave a Ph_2CH deriv. and a halobenzoic acid but was always very slow. *Methods of analysis:* In the direct method the products of the reaction were 1st purified either by crystn. or distn. and then used for the detn. of the constitution. Most transpositions have been studied in this way. But usually it is difficult and sometimes impossible to sep. the products quant. This method was used for (c), (d), (e) and (f). The indirect method consists in treating the product with EtOH + KOH and analyzing the mixt. of benzoic acids obtained. A test expt. showed that the hydrolysis is quant. The halobenzoic acid in the mixt. could be sep. and

dried according to the method of Montagne (*C. A.* 1, 2887; 4, 1485). After hydrolysis is complete H_2O is added and the $EtOH$ evapd. off; the Ph_3CH derivs. are removed by filtration and the soln. dild. until only the halobenzoic acid is pptd. on acidifying with HCl . This method can be used only when but 1 group is transposed or when the difference in solubility is sufficient. The acids may also be analyzed by detg. the halogen according to Baubigny and Chavanne (*Compt. rend.* 138, 85). The alk. hydrolysis mixt. was nearly neutralized with H_2SO_4 and evapd. to dryness in a small flask, cooled and treated with concd. H_2SO_4 and $K_2Cr_2O_7$ and the Cl or Br evolved detd. as usual. When mixed crystals are formed as with $p\text{-}FC_6H_4CO_2H + BzOH$ the comp. of the mixt. was detd. by the m. p. from the m. p. curve for this system. *Prepn. of halobenzoic acids:* In each case the corresponding toluidine was converted into the halotoluene and then into the halobenzoic acid. Details and numerical results are given. $2\text{-}NH_2\text{-}C_6H_4Me$ by Sandmeyer's reaction gave $2\text{-}ClC_6H_4Me$ which on oxidizing with dil. $KMnO_4$ gave $2\text{-}ClC_6H_4CO_2H$, m. 140° ; it was also obtained from $2\text{-}NH_2C_6H_4CO_2H$. $3\text{-}ClC_6H_4CO_2H$, m. 157.5° , and 2- and $3\text{-}BrC_6H_4CO_2H$ were obtained similarly. The method of Wheeler and McFarland (*Am. Chem. J.* 19, 364) for brominating $BzOH$ was found to be the best method for obtaining $3\text{-}BrC_6H_4CO_2H$, but other products were also sepd. The crude product was poured into H_2O and the Fe sepd. with $NaOH$. During filtration some oil passed through the filter and solidified (probably C_6Br_6). Steam distn. gave a colorless oil which was sepd. by distn. into 4 fractions from which $m\text{-}C_6H_4Br_3$, $p\text{-}C_6H_4Br_2$ and $1,2,4,5\text{-}C_6H_2Br_4$ were sepd. The alk. soln. treated with HCl pptd. $3\text{-}BrC_6H_4CO_2H$ and from the $EtOH$ mother liquor some $3,4\text{-}Br_2C_6H_3CO_2H$, m. 232° , was isolated. In brominating $BzOH$ in a closed vessel according to Angerstein and fractionally pptg. the acids from KOH with HCl , pure $3\text{-}BrC_6H_4CO_2H$ was easily obtained and $3,4\text{-}$ and $3,6\text{-}Br_2C_6H_3CO_2H$ were isolated. $6,3\text{-}Br(O_2N)C_6H_3CO_2H$ (Holleman, *Rec. trav. chim.* 20, 206) was reduced to the NH_2 deriv. with $Sn + HCl$ and 4 g. of the latter with 24 g. 48% $HBr + 1.4$ g. $NaNO_2$ in 40 cc. $H_2O +$ "Naturkupper C" gave $3,6\text{-}Br_2C_6H_3CO_2H$. In prep. $2,3\text{-}Br_2C_6H_3CO_2H$ similarly the NH_2 was substituted with Br by the method used by Holleman in getting $2\text{-}BrC_6H_4CO_2H$ from $2\text{-}NH_2C_6H_4CO_2H$. The prepn. of $3,4\text{-}Br_2C_6H_3CO_2H$ was similar to that for the $3,6\text{-}$ deriv. $4\text{-}NH_2C_6H_4CO_2H$ was brominated in HCl with $Br\text{-}H_2O$ (Beilstein, Geitner, *Ann.* 139, 1; *Ber.* 27, 513). The $3,5,4\text{-}Br_3(NH_2)C_6H_2CO_2H$ obtained is sol. in org. solvents, m. 330° (decompn.). A mixt. of 21 g. + 6 g. KNO_3 was added gradually to HNO_3 (d. 1.40), then poured into H_2O , treated with Na_2CO_3 to neutralize 90% of the acid, heated on the H_2O bath with a few cc. of $CuSO_4$ soln. + 40 cc. $EtOH$: the $3,5\text{-}Br_2C_6H_3CO_2H$, m. 219° , sepd. $4\text{-}IC_6H_4CO_2H$ and $4\text{-}FC_6H_4CO_2H$ were obtained from 4-toluidine. *Prepn. of the monohalobenzophenones:* The chlorides of the halobenzoic acids were prepd. from the acids by treating them with the calcd. amt. of PCl_5 and fractional distn. In the case of $4\text{-}IC_6H_4COCl$ the $POCl_3$ was distd. off and the residue crystd. from petr. ether. $4\text{-}FC_6H_4COCl$ was partly volatilized unchanged when boiled with KOH . 2- and 3- chloro-, 2- and 3- bromo- and 4- iodobenzophenones were obtained by heating the corresponding halogen acid chloride + $C_6H_6 + AlCl_3 + CS_2$. Willgerodt and Bogel (*Ber.* 38, 3452) found that $BzCl + PhI + AlCl_3$ give $4\text{-}IC_6H_4Bz$. K. got variable results with this method. It was best to heat 14 g. $BzCl + 40$ g. $PhI + 13$ g. $AlCl_3$ at 60° for 2 days in the sunlight (yield, 25 g.). In the synthesis of $p\text{-}$ halobenzophenones by this method the $o\text{-}$ deriv. is usually obtained as is shown by the formation of phenylindoxazene by the action of alk. NH_2OH on the $o\text{-}$ deriv. This was found for $2\text{-}IC_6H_4Bz$ by Wachter (*Ber.* 26, 1745) and verified by K. by the following syntheses: $2\text{-}NH_2C_6H_4CO_2H \longrightarrow 2\text{-}IC_6H_4CO_2H \longrightarrow 2\text{-}IC_6H_4COCl \longrightarrow 2\text{-}IC_6H_4Bz$ which with NH_2OH gives the phenylindoxazene. The solns. from the prepn. of the $4\text{-}IC_6H_4Bz$ above failed to give this reaction. $4\text{-}FC_6H_4Bz$ was also obtained by the Friedel-Crafts' reaction. *Prepn. of the benzopinacols, etc.:* (1) 35 g. $2\text{-}ClC_6H_4Bz$ (g), in 105 cc. $EtOH$

exposed some days in a uvioI tube, gave a white ppt. and much unchanged (g). Exposed again, more white ppt. seps. The yield of (e) (cf. above) was good. (2) The EtOH soln. of (g) treated with ultraviolet rays gave a poor yield of (e). (3) The results of reducing (g) with Zn + AcOH (C. A. 1, 2887) are rapid and good. 2-Chlorobenzhydrol, $C_{12}H_{11}OCl$, obtained by reducing (g) in EtOH with 10% Na-Hg, needles, m. 65° , sol. in org. solvents. The results for the 3 methods of reduction of 3- ClC_6H_4Bz for the prepn. of (c) were about the same. (c) m. $137-8^\circ$, crystals with difficulty and is sol. in org. solvents. 3-Chlorobenzhydrol, from the 3-Cl isomer with 10% Na-Hg, m. 40° , sol. in org. solvents except petr. ether. For the prepn. of (f) methods (1) and (2) failed but (3) gave a good result; (f) m. 168° , sol. in C_6H_6 , less sol. in petr. ether and EtOH. 2-Bromobenzhydrol, obtained like the Cl deriv., m. 56° . In the prepn. of (d) methods (1) and (3) were successful. (d) seps. as minute needle conglomerates, m. 147° , sol. in org. solvents. The reduction of 3- BrC_6H_4Bz with Na-Hg gave an oil which did not crystallize in several months. (a) could not be prepd. by method (1) since the 4- IC_6H_4Bz decomposed and $\frac{3}{4}$ of the I was liberated as HI. Method (3) gave a good yield of (a). (a) seps. as minute needles, m. $171-2^\circ$, sol. in C_6H_6 , little sol. in petr. ether. The reduction of 4- FC_6H_4Bz by method (1) to give (b) gave nearly the theoretical yield in 1.5 months' exposure. Both methods (2) and (3) also gave good yields of (b). (b) seps. as small plates, m. 176.5° . 4-Fluorobenzhydrol, m. 48° , is sol. in C_6H_6 and EtOH. The intramolecular transposition of the halogenpinacols, etc.: The general results obtained in these transpositions were discussed above. For exptl. details cf. the original. By the transposition of (e) with $AcCl$ at 100° for 64 hrs. the β -pinacolin, 1,1-diphenyl-1,2-di-[2-chlorophenyl] ethanone, $ClC_6H_4(Ph)_2CCOC_6H_4Cl$, m. 140° , was obtained. Similarly (e) gave the 1,2-di-[3-chlorophenyl] compound, m. 105° ; from (f) the 1,2-di-[2-bromophenyl] compound was obtained; (d) gave the 1,3-di-[3-bromophenyl] compound, m. 115° . The results with the sym.-4,4'-dihalogen derivs. are given above.

E. J. WITZEMANN.

Some heterocyclic organo-silicon compounds. ARTUR BYGDÉN. Stockholm. Ber. 48, 1236-42 (1915).—To 10 g. Mg shavings, a speck of I and 200 cc. almost abs. Et_2O kept below the b. p. is slowly added 30 g. $CH_2(CH_2CH_2Br)_2$, and after standing overnight the mixt. is boiled 4 hrs. and siphoned from the 4.4 g. Mg remaining undissolved; the Grignard reagent so prepd., dild. with 200 cc. Et_2O and cooled with ice, is treated with 20 g. $SiCl_4$, boiled 6 hrs., most of the Et_2O distd. off, the distillate poured back upon the residue and filtered (protected from moisture) from the insol. salts; the combined filtrates from 2 expts. on fractionation yield 1.5, 21.6, 4.0 and 1.2 g. fractions b. $167.5-9^\circ$, $169.0-72^\circ$, $172-90^\circ$, $>190^\circ$, resp., and leave a dark brown residue converted by treatment with dil. HCl and H_2O into about 4 g. of a dirty yellow product; the fraction b. $>190^\circ$ also yielded an insol. solid on standing in moist air. A fraction of the main product, $b_m 169.5-70.5^\circ$, $d_4^{20} 1.1779$, $d_4^{30.1} 1.1668$, $d_4^{40.0} 1.1560$, $d_4^{50.1} 1.1453$, $n 1.46700$, 1.46973 , 1.47634 , 1.48191 for α , D , β and γ at 20.2° , had the comp. of cyclopentamethylenesilicon dichloride, $CH_2CH_2CH_2CH_2CH_2SiCl_2$ (a); it is a clear liquid

of penetrating odor, burning with a bright green-rimmed flame and sepn. of SiO_2 and hydrolyzed by H_2O to a viscous mass, sol. in all proportions in the ordinary org. solvents; the residue from the Et_2O soln. on drying at high temps. first gelatinizes and then gradually shrinks to hard yellow-brown pieces, at the same time losing wt. and evolving a peculiar odor; dried at 110° , it loses 2.4% in wt. at 205° and contains 24.35% Si; it is probably a polymeric cyclopentamethylenesilicone, $(C_5H_{10}SiO)_n$. From the Grignard reagent from MeBr and 8.3 Mg in 300 cc. cold Et_2O , treated slowly with 23.2 g. (a) in 75 cc. Et_2O , then boiled 6 hrs., freed from most of the Et_2O which was then poured back upon the residue, treated with 1% H_2SO_4 to dissolve the salts, and the Et_2O layer

then drawn off, dried with Na_2SO_4 and fractioned, are obtained (1) 10.2 g. b. $<155^\circ$, and (2) 5.0 g. b. $>155^\circ$. (1) vigorously shaken 3 times with concd. H_2SO_4 (to which it imparted a yellow color) left undissolved 8.4 g. sepd. into 0.6, 5.8 and 1.0 g. fractions b. $128.5\text{--}32.5^\circ$, $132.5\text{--}4.0^\circ$, $>134^\circ$, resp.; from the middle portion was isolated *dimethylcyclopentamethylenesilicane*, $\text{C}_5\text{H}_{11}\text{SiMe}_2$, b_{780} , $133\text{--}4^\circ$, d_4^{20} 0.8210, $d_4^{10.6}$ 0.8120, $d_4^{20.0}$ 0.8039, $d_4^{29.8}$ 0.7955, n_D^{20} 1.43684, 1.43940, 1.44575, 1.45100; it is an easily inflammable liquid with a faint camphor-like odor. The H_2SO_4 with which (1) had been shaken when poured into cold H_2O deposited 1.7 g. of a yellow oil which did not boil const. No definite product could be isolated from (2), the b. p. rising continuously from 140° to 275° under 15 mm., only about 0.5 of the product distg. over; this fraction and the residue were viscous, almost wholly insol. in H_2SO_4 and had an unpleasant odor. From the Grignard reagent from 24 g. $\text{CH}_2(\text{CH}_2\text{CH}_2\text{Br})_2$ treated with 11 g. Et_2SiCl_2 is obtained 6.4 g. oil insol. in H_2SO_4 , the main portion of which (2 g.) b. $184\text{--}94^\circ$ and has approx. the comp. of *diethylcyclopentamethylenesilicane*. CHAS. A. ROULLIER.

1,2-Aminophenyl mercaptan. TH. ZINCKE AND G. SIEBERT. Marburg. *Ber.* 48, 1242-54 (1915).—*o*-Aminophenyl methyl sulfide (a), from 20 g. of the NO_2 compd. and 40 g. Zn dust treated on the H_2O bath with 140 cc. crude HCl , first drop by drop and then in larger amts., and then heated with occasional additions of Zn dust until the soln. is clear, liquid of faint C_{10}H_8 -like odor, b_{18} , $133\text{--}4^\circ$, stable for a long time (even in the light), when pure, gives no dye but only a dirty brown color with FeCl_3 . *Hydrochloride*, long, silky needles. *Formyl derivative*, obtained by boiling with 95% HCO_2H , prisms from C_6H_6 -benzine, m. $53\text{--}4^\circ$. *Acetyl derivative*, obtained with Ac_2O and NaOAc , leaflets from alc., m. $102\text{--}3^\circ$. *Benzoyl derivative*, spears from alc., m. 96° . Heated a long time with equimol. amts. of $2,4\text{-(O}_2\text{N)}_2\text{C}_6\text{H}_3\text{Cl}$ and KOAc in alc., (a) gives the compound $(\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{NHC}_6\text{H}_4\text{SMe}$, dark orange-red needles from AcOH , m. $158\text{--}66^\circ$, which with boiling alc. Na_2S gives the *2-amino compound*, $2,4\text{-H}_2\text{N(O}_2\text{N)}_2\text{C}_6\text{H}_3\text{NHC}_6\text{H}_4\text{SMe}$, dark garnet-red crystals from alc., m. 137° ; this with HNO_3 forms an azimido deriv. *o*-Iodophenyl methyl sulfide, from (a) through the diazo compd. and KI , light yellow oil, b_{20} 173° ; with excess of H_2O_2 in AcOH after several hrs. on the H_2O bath it gives the *sulfone*, needles from alc., m. $106\text{--}7^\circ$. *o*-Methylmercaptobenzonitrile, from (a) by the Sandmeyer reaction, faintly yellow, felted needles from MeOH , m. $40\text{--}1^\circ$, hydrolyzed by boiling aq. alc. KOH to the acid, needles from dil. alc., m. 169° (Friedländer, *Ann.* 351, 401 (1907), gives 164°). *o*-Aminophenyl methyl sulfoxide, strongly refractive oil whose *hydrochloride*, needles from alc., m. 167° , turning deep blue; the sulfoxide is obtained by hydrolysis with alc. KOH of its *acetyl derivative*, m. $114\text{--}5^\circ$, which is prepd. from 5 g. $\text{AcNHC}_6\text{H}_4\text{SMe}$ in 12 cc. AcOH and 4 cc. of 30% H_2O_2 after 12 hrs. at room temp. *Sulfone*, leaflets from dil. alc., m. $65\text{--}6^\circ$, obtained by boiling with alc. HCl its *acetyl derivative*, m. $139\text{--}40^\circ$, which is prepd. from 2 g. $\text{AcNHC}_6\text{H}_4\text{SMe}$ in 10 cc. AcOH heated 2 hrs. on the H_2O bath with excess of 30% H_2O_2 ; *benzoyl derivative*, made in the same way, needles from MeOH , m. $118\text{--}9^\circ$. From $\text{BzNHC}_6\text{H}_4\text{SMe}$ in 7.5 parts cold AcOH satd. with Cl and allowed to stand 24 hrs. is obtained the *benzoyl derivative*, silky needles from MeOH , m. $138\text{--}9^\circ$, of *5-chloro-2-aminophenyl methyl sulfoxide*, quadratic leaflets from dil. alc., m. $120\text{--}1^\circ$. The Bz deriv. with H_2O_2 in AcOH gives the *sulfone* (also obtained from $\text{BzNHC}_6\text{H}_4\text{SO}_2\text{Me}$ and Cl in AcOH), needles from MeOH , m. $159\text{--}60^\circ$. With 1 part Br in 1 part AcOH , on the other hand, $\text{AcNH-C}_6\text{H}_4\text{SMe}$ gives *3,5-dibromo-2-acetaminophenyl methyl sulfide* (b), needles from AcOH , m. $162\text{--}3^\circ$. *2-Benzoylamino analog* (c), m. $122\text{--}3^\circ$. Slowly heated with 4-5 parts POCl_3 to 130° and kept at this temp. for 2 hrs., the Ac and Bz derivs. of (a) lose MeOH with formation of methyl- and phenylbenzthiazole, resp. The sulfoxides undergo reduction, $\text{AcNHC}_6\text{H}_4\text{SOME}$ giving methylbenzthiazole. *Methylidibromobenzthiazole*, from (b), needles from alc., m. $120\text{--}1^\circ$; *phenyl analog*, from (c), needles from dil. AcOH ,

becoming granular on standing, m. $168-9^{\circ}$. From 1 g. (a)-HCl heated 2 hrs. at 130° with 6 cc. of 95% HCO_2H and 4 cc. POCl_3 is obtained *benzosulfazole*, $\text{C}_6\text{H}_4\text{N}:\text{CH}.\text{SO}_2$.

leaflets from dil. alc., m. $105-7^{\circ}$. *Methylbenzosulfazole*, obtained in the same way from $\text{AcNHC}_6\text{H}_4\text{SO}_2\text{Me}$, leaflets, m. $149-50^{\circ}$. *Phenyl analog*, from $\text{BzNHC}_6\text{H}_4\text{SO}_2\text{Me}$, cryst. powder, m. $169-70^{\circ}$. [2-Methylmercaptophenyl]trimethylammonium iodide, from (a) and MeI heated 6 hrs. in MeOH on the H_2O bath in sealed tubes, prisms from H_2O , m. $162-3^{\circ}$ with loss of MeI, forms with 1 part I in MeOH a diiodide, $\text{C}_{10}\text{H}_{12}\text{NSI}_2$, apparently monoclinic leaves from MeOH, violet in incident, brown in transmitted light, while with 2 parts I is obtained a *tetraiodide*, blue-black needles. The iodide heated *in vacuo* at $170-5^{\circ}$, or 12-5 hrs. at 180° with 5 parts MeOH satd. with HCl, gives *o*-dimethylaminophenyl methyl sulfide, oil smelling like PhNMe_2 , b₇₆₀ 130° , does not form a NO compd.; *hydrochloride*, hygroscopic, deliquescent needles.

CHAS. A. ROULLIER.

Catalytic actions of colloidal metals of the platinum group. XIV. Stepwise reduction of acetylene with colloidal platinum. C. PAAL AND ANTON SCHWARZ. Univ. Erlangen. *Ber.* 48, 1202-7(1915); cf. C. A. 9, 1184, 1883, 2380.—Colloidal Pt preps. containing, besides Na protalbate, 50-59% Pt in the solid state were used in the P. and Gerum shaking app. In 1 expt. the H was gradually introduced into the shaking arm containing the C_2H_2 ; in the other expts. the 2 gases (equal vols. of each) were previously mixed. Some of the expts. were carried out under atm. pressure at room temp., others under a slight excess of pressure at $50-60^{\circ}$. Comparison of the results with those obtained with Pd hydrosol shows that with Pt the reduction proceeds considerably more slowly, and while with Pd the reduction can be so regulated that practically only C_2H_4 and no C_2H_6 are formed, in the expts. thus far carried out with Pt 35-40% C_2H_6 is formed.

CHAS. A. ROULLIER.

Some β -substitution derivatives of butyric acid containing sulfur. J. M. LOVÉN AND HJALMAR JOHANSSON. Univ. Lund. *Ber.* 48, 1254-62(1915).— $\text{MeCHClCH}_2\text{CO}_2\text{H}$ (a), b₁₆ 108° , is obtained in 35.5 g. yield from 26 g. $\text{MeCH}:\text{CHCO}_2\text{H}$ heated 2 hrs. at $70-80^{\circ}$ with 50-5 cc. HCl satd. with HCl gas in the cold, opened, again satd. with HCl in the cold and heated 4 hrs. at 100° ; with HCl in alc. it gives the Et ester, b₁₆ $65-5.5^{\circ}$. $\text{MeCHBrCH}_2\text{CO}_2\text{H}$ (b), b₁₆ $117.5-8.5^{\circ}$, is obtained in 115 g. yield from 65 g. $\text{MeCH}:\text{CHCO}_2\text{H}$ allowed to stand 1 day with 50 cc. HBr satd. in the cold with HBr gas, the satn. and standing being repeated twice more. Either (a) or (b), exactly neutralized with crystd. soda in 0.5 its wt. of H_2O at about 35° , then treated with the equiv. amt. of EtOCS_2K , allowed to stand 24 hrs. and treated with HCl gives the impure, oily β -xanthobutyric acid which, treated in concd. K_2CO_3 soln. with 1.5 times the calcd. amt. of concd. NH_3 , allowed to stand 24 hrs., freed from EtOCSNH_2 with Et_4O , and of NH_3 on the H_2O bath, acidified with H_2SO_4 and extd. with Et_4O gives the crude $\text{MeCH}(\text{SH})\text{CH}_2\text{CO}_2\text{H}$; this is supersatd. with NH_3 after the addition of a few drops of FeCl_3 , allowed to stand several days exposed to the air in a flat dish and filtered; HCl ppts. a mixt. of *dl*- and *meso*- β -bisulfidibutyric acids, $(\text{HO}_2\text{CCH}_2\text{CHMeS})_2$ (yield, 20% starting from (a) or 55% from (b)), cannot be sepd. by crystn. from H_2O , but this is effected through the Ba salts; 20 g. of the acids, exactly neutralized with about 200 cc. $\text{Ba}(\text{OH})_2$ and allowed to evap. at room temp., first deposit about 10 g. homogeneous thick, clear tables and then opaque, spherical aggregates, turning partially glassy on drying. The acid regenerated from the tables seps. from H_2O in leaves, m. 117° , sol. in about 300 parts cold H_2O ; *potassium salt*, small needles with 1 H_2O , deliquesces in moist air; *barium salt*, tables or pyramids with 2 H_2O , weathers in dry air, sol. in about 20 parts H_2O at room temp. Attempts to resolve the acid into active components with *l*-phenethylamine failed. When the mother liquors

from the above well-crystd. Ba salt are treated with dil. HCl and the recrystd. ppt. is treated in acetone with 2-4 vols. H_2O there is obtained the 2nd form of the acid in silvery scales, m. $117-9^\circ$, depresses the m. p. of the other acid; *potassium salt*, deliquescent, usually being obtained as an efflorescence but sometimes in flat needles; *barium salt*, spherical aggregates. β -Sulfidodibutyric acid, best obtained (15 g. yield) as the Ba salt from 75 g. $MeCHBrCH_2CO_2Et$ treated 3 days on the H_2O bath with somewhat more than the equiv. amt. of alc. KSH, neutralized with HCl, treated with $BaCl_2$ and warmed, prisms, m. $84-5^\circ$, sol. in 2 parts H_2O at room temp.; *barium salt*, granular ppt. The filtrate from the Ba salt is acidified with HCl, extd. with Et_2O , evapd., freed of $MeCH:CHCO_2H$ with steam, again extd. with Et_2O , neutralized with $Ba(OH)_2$ and warmed (whereby more of the above Ba salt is pptd.), filtered, treated with $CaCl_2$ and warmed; this gives a granular salt from which is obtained a 2nd form of the acid, lancet-shaped crystals from CCl_4 , m. $62-4^\circ$, sol. in about $1/3$ part H_2O . The 1st acid, neutralized with soda and treated with $KMnO_4$, as long as the latter is rapidly decolorized, gives β -sulfodibutyric acid, $(HO_2CCH_2CHMe)_2SO_4$, rhombic tables, m. $169.5-71^\circ$; *potassium salt*, glassy mass becoming moist in the air; *barium salt*, glassy mass stable in the air; *acid potassium salt*, leafy crusts. CHAS. A. ROUILLER.

β -Butyrolactone. HJALMAR JOHANSSON. Univ. Lund. *Ber.* 48, 1262-6(1915); cf. C. A. 6, 1316; Holmberg, C. A. 8, 1576.—Just as with the monobromosuccinic acids, so the conversion of $MeCHBrCH_2CO_2Na$ into $NaBr + MeCH(OH)CH_2CO_2H$ in neutral soln. is a reaction of the 1st order and the Br ion concn. increases much more rapidly than the acidity, a phenomenon most easily explained by the assumption of the formation of a β -lactone, $MeCH.CH_2.CO.O$, as the 1st stage of the reaction. This

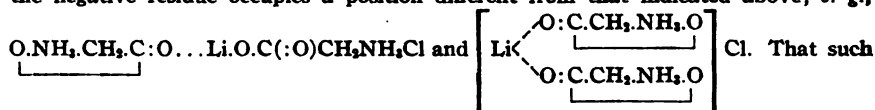
β -butyrolactone was isolated by neutralizing the acid with soda at $40-5^\circ$, cooling to room temp. every 0.5 hr., extg. with Et_2O , drying with $CaCl_2$ and evapg. The residues thus obtained from 14 g. acid when distd. under 29 mm. gave 0.5 g. b. $71-2^\circ$ and 0.9 g. b. $72-4^\circ$; the latter fraction, a mobile refractive liquid of acetone-like odor, contains 55.83% C (calcd., 55.78%) and neutralizes 23.03 cc. $Ba(OH)_2$ (calcd., 23.04 cc.). The velocity coeff. of hydrolysis in H_2O (1st order reaction) slowly decreases with time, being $8.5, 8.3, 8.2 \times 10^{-4}$ after 360, 1070, 1830 min., resp., for 5 cc. of 0.1367 *N* lactone soln. + 8.67 cc. H_2O at 25° . The alk. hydrolysis seems to be a reaction of the 2nd order, independent of the nature of the cation, the velocity coeff. for initial concns. 0.005 of lactone and NaOH or $Ba(OH)_2$ being 50. C. A. R.

Desmotropism of derivatives of succinylsuccinic ester. HUGO KAUFFMANN. *Ber.* 48, 1267-72(1915).—The chrome-yellow product obtained by Baeyer from succinylsuccinic ester (a) and NH_3 (*Ber.* 19, 429(1886)) has been found to be merely an impure form of the colorless compd. obtained by Liebermann (C. A. 8, 2150); no colored forms exist and the supposed desmotropism of (a) is erroneous. K. leaves open the question as to which of the 2 formulas proposed for the supposed desmotropes is the correct one. The colored impurity formed in the action of NH_3 and primary amines is probably isomorphous with the main products, for it cannot be removed by crystn. or with charcoal; its formation can be avoided by carefully excluding atm. O, and it is therefore nothing but the corresponding diaminoterephthalic ester (b). To obtain the compd. colorless, the $AcONH_4$ (prepd. from NH_3 and $AcOH$) is 1st boiled in H and the (a) in boiled $CHCl_3$ is dropped into the resolidified $AcONH_4$ and the $CHCl_3$ allowed to evap. in H, then the residue is heated until the yellow oil dissolves in the melted $AcONH_4$ and the solidified melt treated in a current of H with 80 cc. of boiled H_2O ; even under these conditions the product is still slightly colored (probably owing to traces of O in the H); 1 g. is therefore gently boiled 0.5 hr. in H in 30 cc. alc. and 5 cc. *N* KOH and treated with 150 cc. boiled H_2O , quickly filtered, washed

with boiled H_2O and crystd. in H from $MeOH$ previously boiled in H . The white needles so obtained m. 178° . By the final treatment the colored impurity is converted into alkali salts of the hydrolysis products of (b); the aq. alk. filtrate (which is almost colorless) gives a deeply colored material on acidification and extn. with Et_2O ; both H_2SO_4 in large excess and alkalis remove it from the Et_2O . The crystd. colorless product is quite stable when dry and dissolves without color in solvents previously boiled in H but in the air the solns. soon become yellowish and fluorescent; the same differences are observed when the solid is fused in H or in air. With (a) and $PhNH_2$, carefully excluding O as above, a colorless product is again obtained and dissolves without color or fluorescence, but when melted in the air becomes intensely orange-red; colored preps. can be decolorized by cautious treatment with alc. KOH . C. A. R.

Neutral salt compounds of the amino acids and polypeptides. P. PFEIFFER AND FR. WITTKA. Univ. Zurich. *Ber.* 48, 1289-310(1915); cf. C. A. 7, 3764.—It has already been pointed out that the compds. formed by NH_2 acids with neutral salts cannot be metal ammonias of the type $X_mM(\dots NH_2CH_2CO_2H)_m$, for the betaines, in which the N is coordinately satd., also combine with neutral salts. It has now been found that sarcosine, which stands between glycocoll and betaine, forms with neutral salts compds. which, in comp. and appearance, correspond in some cases to the glycocoll, in others to the betaine compds., so that there can be no doubt as to the close relationship of all these series of compds. The metal atom of the neutral salt must therefore be bound to the O of the NH_2 acid. The "amphi salt" theory previously proposed, however, does not agree with the discovery, which has now been made, of the existence of the compds. $MX_4MeNHCH_2CO_2H_4H_2O$ ($MX = KBr, KI, RbBr$), $CaCl_2(NH_2CH_2CO_2)_2Cu_3H_2O$, $CaCl_2R_2H_2O$, $2LiCl.R_2.5H_2O$, $2LiBr.R_2.5H_2O$ ($R =$ diacipiperazine), and $CaCl_2.3R_9H_2O$ and $2CaCl_2.3R_{12}H_2O$ ($R =$ antipyrine). These must therefore be mol. compds. and the simplest assumption is that the metal atoms of the inorganic salt are coordinately bound to the carbonyl O of the org. component; e. g., $ClLi\dots O:C.CH_2.NH_2O$, $ClLi(\dots O:C.CH_2.NH_2O)_2$, etc. It is not

impossible that these simple formulas may in certain cases be slightly different in that the negative residue occupies a position different from that indicated above; e. g.,



mol. compds. of alkali and alk. earths salts are not exceptional is shown by a long list of some of the compds. which these salts form with alcs. or phenols, sugars, acids, anhydrides, esters, amides, alkylsulfonates and amines. [In the following formulas $a = NH_2$ acid, $s =$ metallic salt.] Triglycocoll-calcium chloride, $3a.s.$, has now been prepd. from 0.5 g. a and 4 g. $s.6H_2O$ in 10 cc. of H_2O at 30° treated with 70 cc. alc. and allowed to stand 24 hrs., whereupon tables of $3a.s$ sep.; in only 1 expt. did the needles of $2a.s.4H_2O$ sep. instead of $3a.s$. Copper glycocoll-calcium chloride. $a.s.3H_2O$ ($a = (NH_2CH_2CO_2)_2Cu$), from 0.5 g. a and 2.5 g. $s.6H_2O$ in a little H_2O allowed to cryst. at room temp., deep blue transparent tables, slowly weathers in the air to a light blue powder, decomps. on heating before it loses all of its H_2O , loses 1 H_2O over P_2O_5 ; if less than 2.5 g. $s.6H_2O$ is used, there seps. a mixt. of the blue needles of a and the blue tables above. Dibetaine-barium bromide, $2a.s.6H_2O$, from 0.9 g. s and 1.1 g. a in a little H_2O allowed to evap. over $CaCl_2$ at room temp., leaflets, attracts moisture from the air, decomps. on heating before losing all of its H_2O , loses 2.5 H_2O over P_2O_5 . Betaine-copper chloride, $a.s.3H_2O$, from 1 g. green s and 0.5 g. a in 4.8 cc. H_2O treated with 80 cc. alc., yellow-green radiating needles, does not lose H_2O over P_2O_5 or at 100° , m.

about 183° , evolves NMe_3 on a Pt foil, forms a turbid bluish liquid with a little H_2O , insol. in and unchanged by boiling alc. In its prepn. there first seps. a brownish yellow powder which redissolves on standing; this is extraordinarily deliquescent in the air but is indefinitely stable over P_2O_5 ; it dissolves turbid in H_2O with bluish color and analysis indicates that it is anhydrous *a.s.* contaminated with basic salt (found, Cu 25.91, Cl 25.24, 25.30%). *Sarcosine-calcium chloride*, *a.s.* $4\text{H}_2\text{O}$, from an aq. soln. of equimol. amts. of *a* and *s* allowed to evap. spontaneously, transparent needles becoming anhydrous on heating. *Trisarcosine-calcium chloride*, *3a.s.*, from a filtered soln. of *s* and 2-3 mols. *a* concd. on the H_2O bath, transparent tables; if only 2 mols. *a* is used, the mother liquors also deposit fine needles of *a.s.* $4\text{H}_2\text{O}$. *Sarcosine-strontium chloride*, *a.s.* $4\text{H}_2\text{O}$, asbestos-like needles. *Sarcosine-barium chloride*, *a.s.* $4\text{H}_2\text{O}$, needles. *Sarcosine-barium bromide*, *a.s.* $4\text{H}_2\text{O}$, needles. *Disarcosine-magnesium chloride*, *2a.s.* $2\text{H}_2\text{O}$, leaflets from 1.8 g. *a* and 2 g. $5.6\text{H}_2\text{O}$ allowed to evap. at room temp. *Sarcosine-sodium iodide*, *a.s.* H_2O , from a soln. of 1 mol. *s* and 2 mols. *a* concd. on the H_2O bath, rhombic plates, deliquesces in the air. *Tetrasarcosine-potassium bromide*, *4a.s.* $4\text{H}_2\text{O}$, from *s* and 3-4 mols. *a*, silky needles, deliquesces in the air. *Tetrasarcosine-potassium iodide*, *4a.s.* $4\text{H}_2\text{O}$, felted needles. *Tetrasarcosine-rubidium bromide*, *4a.s.* $4\text{H}_2\text{O}$, silky, felted needles. *Disarcosine hydrobromide*, *2a.s.* (*s* = HBr), hygroscopic needles which can be recrystd. from a little H_2O , obtained by evapg. over CaCl_2 a soln. containing 1-1.5 mols. (*a*) and the normal salt, *a.s.* flat, broad needles, which is prepd. by concg. *a* in excess of aq. HBr . *Diacypiperasine-calcium chloride*, *a.s.* $2\text{H}_2\text{O}$, seps. from a warm soln. of 1 g. *a* and 10 g. $5.6\text{H}_2\text{O}$ on cooling in thick, transparent prisms, weathers without melting on heating; a hot aq. soln. on cooling deposits *a*. *Diacypiperasine-dilithium chloride*, *a.2s.2.5H}_2\text{O}, from 1 g. *a* and 8-10 g. *s* evapd. on the H_2O bath, transparent needles, does not melt, weathers on heating and then carbonizes, converted by a little H_2O into a white powder; on clay in the air it goes over into *a* in the course of 24 hrs. *Diacypiperasine-dilithium bromide*, *a.2s.2.5H}_2\text{O}, transparent needles, forms a white powder with a little H_2O , softens but does not melt on heating, is converted into *a* in the air. *Triantipyrrine-calcium chloride*, *3a.s.* $9\text{H}_2\text{O}$, from aq. solns. of *a* and *s* allowed to evap. at room temp., needles. *Triantipyrrine-dicalcium chloride*, *3a.2s.12H}_2\text{O}, silky needles from a hot concd. aq. soln. of *a* and a large excess of *s* quickly cooled; if the crystn. is slow a mixt. of the 3:2 and 3:1 compds. seps., and if not at least 4 g. $5.6\text{H}_2\text{O}$ per g. *a* is used a mixt. of the 3:2 compd. and *a* is deposited. *Diantipyrrine-copper chloride*, *2a.s.*, from 1 g. *a* and 2 g. $5.2\text{H}_2\text{O}$, brown needles, m. $160-1^{\circ}$, forms a turbid yellow-green soln. in hot alc. and on short standing deposits a white ppt.; it is sol. in H_2O with blue color.***

CHAS. A. ROUILLER.

Catalytic hydrogenation. I. New method of hydrogenation of volatile substances and the rate of hydrogenation of ethylene. J. B. RATHER AND E. EMMET REID. *J. Am. Chem. Soc.* 37, 2115-8 (1915); cf. *C. A.* 9, 2609, for the app. used.—The volatile substance to be hydrogenated, mixed with H_2 , is passed through a nonvolatile liquid containing the catalyst and kept thoroughly stirred. The catalyst used for the study of the reduction of C_2H_4 was prepd. by treating 100 g. infusorial earth with 50 g. $\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ in 150 cc. H_2O , adding the resulting moist mass to a concd. soln. of 60 g. $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$, washing, drying, reducing below red heat in H_2 until no more H_2O was formed and cooling in CO_2 ; 1.0 g. of this reduced the I no. of 70 g. cottonseed oil from 113.7 to 44.6 after 60 min. treatment in the hydrogenation app. at 180° , and its activity did not deteriorate appreciably during the period each portion of it was in use. The $\text{C}_2\text{H}_4 + \text{H}_2$ (10-50% C_2H_4) was passed at the rate of 10-200 cc. per min. into a mixt. of 1 g. catalyst + 70 g. paraffin kept at $180 \pm 1^{\circ}$, the stirrer being run at the rate of 3300-3500 revolutions per min., and the amt. of C_2H_4 in the issuing gases was detd. when equil. was reached. For all mixts. of $\text{C}_2\text{H}_4 + \text{H}_2$ studied, about 70%

of the C_2H_4 is reduced when the rate of flow is 10 cc. per min. All the results for the 10% mixts. are regular, while mixts. richer in C_2H_4 gave irregular results, the detg. factor doubtless being solubility and the reaction probably taking place between the gases dissolved in the paraffin. When the gas flow is rapid, the gases are carried through before equil. can be established between the gas mixt. and the soln. Plotting the vol. of gases combined per min. against the rate of flow showed, as was to be expected, that the vol. combined increased with the amt. of the gas mixt. exposed to the catalyst. In the 50% mixt. 17 cc. H_2 combined with 17 cc. C_2H_4 in 1 min., and since the 1 g. of catalyst cannot contain more than 0.1 g. or 0.01 cc. or less of Ni, the latter can bring about the combination of 3400 times its vol. (calcd. for 0°) of the gas mixt. in 1 min.

CHAS. A. ROUILLER.

The tolyl esters and toluidides of the nitrosulfonic acids of *p*-xylene. RALPH C. HUSRON. *J. Am. Chem. Soc.* 37, 2119-22(1915).—(All m. ps. are cor.) The tolyl esters of the 3 acids (*C. A.* 8, 2697, 3793) were prepd. from 0.75 g. cresol, 1 g. C_6H_5N and 1.75 g. chloride of the acid heated 15 min. at 90° and allowed to stand overnight. The toluidides were obtained from 1.5 g. acid chloride in 20 cc. CCl_4 treated with 2 cc. toluidine and évapd. on the H_2O bath. *o*-Tolyl 3-nitro-2,5-dimethylbenzenesulfonate, opaque, flat, pointed crystals from alc., m. $66-7^\circ$; *m*-tolyl ester, rhombohedral plates, m. $71.5-2.0^\circ$; *p*-tolyl ester, thin plates, m. $93.5-4.5^\circ$; *o*-toluidide, plates from 95% fine, flat needles from 50% alc., m. $126.5-7.5^\circ$; *p*-toluidide, silky filaments from 50% alc., m. $135-6^\circ$. *o*-Tolyl 6-nitro-2,5-dimethylbenzenesulfonate, opaque prisms, m. $151.5-2.0^\circ$; *m*-tolyl ester, plates, m. $107.5-8.0^\circ$; *p*-tolyl ester, needle-like plates, m. $76-7^\circ$; *o*-toluidide, rhombohedral plates, m. $143.5-5.0^\circ$; *p*-toluidide, flat needles, m. $158.5-9.0^\circ$. *o*-Tolyl 4-nitro-2,5-dimethylbenzenesulfonate, flat, opaque needles, m. $99-100^\circ$; *m*-tolyl ester, flat needles, m. $110-1^\circ$; *p*-tolyl ester, needle-like plates, m. $117.5-8.5^\circ$; *o*-toluidide, slightly yellow plates, m. $140.5-1.0^\circ$; *p*-toluidide, elongated plates, m. $143.5-4.5^\circ$. The m. ps. of the esters of the 3- and 4- NO_2 acids follow the rule of sym. $o < m < p$, while for those of the 6- NO_2 acid the order is $o > m > p$, a fact especially peculiar in the light of Smiles' theory (*Relations between Chemical Constitution and Some Physical Properties*, p. 208). For each acid, the solubility of its derivs. in org. solvents decreases with increasing m. p. As a rule, the derivs. of the 4- NO_2 acid are less sol. than their isomers.

CHAS. A. ROUILLER.

Comparative behavior of thiourea and urea towards acetic anhydride. EDWARD F. KOHMANN. *J. Am. Chem. Soc.* 37, 2130-3(1915).—In an attempt to prep. $AcNHCSNH_2$, 1.8 g. $CS(NH_2)_2$ was heated 1 hr. at 100° with 5 cc. Ac_2O ; on cooling yellow prisms sepd. which, after crystn. from H_2O , alc. or glacial $AcOH$, m. $150-5^\circ$ and contained 19.5% N; 0.5 g. of this product, heated 1 hr. at 100° in 10 cc. H_2O , gave colorless prisms of $AcNHCSNH_2$, m. 165° (N, 23.5%), while 0.5 g. of the original product, heated 1 hr. at 100° in 5 cc. Ac_2O , gave pale yellow, blade-like prisms of *diacetylthiourea*, m. $151-2^\circ$ (N, 17.4%), becomes bright lemon-yellow when heated at 110° and seps. from a concd. Ac_2O soln. in the same lemon-yellow form. Urea under the above conditions yields only the mono-Ac deriv.

CHAS. A. ROUILLER.

Hydantoins. XXXIII. Condensation of cinnamic aldehyde with hydantoins. TREAT B. JOHNSON AND RICHARD WRENSHALL. *J. Am. Chem. Soc.* 37, 2133-44(1915).—4-Cinnamylhydantoin (*a*), obtained in 72% yield from 10 g. hydantoin, 14 g. $PhCH:CHCHO$, 50 g. $NaOAc$ and 50 cc. $AcOH$ heated 6 hrs. at $130-40^\circ$, canary-yellow prisms from $AcOH$, stout or slender prisms (depending on the concn. and temp.) from 95% alc., m. $272-3^\circ$ (decompn.); 8.5 g. in 2.5 g. KOH and 360 cc. H_2O at $50-65^\circ$ slowly treated with 110 g. of 3% $Na-Hg$ and heated 1.5 hrs. gives 7 g. of γ -phenylpropenylhydantoinic acid, diamond-shaped plates from H_2O , m. $142-61^\circ$ (decompn.) depending on the rate of heating; 7 g. digested 50 hrs. with 50 g. $Ba(OH)_2$ in 20 cc. H_2O yields α -amino-

δ-phenyl-*β*-pentenic acid, needles from H₂O, m. 247-8° (some decompn.), sol. in about 100 parts boiling H₂O, converted by boiling 25% HCl in 1 hr. into 4-[*γ*-phenylpropenyl]-hydantoin, needles from 95% alc., m. 160-1°, while 2 g. of the acid heated 1 hr. at 100° with 2 g. NH₄CNS and 10 cc. Ac₂O gave 2.5 g. of 2-thio-3-acetyl-4-[*γ*-phenylpropenyl]-hydantoin, orange plates from 80% alc., m. 97-8°, converted by repeated evapns. with concd. HCl into 2-thio-4-[*γ*-phenylpropenyl]hydantoin (b), needles or distorted prisms from dil. alc., m. 126-7°, which, heated 4 hrs. at 140° with 10% CH₂ClCO₂H, gives 4-[*γ*-phenylpropenyl]hydantoin, needles, m. 160°. 2-Thio-4-cinnamalthydantoin (c), in 85% yield from 8 g. 2-thiohydantoin, 40 g. NaOAc and 60 cc. AcOH heated 2 hrs. at 130°, seps. from hot AcOH in red prismatic columns but below 70° in slender yellow needles; the red form m. 262-3°, while the yellow form first reddens 140-60° and contains 1 mol. AcOH of crystn. With Na-Hg it gives the gummy *γ*-phenylpropenylthiohydantoinic acid, converted by repeated evapn. with HCl into (b). 2-Thio-4-[*γ*-phenylpropenyl]hydantoin(?), quant. obtained from 2.5 g. (c) in enough AcOH to dissolve it at 65° heated 1.5 hrs. at 65-75° with 20 g. Zn dust, powder very sol. in org. solvents, begins to contract 175°, forms a red gum 185°, becomes partly fluid 190°, immediately decolorizes dil. KMnO₄ in acetone. Desulfurization of (c) requires 6 hrs. heating in a bomb tube with 4 mols. of 33% CH₂ClCO₂H. 4-[*α*-Bromocinnamal]-hydantoin, from 1.5 g. (a) in 200 cc. AcOH at 50-60° treated with the calcd. amt. of Br vapors, yellow needles, m. 290-5° (decompn.) depending on the rate of heating, also formed with excess of Br (4 mols.), there being no tendency for the Br to add to the allyl double bond. 4-[*β*-Bromocinnamal]hydantoin, obtained in 6 g. yield from 10 g. PhCH:CHBrCHO, 5 g. hydantoin, 25 g. NaOAc, 20 cc. AcOH and 20 cc. Ac₂O after 1.5 hrs. at 130°, yellow prisms from AcOH, m. 226-7° (decompn.), always decomp. to some extent when recrystd. 3-Acetyl-4-cinnamalthydantoin, from 1.5 g. (a) heated 4 hrs. at 140-50° with 30 cc. Ac₂O, yellow prisms from AcOH, m. 241-2°, easily hydrolyzed to (a) by hot HCl, also obtained in excellent yield from 3-acetylhydantoin, PhCH:CHCHO, NaOAc, AcOH and Ac₂O after 3.5 hrs. at 130-5°. CHAS. A. ROUILLER.

Pyrimidines. LXXV. Pyrimidine-aldehydes and their biochemical interest (thiouracilaldehyde). TREAT B. JOHNSON AND LEONARD H. CRETCHER, JR. *J. Am. Chem. Soc.* 37, 2144-51 (1915).—In connection with J.'s pyrimidine-nucleoside investigations it became necessary to obtain uracil (or thiouracil) combinations containing in position 4 a grouping, like CHO, which would make possible the synthesis, indirectly, of glycol and higher alc. combinations. The CHCl₃CO₂H used, b. 188-92°, was obtained in 76-87% yield from its K salt suspended in C₆H₆ decompd. with dry HCl, filtered from the KCl and freed from C₆H₆ by heating, finally at 150°; 105 g. of this is slowly dropped into 56.2 g. Na in 800 cc. alc. (distd. from Na) at 80°, cooled, treated below 10° with 35 g. HCl in abs. alc., allowed to stand 15-8 hrs. at room temp., exactly neutralized in the cold with alc. NaOEt, filtered from the NaCl, evapd. *in vacuo* at 30-5°, dild. with 20 cc. H₂O and a large vol. of Et₂O and the immiscible oil repeatedly extd. with Et₂O until its vol. remains const. (55 cc.); the Et₂O exts., after drying with Na₂SO₄, yielded 48 g. (EtO)₂CHCO₂Et (a), b₁₈ 94.5-8.0°, 10 g. b₂₀₋₁ 98-103°, and 12 g. of a higher fraction with indefinite b. p. The immiscible oil above, when cautiously acidified with HCl and extd. with Et₂O, yielded 48 g. (EtO)₂CHCO₂H which, on esterification with alc. HCl, gave 12 g. more of pure (a), b₁₈ 83-5°. From (a) was prepd., by a slight modification of Dakin and Dudley's method (*C. A.* 9, 201), (EtO)₂CHCO₂CH₂CO₂Et, 65 g. of which, heated 7 hrs. with 10.5 g. Na, 40 g. CS(NH₂)₂ and 250 cc. alc., freed from alc. at 100°, digested with charcoal in 275 cc. H₂O, cooled and cautiously acidified with dil. HCl, gave 52 g. 2-thio-4-uracilaldehyde diethylacetal (b), thick, rhombic blocks from 95% alc., m. 160°, is not desulfurized by digestion with alc. HgO, freshly pptd. Pb(OH)₂ or CH₂ClCO₂H, quant. hydrolyzed by heating to boiling with dil.

HCl to the free *aldehyde*, golden yellow plates with 1 H₂O, darkens about 230°, decomps. 250°, reduces NH₄-AgNO₃ and Fehling soln., seps. from its aq. soln. or on addition of H₂O to the AcOH soln. as a tar; *phenylhydrazone*, yellow needles, does not m. 300°. *2-Ethylmercapto-6-oxy-4-aldehydopyrimidine diethylacetal* (c), in 11 g. yield from 10 g. (b), 1 g. Na, 1.2 g. EtBr and 250 cc. alc. 1 hr. on the H₂O bath, slender needles from H₂O, m. 128°; free *aldehyde*, elongated prisms, m. 145°. *2-Methylmercapto acetal*, obtained practically quant. from (b), Na and MeI, needles from alc., m. 133°. *Uracil-4-aldehyde*, from (c) boiled 0.5 hr. with HCl, distorted prisms with 1 H₂O from dil. HCl, does not m. 300°. **LXXVI. New methods of synthesizing 2-ketopyrimidines and their sulfur analogs.** TREAT B. JOHNSON AND A. WILLARD JOYCE. *Ibid* 21, 51-64.—2,6-Dioxy-5-ethoxypyrimidine (*J. Biol. Chem.* 2, 441(1906)) is obtained in 90% yield from 50 g. 2-ethylmercapto-5-ethoxy-6-oxypyrimidine digested 6 hrs. with 58 g. CH₂ClCO₂H in 200 cc. H₂O; with excess of POCl₃ it gives 85% of 2-ethylmercapto-5-ethoxy-6-chloropyrimidine (a), while 34 g. heated 3 hrs. at 120-30° with 140 g. POCl₃ gives 90% of 2,6-dichloro-5-ethoxypyrimidine (b), m. 51°, not 41°, as previously given. (a) is not smoothly desulfurized by CH₂ClCO₂H, while 10 g. (a), 25 g. Zn dust, 75 cc. H₂O and 75 cc. of 95% alc. boiled 3 hrs. give 71% of 2-ethylmercapto-5-ethoxypyrimidine (c), thin plates or prisms from petr. ether, m. 31-2°, sol. in acids, repptd. by alkalis, mol. wt. in freezing C₆H₆ 180-2, forms a stable, easily hydrolyzed HCl salt; the aq. reaction mixt., after extrn. of the (c) with Et₂O and addition of sufficient NaOH to redissolve the Zn(OH)₂, leaves 0.6 g. cryst. ppt. sepg. from dil. alc. in needles, insol. in alkalis, m. 126-7°, mol. wt. in freezing C₆H₆ 202-4°. *Hydrochloride* of (c), prisms from (c) in Et₂O satd. with HCl, m. 120-1°; *chloroplatinate*, golden yellow prisms, m. 165-6°. (c) is not attacked by CH₂ClCO₂H after 18 hrs. heating, by Zn dust in boiling 50% alc. after 1 hr. or by satd. alc. NH₃ after 24 hrs. at 100°, 10 hrs. at 130-50°, 4 hrs. at 140-60°, and finally 10 hrs. more at 175-85°. (b) boiled 1.5 hrs. with 2 parts Zn dust in 50% alc. gives 80% of 2-chloro-5-ethoxypyrimidine, sol. in acids, insol. in alkalis, seps. from dil. alc. in thin plates, m. 70°, produces a cooling sensation on the tongue and in small amts. has a sweet taste; 6 g. heated 5 hrs. on the H₂O bath with 8.4 g. KOH in 60 cc. of 95% alc. satd. with H₂S gives 5 g. of 2-thio-5-ethoxypyrimidine (d), yellow columns from 20 parts AcOH, m. 192-3°, insol. in HCl, forms sulfides with hot basic Pb acetate or HgO, sol. in alkalis; the AcOH mother liquors on diln. with H₂O deposit a small amt. of the *sulfide* R₂S or R₂S₂ (R = N:CH.C(OEt):CH.N:C—), m.

125°, insol. in acids and alkalis; the N content agrees with that calcd. for the disulfide (17.90%; found, 17.87, 18.01). From 2.5 g. (d) in 1 g. KOH and 75 cc. alc. heated 3 hrs. with 15 g. EtBr is obtained (c), thus showing that it is the 6-Cl atom which is removed in the reduction of (b). Boiled 5 hrs. with 2 g. CH₂ClCO₂H in 50 cc. H₂O, 2.8 g. (d) gives 2.5 g. 5-ethoxypyrimidine-2-thioglycolic acid, needles, m. 137-8°, sol. in alkalis, insol. in acids, unchanged by boiling 4 hrs. with 10% alc. but decompd. with formation of tarry products on digesting 3.5 hrs. with concd. HCl. *2,5-Diethoxypyrimidine*, from the 2-chloro-5-ethoxypyrimidine and the calcd. amt. of alc. NaOEt, plates, m. 19°, b₄₄ 142°, insol. in alkalis, sol. in concd. acids; *hydrochloride*, needles, easily hydrolyzed; *chloroplatinate*, golden yellow prisms, m. 176° (decompn.). *2-Ethylmercapto-5-ethoxypyrimidine*, obtained in 75% yield from the 6-Cl compd. with Zn dust in 50% alc. boiled 1 hr., b₄₀ 115°, has an unpleasant pungent odor, gradually darkens in the air, sol. in concd. acids, insol. in alkalis; *hydrochloride*, m. 98-9°, unstable in damp air, dissociating into the base and HCl; *chloroplatinate*, golden yellow needles, m. 166°. The base, digested 5.5 hrs. with concd. HCl, gives 2-oxypyrimidine *hydrochloride*, m. 203-5°; *hydrobromide*; free base, light yellow, amorphous, does not m. 320°, possesses both basic and acid properties, is more sol. in NH₄Cl and NH₄Br than in H₂O. *2-Ethylmercapto-4-methylpyrimidine*, in 72% yield from the 6-Cl compd.

with Zn dust boiled 2.5 hrs. in 50% alc., b_{18-9} 123-4°, has a pungent odor, insol. in alkalis; *hydrochloride*, prisms, m. 141-2°, dissociated by H_2O ; *chloroplatinate*, needles, m. 165-6°. The above method of converting monochloropyrimidines into their corresponding EtS deriv. affords a valuable method of detg. the constitution of the former.

CHAS. A. ROULLER.

Nitrated proteins. II. Synthesis of 3,5-dinitrotyrosine. TREAT B. JOHNSON AND EDWARD F. KOHMANN. *J. Am. Chem. Soc.* 37, 2164-70(1915); cf. *C. A.* 9, 2529.—J. and K. have been unable to obtain a dinitrotyrosine by Städeler's method (*Ann.* 116, 82(1860); cf. also Thudicum and Wanklyn, *J. Chem. Soc.* 22, 283(1869)) with HNO_3 alone, only mononitrotyrosine and $(CO_2H)_2$ being obtained, the latter exclusively if the treatment was vigorous, but on the other hand the desired object is easily attained with a mixt. of HNO_3 and H_2SO_4 ; the resulting compd. differs in many respects from that described by S., and he must have had some other substance or, more probably, impure mono- NO_2 compd. The NO_2 groups enter the *o*-positions to the HO group. Like other di-*o*-substituted tyrosines, the compd. does not give the Millon test, indicating that the production of the red color in the test does not involve nitration. To 22 g. concd. H_2SO_4 and 3 g. concd. HNO_3 below 10° is slowly added 2 g. tyrosine and the mixt. is at once poured into H_2O ; in the combined solns. from 6 expts. the H_2SO_4 is quant. pptd. as $BaSO_4$, the Ba-free filtrate made distinctly alk. with NH_3 , evapd. to dryness *in vacuo* at 60°, treated with 25 cc. cold H_2O , decompd. with a little dil. HCl and extd. with boiling H_2O and charcoal; on cooling, 6 g. 3,5-dinitrotyrosine (a) seps. in golden yellow plates with 1 H_2O , becomes anhydrous and brick-red 140-50°, decomp. 220-30°; a hot satd. aq. soln. added to an equal vol. of boiling Millon soln. immediately gives a yellow ppt. of the salt $C_8H_5O_7N_2HgNO_3$, begins to decomp. 170°, effervesces 185°; from an HCl soln. of (a) concd. HCl ppts. the *hydrochloride*, bright yellow plates, begins to darken 220°, decomp. 230°. *Ammonium salt*, from (a) and concd. NH_3 , red prisms, decomp. above 230°. *Thiohydantoin*, $CO.NH.CS.NH.CH-$

$CH_2C_6H_3(NO_2)_2OH$, in 4 g. yield from 3.7 g. (a) heated 1 hr. on the H_2O bath with NH_4CNS and Ac_2O , poured into cold H_2O , filtered, suspended in strong HCl and evapd. to dryness, short prisms from 50% AcOH, m. 225-30° (decompn.); 4 g. heated 6 hrs. at 140° with 15 g. CH_2ClCO_2H and 45 cc. H_2O gives 2.9 g. 4-[3,5-dinitro-4-hydroxybenzyl]hydantoin, golden yellow blocks from AcOH, decomp. 235°, converted by Sn and warm dil. HCl and subsequent diazotization and treatment with Cu_2Cl_2 into the 3,5- Cl_2 compd. (Wheeler, J. and Hoffmann, *J. Biol. Chem.* 10, 147(1911)).

III. Conversion of fibroin into nitrofibroin (fibroin-xanthoproteic acid). TREAT B. JOHNSON, ARTHUR J. HILL AND LEON P. O'HARA. *Ibid* 2170-8; cf. Inouye, *C. A.* 7, 802.—The fibroin was prepd. by boiling 1 lb. of exceptionally pure silk noils with 15 l. of neutral 1% red oil soap for 6 hrs., thoroughly washing with warm and cold H_2O , drying at 100° and placing over H_2SO_4 . To obtain consistent results, the natural condition of the fiber must be preserved as much as possible, pure spun silk or silk yarn of close texture giving results entirely different from those obtained with the noils. To 20 g. portions of the noils in tall beakers was added 1 l. of HNO_3 (d. 1.12), the nitration allowed to proceed at room temp. (18-25°) with frequent stirring of the silk suspension, the product filtered at the end of a given period, washed repeatedly by maceration with cold H_2O until the washings gave no acid reaction, dried at 100°, weighed and analyzed for N. The yield of nitrofibroin ranged from 19.9608 g. with 17.90-17.92% after 12 hrs. to 12.0000 g. with 18.05-18.10% N after 552 hrs. nitration. Up to 48 hrs. the N increases to 18.8% but after 72 hrs. becomes const. around 18%. The yield falls continuously to about 14.3% after 196 hrs. and then remains practically const. for the next 240 hrs., the parallelism in yield and % N indicating a definite nitration product. The nitrofibroin obtained after 240 hrs., when placed in fresh

HNO₃ (d. 1.12) for another 13 days, suffered only a comparatively small change in wt. and no change in N content. When first placed in the acid, the noids did not change in appearance; in about 15 min. they became yellow in spots which rapidly diffused through the individual fibers as the action continued; after 12 hrs. the entire mass was a uniform golden yellow but the fibers did not lose their identity until several hrs. more; after 90 hrs., their disintegration began; the material was then deep golden yellow and could easily be pulverized when dry, by rubbing with the hand; further action produced only a powder of nitrated protein; after 240 and 552 hrs., resp., the products were a deep golden yellow, pulverulent material very much like mosaic gold, without cryst. structure. Up to 44 hrs., the products responded to the Millon test, the intensity of the color diminishing, however, with the length of nitration; beyond 24 hrs. neither the solid nor the filtrate gave the test. The nitrofibroin is insol. in NH₃, aq. alkali carbonates, 1% NaOH, 10% NaOH (changes from yellow to red, becoming more intense on heating; the alk. solns. assume a light orange color destroyed by acids), 50% NaOH (the soln. becomes orange, however, and colorless when neutralized or made slightly acid) and glacial AcOH, sol. in concd. acids (HCl, H₂SO₄, HNO₃), turns brown about 240°, almost black 300°, insol. in Schweitzer reagent, does not give the biuret reaction on account of the orange color of the alk. soln., sol. in hot 50% KOH with slight evolution of NH₃.

CHAS. A. ROUILLER.

Separation of the mono- β -, 2,6- and 2,7-sulfonic acids of anthraquinone. M. L. CROSSLEY. *J. Am. Chem. Soc.* 37, 2178-81(1915).—In the usual method of sepn. through the Ca salts, a considerable amt. of the β - and 2,6-salts is pptd. out and lost with the CaSO₄. C. has found the Na salts a better means of sepn.; 50 g. anthraquinone + 18 g. concd. H₂SO₄ mixed to a uniform paste are heated 2 hrs. at 170° in a covered casserole with 82 g. fuming H₂SO₄ (60% SO₃), boiled 0.5 hr. with 1 l. H₂O, filtered hot, almost neutralized with concd. NaOH, evapd. to a thick paste and pumped dry; the solid is a mixt. of the β - and 2,6-salts, sepd. by fractional crystn. from H₂O. The 2,6-salt changes in sunlight from a light plum color to almost black in sunlight. The filtrate is treated with 95% alc. till no more Na₂SO₄ is pptd., the filtrate evapd. almost to dryness and the residue, in a very little distd. H₂O, treated with a large excess of 95% alc. which ppts. a salmon-pink substance sol. in distd. H₂O with golden yellow color changing to pink on addition of a little tap H₂O and again changing to golden yellow on exposure to sunlight for 24 hrs.; tap H₂O again restores the color, but if the exposure to sunlight is repeated 2-3 times, the yellow color becomes permanent; addition of a drop of dil. NaOH to the pink soln. and exposure to sunlight produces a permanent ruby-red; the substance is a sensitive indicator (reddish pink in alk., golden yellow in acid soln.); the pink color is not discharged by CO₂. The compd. is practically insol. in most org. solvents, slightly in MeOH, changed by CHCl₃ to a dark red oil solidifying to red needles; with PhMe is also formed a dark red oil forming rods. Suspended in 95% alc. and exposed to sunlight it changes to a dark green substance which, when dry, slowly reverts to the salmon pink form and seems to be a loose addition product of the latter. The filtrate from the salmon pink compd. is again evapd. to dryness; the residue is the 2,6-salt. Yield, 2, 60, 28 and 9 g. of the β -, 2,6- and 2,7-salts and the new compd., resp. The best yield (38 g.) of β -salt ("silver salt"), which seps. best in faintly acid soln., is obtained by heating 50 g. anthraquinone + 9 g. H₂SO₄ with 41 g. fuming acid 2 hrs. at 160° and treating as above, the almost neutral soln. being evapd. to 1/2 its vol., whereupon the β -salt seps.

CHAS. A. ROUILLER.

Neutral ammonium salts of some substituted benzoic acids. V. LEROY McMASTER AND I. H. GODLOVE. *J. Am. Chem. Soc.* 37, 2181-8(1915); cf. C. A. 8, 3424. —The following neutral ammonium salts have been prepd. from the acids and dry NH₃ in anhydrous solvents: *m*- and *p*-toluates, *o*-, *m*- and *p*-chloro-, bromo-, nitro- and amino-

and 3,5-dinitrobenzoates. All can be prepd. in Et_2O . The toluates are cryst. ppts. sol. in H_2O , acetone and AcOH , stable in dry air, slowly give off NH_3 in moist air, form neutral aq. solns.; the *m*- and *p*-salts are slightly deliquescent. Of the chlorobenzoates, the *p*-salt can also be made in satd. alc. soln.; all are sol. in H_2O , MeOH , EtOH , AcOH and, to a slighter extent, acetone; the aq. solns. of the *m*- and *p*-salts slowly become acid; all lose NH_3 slowly in the air; the *m*-salt is slightly hygroscopic. Of the bromobenzoates, the *o*- can be prepd. in C_6H_6 and the *m*-salt in $\text{Et}_2\text{O-EtOH}$; all are sol. in H_2O , MeOH , EtOH , AcOH , slightly in acetone, non-deliquescent. Of the aminobenzoates the *m*-salt can be prepd. by pouring the satd. alc. soln. into an excess of Et_2O . So far, the 3,5-(NH_2)₂ salt has not been isolated. CHAS. A. ROUILLER.

Rate of conversion of cinchonine and of cinchonidine into cinchotoxine (BIDDLE) 2.

II. BIOLOGICAL CHEMISTRY.

WILLIAM J. GIES, EDGAR G. MILLER, JR., PAUL E. HOWE.

A. GENERAL.

FRANK P. UNDERHILL.

The existence of a reducing endo-enzyme in animal tissues. D. F. HARRIS. Dalhousie Univ., Halifax, N. S. *Trans. Nova Scotian Inst. Sci.* 13, 259-78(1913-14).—It is pointed out that a reducing endo-enzyme, reductase, exists in animal tissues. This enzyme is a typical deoxidizer in that it removes O from OsO_4 and from such substances as oxyhemoglobin, which is fully reduced, and methemoglobin, which is reduced to the oxy-condition. Substances containing O, but not in a form wholly removable, can be reduced from the higher to the lower state, as when NaNO_3 is reduced to NaNO_2 , or when Na indigodisulfonate and Na alizarinsulfonate are, respectively, reduced to their pale chromogens. It is further shown that reductase can also reduce metallic salts containing no O from their higher to their lower forms, as when FeCl_3 is reduced to FeCl_2 . Further, certain pigments containing no O, such as sol. Prussian blue and methylene blue, are reduced to the pale or white chromogenic conditions. In conclusion the tissue respiratory ferments are discussed. Cf. C. A. 9, 89.

H. JERMAIN CREIGHTON.

Peroxidase in beer yeast. A. BACH. *Arch. sci. phys. nat.* 39, 497-507(1915).—The facts observed by Harden and Zilva (C. A. 8, 3060), that in a mixt. of *p*-phenylenediamine and H_2O_2 yeast produces a violet color, cannot be attributed to the action of peroxidase for in a series of expts. with yeast suspensions, previously boiled, similar colorations were produced, results incompatible with the hypothesis of the intervention of an enzyme; further, not in a single instance did the yeasts examd. give a positive reaction for peroxidase with the usual reagents (guaiacol, pyrogallol, hydroquinone). The formation of violet dyes in the oxidation of *p*-phenylenediamine by H_2O_2 occurs only in the presence of acids and the quantity of dye increases directly with the acidity to a limit which corresponds nearly exactly to the ratio *p*-phenylenediamine:acid = 1 mol.:0.5 mol. Beyond this limit no more violet color is produced, but brown and yellow-brown shades instead. The reaction observed by Harden and Zilva is solely due to the acidity of yeast and not to the intervention of peroxidase. In a mixt. of *p*-phenylenediamine and H_2O_2 finely divided silk accelerates the formation of the violet dye in the same manner as yeast. Yeast exts. purified by ultrafiltration contain considerable quantities of invertase and maltase, but no peroxidase. Neither top nor bottom yeasts, both cultivated in pure state, gave any peroxidase reactions. The same results were obtained when yeasts were cultivated in a current of air.

L. W. HAAS.

Enzymes: the synthetic and hydrolytic oxynitrilase. II. VERNON K. KRIEBLE. *J. Am. Chem. Soc.* 37, 2205-13(1915); cf. *C. A.* 7, 3976; Rosenthaler, *C. A.* 7, 3762; Bayliss, *C. A.* 7, 3764.—The benzaldehyde used was prepd. by treating the lab. stock with NaHCO_3 , extg. with Et_2O , drying with Na_2SO_4 and distg. *in vacuo* directly into a buret, flooding the app. with N and connecting the buret with a large reservoir of N. When not in use, the tip of the buret was kept under H_2O . The mandelonitrile (a), from benzaldehyde, shaken with aq. HCN in a bottle flooded with N until the calcd. amt. of HCN was absorbed, was never obtained quite pure; when hydrolyzed it gave only about 82% of the calcd. amt. of NH_4Cl and in 168 vols. of H_2O yielded only 13.7% free HCN at equil. instead of the calcd. 19%. The rate of reaction and the equil. point between HCN and benzaldehyde in the presence of oxynitrilase were studied to det. whether there was any difference in the enzyme obtained from various sources and in enzyme from the same source but obtained by various methods and subjected to certain treatments. The benzaldehyde and enzyme soln. were stirred 0.5 hr. at 25° in a N atm., the HCN added and the rate of reaction followed by withdrawing measured vols. of the mixt. from time to time, adding to AgNO_3 and HNO_3 , filtering and titrating the filtrate with NH_4CNS . Equil. was very nearly reached 30 min. after adding the HCN. Expts. with exts. of wild cherry leaves, the acetone ppt. of the latter, and of peach leaf ext. and Kahlbaum sweet almond and peach kernel emulsins all gave practically the same equil. point. The same was true when the extns. were continued for different lengths of time and with different amts. of H_2O . A repetition of some of the methods given by R. for the sepn. of the hydrolytic from the synthetic enzyme has thus far given no evidence of the possibility of such a sepn. C. A. R.

The individuality and polyvalency of trypsin. FRANCESCO MARRAS. Univ. Sassari. *Centr. Bakt. Parasitenk. I Abt.* 75, 193-7(1915).—Although heating destroys the ability of trypsin to digest all substances but gelatin, an antiserum made by injecting it into a dog does not differ from that made from active trypsin as detd. by the complement fixation and precipitin tests. These facts indicate that trypsin is only a single enzyme but is polyvalent. Cf. *C. A.* 8, 743.

JULIAN H. LEWIS.

Pyrimidine-aldehydes and their biochemical interest (JOHNSON) 10. Nitrated proteins (JOHNSON) 10. Neutral salt compounds of the amino acids and polypeptides. (PFEIFFER) 10. Preparation of sarcosine (BAUMANN) 10:

B. METHODS AND APPARATUS.

STANLEY R. BENEDICT.

Method for imbedding small objects. P. A. WEST. *Science* 41, 898-9(1915).—By this simple method is secured a flat surface from which to make sections. The danger of losing the objects while transferring them from the various reagents with a pipet is removed.

H. DUBIN.

New test of blood-serum and cerebrospinal fluid in syphilitic involvement of the nervous system. ALFRED GORDON. *N. Y. Med. J.* 101, 343-5(1915).—To 0.5 cc. blood-serum in a t. t., slowly add, in the center of tube, 5 drops of 1:100 soln. of HgCl_2 . In normal serum an immediate cloudiness appears, rapidly increasing in density and, at the end of 10 min., presents a thick, gray mass with a slightly greenish tint. In syphilitic serum a foamy upper layer forms above a transparent serum. On standing overnight the former coagulum falls to the bottom; the latter dissolves. Of 29 cases all but 2 ran parallel to Wassermann tests. In cerebrospinal fluid the same procedure gives cloudiness in syphilitic serum but in normal it remains clear. Out of 9 cases all but one ran parallel to the Wassermann test. The intensity of cloudiness varies with the intensity of the Wassermann.

M. RINGER.

A disturbing factor in Barfoed's test. WILLIAM H. WELKER. *J. Am. Chem. Soc.* 37, 2227-30(1915); cf. *P. Am. Soc. Biol. Chem.* 1909, 180; Mathewson, *Diss.*

Columbia Univ. 1912.—A series of expts. with solns. containing varying amts. of glucose and NaCl showed that very small amts. of the latter interfere with Barfoed's test. In the absence of NaCl, 1 cc. of reagent and 9 cc. glucose soln. heated 2 min. in boiling H_2O give a very definite reduction when the concn. of the glucose is 0.08%; 0.04% glucose gives a faint reduction. At room temp., a NaCl concn. of 0.16% does not but one of 0.32% does give a ppt. with the B. reagent; glucose seems to favor the formation of opalescent (colloidal) solns. when added to the reagent and NaCl. The greenish white ppt. formed by NaCl contains Cu, Na, Cl and the AcOH radical; when formed at room temp. it tends to form colloidal solns.; boiling hastens the pptn. C. A. R.

Recent methods of bacterial air analysis. G. L. A. RUEHLE. *Am. J. Pub. Health* 5, 603-7(1915).—The author compares the 3 methods of air analysis for germ content: water-filtration method of Rettger, sand-filtration of Am. Public Health Assoc., and a modification of the latter devised by the author, which consists in eliminating the lower rubber stopper and bolting cloth supports and fusing the small tube into the larger one, thereby causing the layer of sand to rest upon a layer of cotton which in turn rests on the shoulder made by the junction of the large and small tubes. The upper rubber stopper is replaced by one of cork. On comparison it was found that the sand filter gave 92% efficiency, while the Rettger tubes gave 93%, and the modified method gave 96%. The advantages and disadvantages of each method are pointed out. J. G.

C. BACTERIOLOGY.

ERNEST D. CLARK.

The Schumann rays as an agent for the sterilization of liquids. W. T. BOVIE. *Botan. Gaz.* 60, 144-8(1915).—By the use of a sterilizer such as is described by Billion-Daguerre (*C. A.* 4, 470, 2022) B. shows that the bacteria would not be exposed to sufficient light to kill them. An improved sterilizer reduced the bacterial count of the water from 50 to 4 per cc., and the fungal count from 3 to 1 per cc. In none of the experiments was the water completely sterilized. B. H.

Some filamentous fungi tested for cellulose-destroying power. F. M. SEAKS. *Botan. Gaz.* 60, 149-53(1915).—S. used 30 species of *Penicillium* and 10 species of *Aspergillus*. The cellulose-destroying power of these organisms was detd. with two different sources of N: $(NH_4)_2SO_4$ -cellulose-agar and a peptone-cellulose-agar. The $(NH_4)_2SO_4$ medium was prepared as described by McBeth and Scales (*C. A.* 7, 1527) and the peptone medium by substituting 1 g. per liter of peptone for the $(NH_4)_2SO_4$. In almost all cases the fungi possess the power of destroying cellulose. B. H.

Alcohol and iodine as germicides. ALBERT COMSTOCK. *N. Y. Med. J.* 101, 305-6(1915).—Germicidal action was tried on *B. subtilis*, *B. anthracis*, *B. coli communis*, *Staphylococcus pyogenes aureus*. The germicides were: 95% and 70% alc., tincture of I, and both together. I as generally employed was found to be a thoroughly germicidal substance, whereas alc. had but little antiseptic value. M. RINGER.

Utilization by the animal organism of sugar produced from sucrose and nutritive mineral salts. WILHELM VÖLTZ. *Z. Spiritusind.* 38, 235-6(1915).—Comparative expts. (on a dog) with dried brewers' yeasts and with yeast propagated in a sugar soln. contg. mineral matter as the only other constituent, led V. to the conclusion that there are no differences between these yeasts as to digestibility and utilization of the nutritive constituents. L. W. HAAS.

Culture media for bacteriological examination of water (CHAMOT) 14.

D. BOTANY.

CARL L. ALSBERG.

Action of potassium cyanide when introduced into tissues of a plant. W. MOORE

AND A. G. RUGGLES. *Science* 42, 33-6(1915).—KCN failed to destroy various sucking and wood-boring insects. H. DUBIN.

Toxicity and malnutrition. R. H. TRUE. *Science* 42, 195-6(1915).—A discussion of the conception of the term, toxicity. H. DUBIN.

The absorption of ions by living and dead roots. H. V. JOHNSON. *Am. J. Botany* 2, 250-4(1915).—J. shows that the unequal absorption of anions and cations by plants may be due to dead rather than living cells of the root. In a soln. of CaCl_2 live beets removed 41.3% of Ca and 43.74% Cl while dead beets removed 44% Ca and only 26.25% Cl. Carrots gave a similar result. In expts. with sweet corn the dead roots took up more Ca than Cl but this was not true of white corn. J. J. SKINNER.

Synthesis of chlorophyll (MARY) 10.

E. NUTRITION.

PHILIP B. HAWK.

NORMAL.

Stimulation of growth. J. LOEB. New York. *Science* 41, 704-15(1915).—An address. E. M. FRANKEL.

The function of the liver in urea formation from amino acids. B. C. P. JANSEN. Univ. Amsterdam. *J. Biol. Chem.* 21, 557-61(1915).—The surviving liver of dogs and cats was perfused with blood and blood diluted with Ringer soln. to which, after perfusion for $\frac{1}{2}$ hr., were added varying amts. of $(\text{NH}_4)_2\text{CO}_3$, glycocoll, leucine, alanine and ereptone. The amt. of urea in the perfusing liquid was detd. after 30 min. and after an hour of perfusion by the urease method, after removing the protein by the addition of an equal vol. of 2% HCl and an equal vol. of 6% HgCl_2 soln. The perfusion app. of Mandel-Embsden was used; in it good arterialization of the blood is effected. Increase in the amt. of urea was observed in all the 26 expts. and, contrary to the results obtained by Fisk and Karsner (*C. A.* 8, 729), it is evident that the liver can play an important part in the formation of urea from amino acids. A. P. L.

The metabolism of creatine and creatinine. X. The relationship between creatine and creatinine in autolyzing tissue. VICTOR C. MYERS AND MORRIS S. FINE. N. Y. Post-Graduate Med. School. *J. Biol. Chem.* 21, 583-99(1915).—In pure soln. creatine is transformed into creatinine and creatinine into creatine at a const. rate of about 0.5% at body temp. After 11 months an equil. is established between the 2 substances. In muscle tissue autolyzing at body temp. the transformation of creatine to creatinine is 3 times as fast as in pure soln., the change being sufficiently rapid to be almost directly comparable with the rate of creatinine formation in the body. Comparatively small changes in temp. influence the rate of transformation in much the same way that fever increases the creatinine elimination. There was no destruction of creatine or creatinine in the autolyzing mixts. Comparable results were obtained with rabbit, cat and hen muscle but with dog muscle the creatinine did not increase after a certain period and there was a loss in total creatinine. Expts. with autolyzing human blood and rabbit liver showed an increase in both the creatine and the creatinine. "Since the creatine of the muscle tissue has a relatively definite concn. for a given species of animals, it is logical to assume that it is very const. for an individual animal. In the autolysis expts. with muscle tissue it has been shown that creatine is converted into creatinine at a very const. rate. This same reaction in the body would account for the well-known constancy in the excretion of creatinine. Since the muscle creatine and urinary creatinine are const., there must be a definite ratio between the two. This would be equiv. to a daily conversion of creatine to creatinine of about 2%. When creatine is administered to man or animals, there is a slight conversion to creatinine which corresponds very well with this figure; and in autolyzing muscle tissue there is practically

the same rate of transformation." The data constitute a strong set of arguments supporting the authors' hypothesis even though they "cannot be regarded as directly bearing upon the relationship existing *in vivo* between creatine and creatinine."

A. P. LOTHROP.

The influence of the composition and amount of the mineral content of the ration on growth and reproduction. E. V. MCCOLLUM AND MARGUERITE DAVIS. Univ. Wisc. *J. Biol. Chem.* 21, 615-43 (1915).—Expts. were performed using diets consisting of milk powder, casein, butter fat, agar, dextrin and sucrose and varying amts. of a salt mixt. The rations ranged from an acidity of 14.3 cc. to an alkalinity of 102.1 cc. of *N* soln. per 100 g. "Provided the other factors in the ration are adequate, young rats can grow normally and remain in apparent good health on rations whose base content varies widely in amt. Four of the rations were highly acid yet growth and well-being were not markedly interfered with. Growth to the normal adult size at the usual rate and continued well nourished appearance is not sufficient evidence that a ration is fully adequate. Only when normal reproduction and rearing of young is repeated at normal intervals can a ration be said to be physiologically sufficient." On the diets employed there was in all cases a failure to repeat reproduction at normal intervals. When part of the dextrin and casein was replaced by wheat and the mineral content of wheat was corrected by the proper salt addition, reproduction was repeated normally and it was evident that some other factor than the mineral content was responsible for the inadequacy of the rations. The most satisfactory ration consisted of wheat, casein, dextrin, butter fat and salt mixt., the alkalinity of the ration being 17.9 cc. of *N* soln. per 100 g.

A. P. LOTHROP.

Creatinuria. ALONZO E. TAYLOR. Univ. Penn. *J. Biol. Chem.* 21, 663-5 (1915).—In the child creatinuria is not dependent upon a low carbohydrate intake and there is evidently a partition of creatine-creatinine in the urine of children. Ketones, in the amts. in which they are present in children's urine, have no effect on the reading in the Folin method for creatinine. In expts. with 2 children on a generous carbohydrate intake, 19 and 40% of the creatine-creatinine elimination was in the form of creatine. "The absolute figures for creatine-creatinine compare approx. with those noted in adults, when the wts. of the children and the probable masses of muscular tissue are considered, thus confirming the Folin-Shaffer postulate of the relation of creatinine to mass of muscle tissue."

A. P. LOTHROP.

Animal sugar. D. VITALI. *Giorn. farm. chim.* 64, 97-101 (1915).—V. discusses the presence of glycogen in the animal organism in connection with carbohydrate metabolism and emphasizes the value of carbohydrates in the diet. H. S. PAINE.

Importance of extractives in the diet. H. ARON. *Monatsschrift Kinderheilkunde* 13, No. 8 (1915); *J. Am. Med. Assoc.* 65, 205.—Expts. with rats showed that when fed abundantly with casein, fat, starch, salts and an ext. of wheat bran, the animals thrived and constantly increased in wt., while on the same diet without the wheat bran ext. they lost wt. and finally died. Ext. of malt gave results similar to ext. of bran but its action was slower. A. tried to keep the technic of his expts. like that of Osborne and Mendel for purposes of comparison.

L. W. RIGGS.

Nutrition and metabolism of an infant on artificial food. E. HELLENSEN. *Nord. Med. Arch.* 48, Nos. 3-4, 120 pp. (1915); *J. Am. Med. Assoc.* 65, 566.—This research is accompanied by 31 tables showing the metabolic findings and the conditions with regard to nourishment. The data confirm the view that carbohydrates spare the N and C reserves better than fat. Carbohydrate food has a marked influence on the mineral metabolism especially of Na. Carbohydrates and fats cannot substitute each other indiscriminately as each has its specific action on the whole metabolism of force and matter, which is a factor of great importance for their role as food. L. W. R.

Some studies on sugar in infant feeding. L. PORTER, San Francisco AND C. H. DUNN, Boston. *Am. J. Dis. Children* 10, No. 2(1915); *J. Am. Med. Assoc.* 65, 466. —From observations with 18 infants the authors think that the idea of sugar injury or sugar intoxication has been overemphasized, particularly in cases of mild fat intolerance.

L. W. RIGGS.

ABNORMAL.

Studies on tissues of fasting animals. S. MORGULIS, P. E. HOWE AND P. B. HAWK. *Biol. Bull.* 28, 397-407(1915).—Largely histochemical. B. HOROWITZ.

Is pathologic metabolism in the parental organism responsible for defective and monstrous development of the offspring? E. I. WERBER. Woods Hole and Princeton Univ. *Bull. Johns Hopkins Hosp.* 26, 226-9(1915).—When fertilized eggs of *Fundulus heteroclitus* are subjected to the action of solns. of acetone and butyric acid, there are produced an unusually large number and variety of monsters, which resemble morphologically those which have been described in human beings. The opinion is expressed that toxic substances produced by disturbances of metabolism may cause the development of monsters through the poisoning of the embryo or germ-cell. Success in the production and control of monstrous or defective development experimentally in mammals may eventually lead to means by which their occurrence can be checked. The problem is one of great medical significance. A. P. LOTHROP.

Relation of gas bacillus to infectious diarrhea and other digestive disturbances of childhood. P. H. SYLVESTER AND F. H. HIBBEN. Boston. *Arch. Pediatrics* 32, No. 6(1915); *J. Am. Med. Assoc.* 65, 555.—The following routine gave excellent results: Give unpasteurized lactic acid milk exclusively until the stools are free of bacilli for 3 successive plants at 2- or 3-day intervals. When free from the gas bacillus, continue a small amt. of the lactic acid milk daily, and gradually increase the amt. of food to normal caloric requirements, by adding skimmed milk and with caution small amts. of carbohydrates in the form of maltose or well cooked starches, testing for gas from time to time. Add fat in very small amts. to the diet after weeks or months, watching stools frequently for undigested fat. When there is a recurrence of the gas bacillus the treatment should be repeated. L. W. RIGGS.

Functioning of the pancreas and its relation to the pathogenesis of diabetes. A. VISENTINI. *Intern. Monatssch. Anat. Physiol.* 31, Nos. 10-2(1915); *J. Am. Med. Assoc.* 65, 655.—The conclusions of this paper confirm anew and apparently with certainty that the islands of Langerhans, and these alone among the elements of the pancreas, control the metabolism of carbohydrates in the animal organism. This paper, which fills over 100 pages, was awarded the Warren triennial prize at Boston in 1913. L. W. RIGGS.

Metabolism study of a case of chronic urticaria. JACOB ROSENBLUM AND M. C. CAMERON. Pittsburgh, Pa. *J. Cutaneous Dis.* 33, 15-7(1915).—The female patient afflicted with chronic urticaria for many years was kept on an exact diet. There was a retention of 5.08 g. N in 3 days. The urea N was low and the fecal N was 3 times the normal. During the first 2 days the amount of neutral S was large, but on the 3rd day the ethereal sulfates increased. The fat in the stools was above normal, whereas the quantities of Ca and Mg excreted in the urine and feces were normal.

M. RINGER.

Homogenized olive oil and fat-free milk mixtures in case of difficult feeding. M. LADD. Boston. *Arch. Pediatrics* 32, No. 6(1915); *J. Am. Med. Assoc.* 65, 554. —L. describes a method of administering homogenized olive oil as a substitute for cow fat in the cases of fat intolerance. L. W. RIGGS.

Starch digestion in children, with some clinical observations. H. H. YERINGTON

AND C. T. WETMORE. Stanford Univ. *J. Am. Med. Assoc.* 65, 569-72(1915).—A study of 372 stool analyses from 338 children ranging from 1 to 14 years of age showed that there is a type of indigestion in children brought on by continued use of a diet composed principally of carbohydrates. This condition can be relieved by a partial elimination of the starches, and giving a mixed diet fed at proper intervals, for which parents must be supplied with an accurate written dietary. Frequent exam. of stools is absolutely necessary to check up the progress of the case. Before attempting to correct the dietary, the oral cavity should be examd. as decayed teeth, inflamed tonsils, and nasal secretions play a most important part in the proper digestion of the child's food.

L. W. RIGGS.

F. PHYSIOLOGY.

ANDREW HUNTER.

Experimental and chemical studies of the blood. I. J. J. ABEL. *Science* 42, 135-47(1915).—A. reviews briefly the history of blood-letting and describes a new procedure to which he gives the name, *plasmapheresis*. According to this method, blood is withdrawn from an animal and clotting prevented by the addition of leech ext. An equal vol. of Locke's fluid is added and the mixt. centrifuged until the corpuscles have settled out. The supernatant plasma is drawn off, replaced by Locke's fluid, the corpuscles are stirred up and the new mixt. returned to the animal. By this means, as much as twice the vol. of blood in the body has been removed from a dog by repeated bleedings in a single day, with no apparent injury. A study was made of the chem. changes in the blood during plasmapheresis; blood-pressure was observed, and blood-counts taken. A. describes also a process called "vividiffusion" for the isolation of various constituents of the blood of a living animal, suggesting it as a means of studying the organs of internal secretion. II. *Ibid* 165-78.—A general discussion of internal secretions, with special reference to epinephrine.

H. DUBIN.

Influence of pregnancy on the hyperglucemia of pancreatic diabetes. A. J. CARLSON AND H. GINSBURG. *Am. J. Physiol.* 36, 217-22(1915).—Pancreatectomy in bitches near full term is not followed by hyperglucemia and glucosuria as long as the fetuses are alive and the placental connection not severed.

J. F. LYMAN.

The alleged influence of epinephrine and of the sympathetic nervous system on the tonus of skeletal muscle. YAS KUNO. *J. Physiol.* 49, 139-46(1915).—Epinephrine, which has a marked influence on the nerve endings of the sympathetic system, has no effect on tonus of skeletal muscles in frogs. Division of the rami communicantes does not affect the tonus of the hind legs. Hence the sympathetic fibers have no significance for muscle tonus. Tonus is markedly affected after division of the anterior roots of the spinal nerves.

J. F. LYMAN.

Jaundice of the newly born. F. BANG. *Hospitalstidende* 58, No. 26(1915); *J. Am. Med. Assoc.* 65, 566.—B. found that the blood in the umbilical cord of 24 newborn infants contained bile pigment, which increased in amt. during the first few days but began to subside after 3-5 days, though giving a positive reaction on the 10th day. Icterus in the newly born appears to be a physiologic condition. The Gmelin-Sunde technic was employed in testing for bile pigments.

L. W. RIGGS.

Proteolytic ferments in portal blood. F. H. FALLS. Chicago. *J. Am. Med. Assoc.* 65, 524-6(1915).—From expts. with dogs F. finds that the portal and the peripheral blood contain a demonstrable increased amt. of proteolytic enzyme at the height of digestion. This is also true of the portal blood in the dog in the fasting state. Under both the foregoing conditions, the portal blood is relatively richer in enzyme than the peripheral blood. The probable source of this enzyme is the intestinal contents at the height of digestion.

L. W. RIGGS.

Protection of parasites in digestive tract against action of digestive enzymes. W. E. AND E. L. BURGE. Chicago. *J. Parasitology* June, 1915; *J. Am. Med. Assoc.* 65, 558.—Expts. showed that tapeworms and roundworms from the intestine of the dog are not digested when introduced into activated pancreatic juice so long as they remain alive, but are digested when dead. If any part of them be killed this part is digested. A dead roundworm which is ordinarily digested when placed in activated pancreatic juice, can be prevented from being digested by keeping the dead body wall constantly permeated with nascent O. The oxidative processes of the living parasites enable them to withstand the action of the digestive juices by oxidizing the enzyme soln. immediately in contact with them.

L. W. RIGGS.

Iodine test for functional capacity of the kidneys. M. N. EROFIEV AND V. A. DEGTYAREV. Russ. *Vrach* 14, Nos. 3 and 4(1915); *J. Am. Med. Assoc.* 65, 658.—In 8 healthy persons the duration of elimination of I in the urine ranged from 20.5 to 49 hrs.; in the saliva from 23 to 30 hrs. The opposite was observed in 27 cases of acute and chronic nephritis in which the urine elimination of I was observed from 23 up to 119 hrs., while in the saliva the findings were positive from 28 to 189 hrs. With healthy persons I appears in the urine in from 20 to 53 min. after taking 0.5 g. of KI; in the saliva in from 3 to 26 min. With nephritics I appears in the urine in from 15 to 160 min. and from 4 to 29 min. in the saliva. It is evident that the duration of I elimination by the kidneys does not indicate the condition of renal epithelium, since other organs participate in the same function, and the I may be found for a longer period in the saliva than in the urine.

L. W. RIGGS.

Reaction of the pancreas. J. H. LONG AND F. FENGER. *J. Am. Chem. Soc.* 37, 2213-9(1915).—The fresh pancreas of the steer, hog or sheep is distinctly acid to fresh litmus, no matter how quickly the test is made (even before the organ is removed), and the acid reaction persists after the organ is chilled. It was found that the best method of sepg. the liquid from the minced glands consisted in centrifuging 45 min. at 3000 r. p. m. whereby a sepn. was effected into 3 layers: solid (about 50% of the whole), a more or less reddish liquid, often quite clear (often 25% of the whole), and a top layer containing much fatty matter and part of the protein tissue. After chilling in ice H₂O the liquid layer can be sepd. very completely and on filtration is obtained in bright clear condition. Its H-ion concn. was detd. by the potential method (Hasselbalch cells and a calomel electrode at 20°). The measurements were made within 1-2 hrs. after death, although the potential remained const. through many hrs. Beef and hog pancreas juices secured on various days in June and July all showed approx. a H-ion concn. of 29×10^{-7} ; with sheep pancreas juices, the results are not so regular; 2 juices secured 1 day gave 25.0 and 23.8×10^{-7} and were perfectly clear; 2 others from young lambs gave 10.5×10^{-7} ; another 12.2×10^{-7} ; but in 1 case where there was very little fat and in some other points the behavior was anomalous, the H-ion concn. was 26.6×10^{-8} . The acid reaction of the pancreas is undoubtedly the normal one, and as the juice is rich in phosphates the reaction is probably due to an acid phosphate.

CHAS. A. ROULLER.

G. PATHOLOGY.

H. GIDEON WELLS.

Fat-phanerosis in nerve cells. GIOSUÈ BIONDI. *Arch. path. anat. (Virchows)* 220, 222-33(1915).—In nerve cells of the spinal cord of the dog, autolyzed in NaCl soln., the amt. of contained fat is greater than in nerve cells which undergo fatty changes *in vivo*. The form and distribution of the fat is different; with autolysis, the lipoids which make their appearance are in diffuse form and abundant and the lipid granules lie distributed in the cytoplasm, while with the pathological formation of fat, the lipid materials appear chiefly in the form of granules lying together in groups. This differ-

ence is easily explained since the first process is concerned with dead cell elements, the second with living and active cells. The absence of fat-pigment formation in autolysis may be explained as due to the rate at which the changes take place. The "masked" protoplasm-lipoids in the nerve cells of rabbits seem to be much more firmly bound to the protein than in the dog. The autolytic enzymes seem to be unable to break down this combination.

GEO. T. CALDWELL.

The preservation of the reagents used in the Wassermann reaction. P. G. WESTON. State Hosp., Pa. *J. Med. Res.* 32, 391-8(1915).—Human and rabbit corpuscles were washed and dried *in vacuo* over H_2SO_4 and preserved in amber-colored, glass-stoppered bottles for 15 months, at the end of which time they still retained antigenic properties. Anti-sheep amboceptor was preserved dried on paper for 5 yrs. without deterioration. Some of the paper exposed in a room where there was slight humidity soon lost its amboceptor properties. Complement was preserved at -15° for 3 mos. without deterioration. Human serum, which in a fresh state gave a strongly positive Wassermann reaction, was preserved in a dry state for 19 months without loss of complement-binding properties. Normal and Wassermann plus cerebrospinal fluids were kept in sterilized test-tubes at ice-box temp. for 9 months, at the end of which time the normal fluid gave a negative Wassermann reaction and the plus fluid a positive reaction. Neither fluid had been heated at any time. No anticomplementary bodies developed in the normal fluid.

GEO. T. CALDWELL.

The pyrogenic action of *Bacillus typhosus*. D. H. BERGEY. Univ. Pa. *J. Med. Res.* 32, 433-44(1915).—A large part of the pyrogenic action of *B. typhosus* is due to an intracellular poison, and only a slight effect, if any, is due to a sol. toxin. The serum of animals immunized against culture filtrates of *B. typhosus* and against dead bacilli exerts a slight antipyretic action. There is not sufficient evidence, in the results obtained by the protective use of the serum of immunized animals, to suggest that similar serums would have much influence as therapeutic agents.

G. T. C.

A study of the effect of anaphylaxis and leech extract on the coagulation of the blood. R. I. LEE AND BETH VINCENT. Boston. *J. Med. Res.* 32, 445-54(1915).—Probably many substances and many conditions act in inhibiting or preventing coagulation of the blood; these vary from extreme cold, oxalate and similar salts which ppt. the Ca, to anaphylaxis and leech ext. The authors believe that "anti-thrombin" instead of being really one substance is the effect of many substances or conditions upon some of the essential principles of coagulation. The alteration of coagulation in anaphylaxis and leech ext. blood is attributed to a definite effect on the blood platelets and not to the introduction of antithrombin.

GEO. T. CALDWELL.

Cell enzymes and energetics in relation to cancer. L. D. BRISTOL. Univ. N. Dakota. *J. Med. Res.* 32, 475-86(1915).—The conclusion reached by the author is that cancer is the result of localized, unchecked over-combustion or hyperoxidation, in epithelial cells.

GEO. T. CALDWELL.

The persistence of typhoid antibodies in the blood of inoculated persons as estimated by agglutination tests. G. DREYER AND A. C. INMAN. London. *Lancet* 1915, II, 225-6.—At least 8 months after a single or double dose of typhoid vaccine, the serum of every inoculated person contains relatively large quantities of agglutinins. Persons who received 2 doses of vaccine, usually, but not always, exhibited a higher agglutinin titer than those who had only 1 dose. In persons who had been inoculated before (within 6 yrs.) the agglutinin titer maintained a high level for a longer period than in the case of those not previously inoculated. The importance of repeated inoculations is not so much that it induces of necessity a higher initial immunity but that it insures with certainty a more persistent one.

GEO. T. CALDWELL.

The significance of acetone bodies in the urine. B. DERHAM. Bolton-le Moors. *Lancet* 1915, II, 227-30.—If there is no sugar present in the urine and the acetoacetic acid is transitory, especially if the patient is young and symptoms of gastric catarrh are present, it may be that the site of manufacture of the acetoacetic acid is the intestinal canal, the process being a result of an irregular fermentation of sugar.

GEO. T. CALDWELL.

Experimental treatment of human beriberi with constituents of rice polishings. R. R. WILLIAMS AND N. M. SALEEBY. *Philippine J. Sci.* 10B, 99-118(1915).—W. and S. conclude that treatment with ext. of rice polishings is of distinct value. They show further that allantoin has a beneficial effect in some cases of beriberi, while the vitamine of rice polishings possesses the same property to a greater extent.

H. DUBIN.

Thymus gland in beriberi. R. R. WILLIAMS AND B. C. CROWELL. *Philippine J. Sci.* 10B, 121-5(1915).—There is no apparent connection between beriberi and atrophy of the thymus.

H. DUBIN.

Practical experience with some enriching media recommended for bacteriological diagnosis of Asiatic cholera. OTTO SCHÖHL. *Philippine J. Sci.* 10B, 127-44(1915).—S. suggests that combinations of peptone soln. and selective enriching medium be used, the former because it is more favorable for the rapid growth of the cholera vibrio and the latter because it inhibits the growth of the bacteria other than vibrios more thoroughly than the alkaline peptone soln.

H. DUBIN.

Experiments on the immunization of guinea pigs by the inoculation of avirulent tubercle bacilli in agar. M. A. BARBER. *Philippine J. Sci.* 10B, 145-6(1915).—Some of the animals were given avirulent human bacilli mixed with agar, some were given avian bacilli, and some received an emulsion of the avian strain without agar, as the immunizing dose. The time elapsing between the immunizing and the test doses varied, and in some cases two immunizing doses were given, quite a long interval elapsing between the two doses. In general, the average number of days of survival of the controls is higher than that of any series of treated animals. Two animals outlived the controls by 300 and 330 days, resp.

H. DUBIN.

Typhoid immunity. ALSTAEDT. Lubeck. *Berl. klin. Wochschr.* 52, 681-3(1915).—A series of people who either had typhoid or had received vaccine treatment were tested for intracutaneous reactions with dead typhoid bacilli. The results are used to show that immunity in typhoid is cellular as well as humoral.

J. H. L.

Complement-producing substance in cow milk. R. T. HEWLETT AND CECIL REVIS. Univ. London. *J. Hyg.* 15, 1-10(1915).—Heating to 55° for 30 min. destroys the complementary activity of milk. The complementary substance does not pass through porcelain filters. Removal of the Ca salts from milk with Na oxalate does not decrease its complementary activity. Vigorous shaking at room temp. with or without glass beads has little effect. Cow milk contains a stimulating substance for ox complement, since shaking ox complement with inactivated cow milk increases its activity. This stimulating substance is destroyed by boiling, and the greater part of it can be filtered off with the casein. Stimulation occurs only in the case of cow milk and ox complement. Cow milk inhibited the action of guinea-pig complement. Asses' complement was not stimulated by asses' milk, or human complement by human milk. These results seem to admit of little explanation.

JOHN T. MYERS.

The sterilization of vaccines and the influence of various methods employed on their antigenic properties. FRANK E. TAYLOR. Univ. London. *J. Hyg.* 15, 163-7(1915).—*Staph. pyogenes aureus* vaccine was used. The toxicity was judged by the negative phase of the opsonic index curve and the antigenic power by the height

and length of the positive phase. The toxicity was not increased or the antigenic power decreased by the action of heat, even boiling. The substitution of antiseptics for heat does not definitely decrease the toxicity or increase the immunizing power; the opsonic index does not reach as high a point and in the case of NaF the positive phase is shorter. Ultraviolet rays are uncertain in sterilizing power and do not decrease the toxicity or increase the immunizing power of vaccines. J. T. M.

Influence of autolytic products on tumor growth. G. L. RHODENBURG AND F. D. BULLOCK. *Columbia Univ. Med. Record* 88, 233-4(1915).—The expts. were restricted to chemical products. Of 33 different products of autolysis studied, only nucleinic acid (from animal cells) and phenylalanine showed any retarding influence on transplanted tumors in mice. On retesting these compds. on a larger series of inoculated mice the apparent retarding influence disappeared. A. H. RAHE.

Creatine as index of pregnancy intoxication. C. J. C. VAN HOOGENHUIJZE. *Nederlandsch Tijdschrift Geneeskunde* May 22, 1915; *J. Am. Med. Assoc.* 65, 208.—The findings in 15 cases show that in a normal pregnancy the creatine in the urine is always below 20% of the total creatinine. A creatine figure above 20% indicates the action of toxic influences and may warn of impending eclampsia or other serious difficulty. During the first month of pregnancy the proportion of creatine was 5.8%, the third month 18.9%, and the eighth month 15.1%. It is suggested that the finding of creatine in the urine might reinforce the diagnosis of pregnancy in doubtful cases, after the exclusion of other sources of creatine in the urine. L. W. RIGGS.

Intestinal obstruction. A proteose intoxication. G. H. WHIPPLE. *Univ. Cal. J. Am. Med. Assoc.* 65, 476-8(1915).—The poison under discussion may be obtained from the fluid above an intestinal obstruction, from a closed washed loop of small intestine, or from the mucosa of a closed loop or a loop draining externally through an enterostomy wound. The mucous membrane forms the poison and passes it into the blood stream. By destruction of the mucosa by NaF the formation of the poison ceases. Five vols. of 95% alc. completely ppt. this poison, whether the fluid is freshly removed from an intestinal loop rich in albumins, or has been digested to a clear broth. This ppt. is insol. in Et₂O but freely sol. in H₂O. The poison may be further purified by pptn. with an equal vol. of satd. (NH₄)₂SO₄, the ppt. collected in a centrifuge, dried and again dissolved in H₂O and boiled with a drop of AcOH to remove the last trace of albumin. Dialysis of this aqueous soln. against normal salt will remove most of the (NH₄)₂SO₄ but will not change the toxic action of the poison which does not dialyze. The purified soln. of the poison gives the biuret, ppts. with phosphotungstic acid or satn. with NaCl. Estimations from the dry wt. show that 0.1 g. given intravenously is fatal to a 15-pound dog. The process of chem. isolation gives a primary proteose and eliminates all other substances except NaCl and (NH₄)₂SO₄. The injection of this toxic proteose causes a marked rise in the incoagulable N of the blood from a normal of 30 mg. to 70 or 80 mg. shortly before death, the change taking place within 3 hrs. Dogs with intestinal obstruction may show incoagulable N as high as 200 mg. L. W. RIGGS.

Botulism, an experimental study. Preliminary report. E. C. DICKSON. *San Francisco. J. Am. Med. Assoc.* 65, 492-6(1915).—D. presents the following conclusions: The presence of animal protein is not essential, as hitherto supposed, for the development of the toxin of botulism. The toxin may be produced in a medium made from string beans or from peas. An acid reaction of as much as 3.2% to phenolph. does not prevent the formation of the toxin. The toxin produces some disturbance of the circulatory system which leads to hyperemia and hemorrhages in the meninges, and in the central nervous system, and to thrombosis in the arteries and veins of the meninges and of the central nervous system. The lesions in the nerve cells are not

due to a specific action of the toxin on the cell protoplasm, but they are secondary to disturbances of blood supply.

L. W. RIGGS.

Alkaptonuria. G. SODERBERGH. *Nord. Med. Arch.* 48, Nos. 3-4, 130 pp.(1915); *J. Am. Med. Assoc.* 65, 566.—19 plates, 18 other illustrations and 17 graphic tracings are given. The Wassermann reaction was strongly + in the principal case of alkaptonuric ositis, but became — under a month of Hg inunctions. It became + in 3 of 4 cases immediately after the patients had taken a 5 g. dose of tyrosine, the mother substance of homogentisic acid. Although the Wassermann was + there was nothing else in the signs or antecedents to indicate syphilis. The bone changes resemble those of Paget's disease in which the Wassermann reaction is also frequently + with nothing otherwise to suggest syphilis.

L. W. RIGGS.

Spontaneously precipitated albumin in urine. JACOB ROSENBLUM. *N. Y. Med. J.* 101, 23(1915).—R. cites a case where albumin of urine was spontaneously pptd. The filtrate showed no albumin although the residue contained 1.25 g.

M. R.

Active immunization to hay fever. SEYMOUR OPPENHEIMER AND MARK J. GOTTLIEB. *Biochem. Lab., Coll. of P. and S. and Lab. for Chem. Research.* *N. Y. Med. J.* 101, 229-32(1915); see *C. A.* 9, 1937.

M. RINGER.

Colloidal gold test on spinal fluid; in paresis and other mental diseases. CHAS. J. SWALM AND ABRAHAM L. MANN. Norristown, Pa. *N. Y. Med. J.* 101, 719-23 (1915).—The authors employed Carl Lange's colloidal gold test in 70 cases of paresis. They found 90% gave positive reactions although they doubt the specificity. The technic of the method is given.

M. RINGER.

Recent studies of pancreatic secretion. MAX EINHORN. *N. Y. Pst. Grad. Med. School. Med. Record* 87, 967-72(1915).—This paper contains a tabulation of data pertaining to duodenal contents in many pathologic cases.

M. RINGER.

H. PHARMACOLOGY.

ALFRED N. RICHARDS.

Physiological action and behavior of some derivatives of benzene compared to those of cyclohexane. EDUARDO FILIPPI. Florence. *Arch. farm. sper.* 18, 178-211 (1914).—The pharmacol. effects of toluene, *o*-, *m*-, and *p*-xylene, mesitylene, benzyl alc., cyclohexane, *o*-, *m*-, and *p*-methylcyclohexanol, methyl-, dimethyl- and trimethylcyclohexane, cyclohexanone, methyl-, dimethyl- and trimethylcyclohexanone are compared.

A. W. DOX.

The effect of certain drugs on the respiration and gaseous metabolism in normal human subjects. HAROLD F. HIGGINS AND JAMES H. WEAVER. Boston. *J. Pharmacol.* 7, 1-30(1915).—Therapeutic doses of the following drugs were used: Atropine produced no effect on the respiration or respiratory center, but produced bronchial dilatation with increased metabolism and a fall in pulse rate with a subsequent rise. Caffeine stimulated the respiratory center with increase in the respiratory rate and metabolism; there was no change in pulse rate and either bronchial dilatation or none. Camphor had no effect on the respiratory center, respiratory rate, pulse rate, slightly increased the metabolism and either dilated or had no effect on the bronchi. Strychnine produced no effect on the respiration, bronchi, pulse or metabolism. Morphine depressed or had no effect on the resp. center, constricted the bronchi and slightly increased the resp. rate, but decreased or had no effect on metabolism and the pulse rate. Heroin differed from morphine in that there were no effects on the resp. rate and metabolism. The sensitivity of the resp. center was followed by making frequent detns. of alveolar CO₂, testing by the Haldane method. Gaseous metabolism was obtained by the Tissot method or Benedict universal app.

P. J. HANZLIK.

Observations on the effect of intravenous injections of sodium phosphate. ISIDOR

GREENWALD. Roosevelt Hosp., N. Y. City. *J. Pharmacol.* 7, 57-61(1915).—The results reported by Starkenstein (*C. A.* 8, 3472) that the administration (*per os*, intravenous or subcutaneous) of ortho-, meta- and pyro-phosphates, also citrate, gives rise to convulsions are not confirmed for the intravenous injection of the phosphates by G.

P. J. HANZLIK.

Action of veratrum viride. WILLIAM CRAMER. Edinburgh. *J. Pharmacol.* 7, 63-82(1915).—A 15% ext. of the crude drug and a commercial prepn. were used. In small doses veratrum produces reflex slowing of the respiration, a fall of blood pressure due to vasodilatation, and a slowing of the pulse due to stimulation of the vagus center. The integrity of the vagus nerves is necessary for these effects. After stimulation of the vagus, paralysis occurs so that a 2nd or 3rd dose is ineffective. With large doses the drug in addition to the effects just mentioned paralyzes the cardio-inhibitory nerve endings of the vagus and has also a direct action on the medullary centers leading to vasoconstriction and to paralysis of respiration. The general result of a large dose is complex and irregular. It was not decided whether the action of veratrum viride is due to veratrine or protoveratrine. The drug is therapeutically valuable (recommended dose, 0.5 cc. of Brit. Pharm. tincture).

P. J. HANZLIK.

Action of drugs on the isolated gall-bladder. CHARLES C. LIEB AND JOHN E. MCWHORTER. New York. *J. Pharmacol.* 7, 83-98(1915).—Atropine and epinephrine relaxed, NO_2 and bile salts depressed, strophanthin and BaCl_2 constricted and morphine in therapeutic doses was ineffective on strips of surviving gall-bladder of the dog. Atropine and NO_2 would seem to be indicated in gall-stone colic.

P. J. HANZLIK.

The effects of chelidonin on smooth muscle. PAUL J. HANZLIK. Cleveland. *J. Pharmacol.* 7, 99-119(1915); see *C. A.* 9, 658.

P. J. H.

The comparative action of the stereoisomers of hydroxyhydrindamine. YASUO IKEDA. Cambridge. Eng. *J. Pharmacol.* 7, 121-4(1915).—The hydrochlorides of

the *l*- and *d*-hydroxyhydrindamine $\text{C}_8\text{H}_9\text{CH}_2\text{CH}(\text{CHOH})\text{CH}_2\text{NH}_2$ are white, cryst. salts,

sol. in H_2O , sparingly sol. in alc. and powerfully optically active. Both varieties depress smooth and cardiac muscle, cause vasodilatation, act as mild antiseptics, but are innocuous systemically in intact animals. The *d*-salt is more toxic than the *l*-salt, both being mild, general protoplasmic poisons.

P. J. HANZLIK.

The antitoxic action of rattlesnake serum on rattlesnake venom, with a note on the percentage of total solids of the serum and bile. WM. H. WELKER AND JOHN MARSHALL. Philadelphia. *J. Pharmacol.* 7, 125-8(1915); cf. *C. A.* 9, 1806.—Each of the blood sera of the 2 species of rattlesnakes (*Crotalus atrox* and *C. adamanteus*) has antitoxic action for the venom of other species.

P. J. HANZLIK.

The toxicity of certain hirudin preparations. E. K. MARSHALL, JR. Baltimore. *J. Pharmacol.* 7, 157-68(1915).—Prepns. of the commercial hirudin of Sachse & Co. proved to be very toxic for dogs, less so for rabbits. 20 to 25 mg. per kg. was fatal to dogs with symptoms of severe diarrhea and continuous vomiting. Smaller doses (1.3 mg. per kg.) gave definite symptoms of depression, vomiting and diarrhea. Autopsy showed a marked congestion of intestinal tract with hemorrhagic patches in the lungs and pericardium and occasionally the spleen. The toxic effects were shown to be due not to the hirudin of the prepn., but to some other substance, such as sepsin possibly. Leech ext. obtained by extn. with H_2O and coagulation of protein at 82 to 85° is non-toxic in quantities used to render circulating blood non-coagulable.

P. J. HANZLIK.

Action of calcium salts. CHAS. O. JONES. Liverpool. Biochem. Lab. *Brit.*

Med. J. 1915, I, 462-3.—A study of the excretory powers of animals for Ca salts and the protection of the body against excess. Rabbits were used and CaCl_2 in 10% soln. was administered intravenously. When injected into the blood in small quantities it is excreted by the kidneys as phosphates, carbonates and oxalates. In larger quantities the bowels also take part in excretion and eliminate Ca as inorganic salts. In greater quantities the kidneys are thrown out of action and the intestines alone effect the excretion, until a toleration point is again reached, when the kidneys resume their action. In still greater quantities Ca is excreted by the intestines as Ca-soap. In excessive amount, intravascular clotting and death ensue. The toleration point can be raised by injecting increasing doses of CaCl_2 provided time is given for the animal to complete excretion of one injection before the next is made. M. RINGER.

Composition and pharmacological action of Spiritus aetheris nitrosi. C. R. MARSHALL AND ELIZABETH GILCHRIST. *Brit. Med. J.* 1915, II, 125-8.—Sweet spirits of niter contained not only EtNO_2 and aldehyde but also EtNO and paraldehyde. Nitrite was estd. by the official (Brit. Pharm.) method with KI and dil. H_2SO_4 using a nitrometer charged with Hg instead of with brine. The aldehyde was detd. colorimetrically with Schiff's reagent. Paraldehyde was converted into aldehyde by distn. with dil. acid and estd. by difference. Evidence of the presence of EtNO_2 was obtained in some instances, but the authors were unable to devise a method for its detn. in the presence of EtOH , EtNO_2 and aldehyde. An approximation was obtained by detg. the total N by Dumas' method and estg. the nitrate by difference. It is not probable that any of the activity of sweet spirits of niter can be due to the paraldehyde. The EtOH accounts for the carminative action of the prepn. but does not explain the whole effect, particularly the vasodilating action. Acidity is of no effect, and in consequence the activity of sweet spirits of niter must be due to EtNO_2 , EtNO , or to acetaldehyde, the only other ingredient. Pharmacological expts. showed that the activity of the prepn. was due to EtNO_2 . Diln. with water causes an evolution of nitrite and this loss occurs in some degree even in a filled stoppered bottle in the dark. A. H. R.

Biochemical properties of chrysarobin. J. F. SCHAMBERG, G. W. RAIZISS AND J. A. KOLMER. Philadelphia. *J. Cutaneous Dis.* 33, 98-116(1915).—Chrysarobin has 3 primary properties: (1) resistance to oxidation on exposure to air, (2) strong reducing action, (3) chem. affinity and firm union with the proteins of the skin. The possibility is suggested that the favorable influence of chrysarobin on psoriatic lesions is due to a chem. union and abstraction of O, resulting in a restraining influence upon the proliferative power of epithelial cells. M. RINGER.

Study of the germicidal activity of chrysarobin and certain other medicaments used in psoriasis. JAY F. SCHAMBERG, JOHN A. KOLMER AND G. W. RAIZISS. Phila. Polyclinic and Coll. for Graduates in Med. *J. Cutaneous Dis.* 33, 1-15(1915).—Having failed to secure direct evidence of the parasitism of psoriasis, the authors sought to det. whether the known remedies produce their beneficial results through germicidal effect on the skin or through some biochem. action. Chrysarobin, pyrogallie acid locally and As internally, do not exert their curative effects through germicidal action upon cocci of psoriatic patches, *Staphylococcus epidermis albus* being taken as an example. This is supported by indifferent effects of strong germicidal substances, e. g., phenol, formalin, calomel, on psoriatic lesions. Cf. C. A. 9, 936. M. R.

The elimination of soluble radium salts taken intravenously and per os. HARVEY A. SEIL, CH. H. VIOL AND M. A. GORDON. Pittsburgh. *N. Y. Med. J.* 101, 896-7 (1915).—The authors intravenously injected 0.1 mg. Ra in a man. The main part was eliminated through the feces. It was rapid during the first 3 or 4 days, slower for the next 6 or 7, then very slow for months. When Ra was taken by mouth it was eliminated twice as fast. M. RINGER.

Excretion of mercury by the gastric mucous membrane. C. C. LIEB AND G. M. GOODWIN. New York. *J. Am. Med. Assoc.* 64, 2041(1915).—Expts. with rabbits and cats, in which the esophagus was ligated to prevent the saliva from reaching the stomach, and the animals given 20 mg. HgCl_2 subcutaneously, showed the presence of Hg in the mucous membrane of the stomach after periods varying from 4 to 8 hrs. In one series of expts. the duodenum as well as the esophagus was tied off and Hg found after 4 hrs. The method employed in testing for the Hg was that of Vogel and Lee. Cf. C. A. 8, 1596.

L. W. RIGGS.

Isolation in the crystalline form of the compound containing iodine, which occurs in the thyroid. E. C. KENDALL. Rochester. Minn. *J. Am. Med. Assoc.* 64, 2042-3 (1915).—By an alk.-alc. hydrolysis the thyroid proteins are broken into many simpler constituents (cf. C. A. 9, 1625). These may be sepd. into 2 groups: (A) those insol. in acids; (B) those sol. in acids. From A a pure cryst. compd., containing 60% of I has been isolated. It appears to be diiododihydroxyindole. Group B contains I in some unknown form of combination. It is a mixt. containing amino-acid complexes and has a low mol. wt. Administration of A produces in the dog and in the human being a rapid increase in pulse rate and vigor, and increase in metabolism and nervous irritation. This physiologic activity is produced by the compd. containing I in all stages of purity up to and including its cryst. form. Given in excess, toxic symptoms are produced. The amt. of the I compd. required to produce toxic effects is exceedingly small. The I compd. plays an important role in the production of the symptoms of exophthalmic goiter. The constituents of group B, although containing I, produce no toxic symptoms, but in cases of cretinism, myxedema and certain skin conditions, they exert physiologic activity.

L. W. RIGGS.

Action of ether on the ductless gland system. G. MARCHETTI. *Riforma medica* 31, No. 24(1915); *J. Am. Med. Assoc.* 65, 370.—The administration of ether to cats by inhalation was followed immediately or after 2 hrs. by an increase of 40 to 50% in the epinephrine content of the suprarenal, which returned to normal after 24 hrs. There was also a less pronounced increase of epinephrine after the administration of ether by injection.

L. W. RIGGS.

Salicylic compounds and salicin (SHARP) 17. Phenazone, phenacetin and acetanilide (SHARP) 17.

12. FOODS.

W. D. BIGELOW.

The detection and determination of benzoic acid in animal foods. K. BAUMANN AND J. GROSSFELD. *Z. Nahr.-Genussm.* 29, 397-409, 465-72(1915).—A comparison of a number of qual. tests for benzoic acid showed the $(\text{C}_6\text{H}_5\text{CO}_2)_2\text{Fe}$ repptn. to be exceedingly delicate provided the soln. to be tested as well as the reagent is neutral, that an excess of reagent is avoided, and that other organic or inorganic salts, particularly CH_3COONa , are not present in large amts. These conditions can be attained by carefully adding weak NaOH to a soln. of the acid containing a trace of phenolphthalein until a slight pink color appears, the color being then discharged with a minute amt. of 5% CH_3COOH . Use neutral Fe alum soln. as a reagent. The Mohler test modified by v. d. Heide and Jacob was found to be sensitive to 0.1 mg. benzoic acid, while that of Jonescu failed to detect less than several mg. The Cu salt is also recommended for the detection of benzoic acid, giving a bright blue ppt. in neutral soln. Neutral CuSO_4 soln. is used for this purpose, the ppt. not being readily sol. in excess of the reagent. Milk (quant. detn.): treat 100 cc., which must not contain more

than 0.5 g. benzoic acid, with K_2CO_3 until a permanent red color is obtained in the presence of phenolphthalein, dil. to 200 cc., add 20 cc. of 20% $CaCl_2$ soln., heat on a steam bath for 15 min., cool, and filter through a dry filter. Measure 175 cc. of the filtrate into a 200 cc. flask, add a few drops of satd. $CuSO_4$ soln., and shake; then add 10 cc. of Na phosphotungstate soln. (20 g. $Na_2WO_4 \cdot 2H_2O$, 12 g. $Na_2HPO_4 \cdot 12H_2O$, one l. water), make up to vol. with 1:3 H_2SO_4 , and allow to stand overnight. Filter through dry paper, ext. 100 cc. of the filtrate with CCl_4 for 6 hrs., dil. the CCl_4 ext. with an equal vol. of neutral alc., and titrate with 0.1 *N* NaOH, using phenolph. as indicator. Fats (quant. detn.): warm 50 g. in a beaker until the fat is liquid, add 150 cc. of C_6H_6 , transfer the liquid to a separatory funnel, rinsing the beaker with ether, and shake the contents of the sep. funnel once with strong, warm K_2CO_3 soln. containing a little phenolph. If the red color is discharged, add more K_2CO_3 and shake again. Run the aq. layer from the sep. funnel into the beaker and wash the C_6H_6 -fat mixt. with several portions of warm water, adding these to the K_2CO_3 mixt. in the beaker. Then treat the contents of the beaker with 20 cc. of 20% $CaCl_2$ soln., add a few pieces of pumice and heat over a small flame until the odor of C_6H_6 disappears, transfer to a 200 cc. flask, add a soln. containing a few cg. of gelatin, cool, and make up to mark with water. Filter through a dry paper, transfer 175 cc. of the filtrate to a 200 cc. flask, add 10 cc. of the Na phosphotungstate soln. described above, and make up to vol. with 1:3 H_2SO_4 . After standing for several hrs. filter and det. benzoic acid in 100 cc. of the filtrate as given above. Meat products (quant. detn.): heat 100 g. of the meat in a beaker with 100 cc. of 5% NaOH until dissolved, transfer the hot mixt. to a separatory funnel, allow the fat to sep., and run the aq. layer into a 700 cc. flask. Rinse the beaker with a little water and add this together with about 50 cc. of C_6H_6 to the fat in the sep. funnel. Shake gently, allow to sep., and add the aq. layer to the contents of the flask. Wash the C_6H_6 -fat layer with a small amt. of water, adding this to the first aq. sepn. Render the combined aq. exts. slightly acid with H_2SO_4 , cool, underlie with an equal vol. of concd. H_2SO_4 , subject to steam distn., heating the mixt. to maintain const. vol., and collect 500 cc. of distillate. Add KOH to the distillate until it is slightly alk. to phenolphthalein, warm to dissolve the fatty acids, and then add dil. H_2SO_4 until the red color disappears but not enough to redden blue litmus paper. Evap. to 50 cc. in a porcelain dish, add 2 cc. of 20% $CaCl_2$ soln.; filter through a small paper, and wash the ppt. with a little hot water. Acidify the filtrate with H_2SO_4 and ext. the benzoic acid with CCl_4 by perforation, proceeding from this point as in the case of milk given above. Meat products (qual. test): dissolve 50 g. of meat in 100 cc. of hot 5% NaOH, treat with 40 cc. of 20% $CaCl_2$ soln., cool, filter, and reflux the filtrate with 25 cc. of concd. H_2SO_4 . Cool, filter, shake the filtrate with ether, and wash the ether layer with a little water. Fairly pure benzoic acid will be obtained upon evapn. of the ether. By these procedures excellent results can be obtained except in the case of substances, like cheese, containing large amts. of water-sol. fatty acids. A number of test analyses showing excellent results are given.

A. F. SEEKER.

Increase in the fat-free dry substance of milk from which the fat has been wholly or partially removed. GIACOMO TELLERA. *Boll. chim. farm.* 53, 358-65(1914).—T. has further analyzed the data obtained by Formenti regarding the fat-free dry substance of pure and watered milk from which the fat has been wholly or partially removed; he finds that the fat-free dry substance may be calcd. from the relation $r/(100 - g) = r'/100$ in which r is the original fat-free dry substance, g is the amt. of fat removed and r' is the fat-free dry substance of the milk after removal of fat. Assuming that 0.25 represents the max. error of technic (due to errors of observation, slight mechanical losses, slight increases in wt. due to oxidation, etc.) it is found that

only 22 of 206 samples of milk investigated by Formenti show an abnormal content of fat-free dry substance (i. e., where the abs. difference between the calcd. and observed values exceeds 0.25); 21 of these 22 samples were commercial and 8 of this no. were normal and showed abs. differences of 0.27-0.42 between the calcd. and observed values, while the other 13 samples were watered and showed differences of 0.27-0.42 with the exception of 2 of this no. for which the differences were 0.59 and 0.81, resp. (the remaining one of the 22 exceptions was an abnormal, non-commercial sample of pure milk, for which the contents of fat-free dry substance and fat were 8.62% and 3.40%, resp.). In each of the 22 exceptions noted above the observed value was greater than the calcd. value of fat-free dry substance.

H. S. PAINE.

Experimental data comparing the delicacy of different tests for hydrogen peroxide in milk. I. T. DARLINGTON. *J. Ind. Eng. Chem.* 7, 676(1915).—Comparative tests with the following reagents: starch, *p*-phenylenediamine, benzidine, titanous acid, vanadic acid. The tests were made on milk immediately after the addition of H_2O_2 and also 18 hrs. later. *p*-Phenylenediamine and benzidine gave the most delicate tests, the limits being 0.00075 g. H_2O_2 per 100 cc. milk. Practically all H_2O_2 is reduced after standing 18 hrs. except when the H_2O_2 content is 9 and 15%. I. M.

The analysis of frozen milks. L. PADE. *Ann. fals.* 8, 170-2(1915).—Cans of milk were frozen solid and then gradually melted, the melted portions being removed from time to time. Analyses of these portions showed a great variation in their compn. That melting first was the richest in solids, fat, ash, etc.

H. S. BAILEY.

Estimation of milk fat by the Kumagawa-Suto method. G. PALAZZOLO. *Industria lattiera e zootechnica* 12, 92(1914); through *Ann. chim. applicata* 3, 378-9(1915).—Expts. showed that the Kumagawa-Suto method gives slightly higher results than the Gottlieb-Röse method. The former is more exact, but the latter is more rapid and easier.

S. LEVY.

Farinaceous milks. GOBERT. *Ann. fals.* 8, 165-70(1915).—The Swiss Codex defines "Farinaceous Milks" (Malted Milk?) as preps. composed of a mixt. of dried milk and cereal or legume flour, the starch being so treated as to render it as sol. as possible. There should be at least 4% of fat present. The various methods of rendering the starch sol. and the properties which these preps. should possess are discussed. A detn. of the % of H_2O , fat, total sol. solids, reducing sugars, sucrose, casein, insol. solids, ash, N, and starch, together with the butyrefractometer reading and microscopic exam., should be made. From the results the % of milk, hydrolyzed and unhydrolyzed starch can be calcd. Figures for 5 samples of wheat flour and 4 of so-called "farinaceous milks," only one of which contained any appreciable quantity of milk fat, are given.

H. S. BAILEY.

Modifications of milk secretion of cows having a very prolonged period of lactation. E. GOLDOMI. *Industria lattiera e zootechnica* 13, 70(1915); through *Ann. chim. applicata* 3, 379(1915).—The milk of cows whose period of lactation was prolonged for about 1½ yrs., was less in quantity than ordinarily, but richer in solid substances. S. L.

Pasteurization of cream for butter-making. Iowa Expt. Sta., *Bull.* 156, 40 pp. (1914). **Part I. Effect on quality and chemical composition.** M. MORTENSEN, W. G. GAESSLER and W. H. COOPER. Pp. 1-26. **Part II. Bacteriological studies.** B. W. HAMMER. Pp. 27-40.—The following summary is given for Part I: "Pasteurization of either sweet or sour cream improves the flavor of the resulting butter. Vat pasteurization seems to be the most efficient method of sour cream pasteurization for improvement of flavor. The % of butter fat lost in the buttermilk when churning raw cream is slightly greater than with cream pasteurized while sweet. Reversed results were obtained when sour cream was pasteurized. The % of butter fat lost in

the buttermilk when churning cream pasteurized while sour by the holding method is greater than when churning cream pasteurized while sour by the flash method. The body of the resulting butter is slightly injured by pasteurizing sweet cream by the holding method. Butter manufd. from raw cream has higher moisture content than butter manufd. from cream pasteurized by the flash method. Prolonged heating of sour cream produced a higher moisture content in the resulting butter. The % protein content of the resulting butter is not influenced by the pasteurization of sweet cream, but is decreased by pasteurization of sour cream. Part II deals with comparative studies on pasteurization. The method of vat pasteurization, flash method and double pasteurization were considered. The flash and double methods were equally efficient.

B. E. B.

The influence of sugar beet feeding upon the composition of butter fat. J. BOES AND H. WEYLAND. *Z. Nahr.-Genussm.* 29, 473-5(1915).—A sample of butter obtained from a herd fed exclusively upon sugar beets showed the following analysis: water 14.79%, ash 0.062%, casein + lactose 1.28%, and acidity 3.87%. The butter fat gave: m. p. 33°, solidifying p. 23°, refract. read. (25°) 51, acidity 3.61, R.-M. no. 28.16, Polenske no. 6.16, sapon. no. 234.2, and I no. 24.22. A comparison of these with previously published figures is given.

A. F. SEEKER.

Apparent effect of acetic acid upon the constants of butter fat. C. BAHLMAN. *J. Ind. Eng. Chem.* 7, 680-1(1915).—A study of the cause of low results in the detn. of fat content of ice cream by the method of Lichtenburg (*C. A.* 7, 3624). It was found that fats sepd. in the presence of acetic acid retain this acid mechanically; the latter should be removed by drying at 90-95° for 1 hr. before the detn. of the fat constants.

ISADOR MILLER.

Determination of peanut oil in olive oil. R. LUND. *Tidskrift Kem. Farm. Terapi.* 12, 157-60(1915).—The acids from pure peanut oil crystallize out of the alc. soln. used in the Franz-Adler method (cf. *C. A.* 6, 2656; 7, 846) at 40-41°. For each successive tenth part of olive oil added to peanut oil the temp. of clouding in the alc. soln. becomes 39.3, 38, 36.6, 35.5, 33.8, 31.5, 29.2, 25.7, 19.8°. If no clouding takes place until after the temp. has dropped to 16° or less the peanut oil in the sample examd. is under 5%.

A. R. ROSE.

Tables for calculations in analysis of sugared solutions. N. VACCARONI. *Ann. Lab. chim. cent. delle Gabelle* 7, 253(1914); through *Ann. chim. applicata* 3, 374(1915).—Applicable especially to com. glucoses, condensed milks, and candies.

S. LEVY.

Baking without grain flour. WA. OSTWALD AND A. RIEDEL. *Chem. Ztg.* 39, 537-8(1915).—Results of expts. with potato and tapioca flours singly and mixed in equal proportions, to which was added potato flour paste, with baking powder or milk and yeast and a little sugar and salt, and, in 1 case, eggs. Potato flour and paste with milk and yeast gave the best results. Cf. Fornet, *C. A.* 9, 2406.

J. H. MOORE.

Shorts or middlings. A. MCGILL. Inland Revenue Dept., Ottawa, Canada, *Bull.* 311, 23 pp.(1915).—Analyses of 189 samples of cattle feed collected in Canada.

E. H.

Detection of rice husks in fodder-meal. E. COEN. *Ann. lab. chim. cent. delle Gabelle* 7, 105(1914); through *Ann. chim. applicata* 3, 372(1915).—The products of the grinding of wheat give an ash almost completely sol. in HCl, while the ash of rice husks is almost completely insol. Hence the detn. of the total ash and the part insol. in HCl gives a sure means of detecting rice husks in fodder or bran of wheat. Microscopic exam. will show the siliceous skeletons of the rice husks.

S. LEVY.

White pepper. A. MCGILL. Inland Rev. Dept., Ottawa, Canada, *Bull.* 314, 39 pp.(1915).—A report of results of the exam. of 387 samples collected throughout

Canada. Only 4.1% of the samples examd. were adulterated. Starch and flour were the chief adulterants found. E. J. C.

The official method for determining crude fiber as applied to cottonseed meal. C. K. FRANCIS. *J. Ind. Eng. Chem.* 7, 676-80(1915).—Slight modifications in procedure are suggested. A thorough investigation of filtering media has been carried out. Filter paper is the medium preferred as it is shown that there may be a loss of crude fiber when linen is used and that the results are apt to be too high with asbestos because the asbestos loses weight. ISADOR MILLER.

The use of "steriline." BORDAS. *Ann. fals.* 8, 182-8(1915).—"Steriline," a prepn. of NaOCl, is not approved by the Superior Counsel of Hygiene of France for use in preserving food. H. S. BAILEY.

Investigation of the Bömer method for detecting tallow in lard. J. PRESCHER. *Z. Nahr.-Genussm.* 29, 433-7(1915).—Fifty-eight fats of known character were examd. by both the Bömer (*C. A.* 8, 1174) and the Polenske (*C. A.* 2, 716) methods in order to ascertain their relative efficiency in detecting foreign fats in lard. In the case of 25 samples of adulterated lard only 3, containing, resp., 10, 20 and 30% of beef tallow, could be detected by the Polenske method, the others, some containing as much as 15% of beef tallow, giving negative tests. The Bömer method failed in only 2 cases, in which 5 and 10%, resp., of beef tallow were present. Eighteen samples of pure lard gave negative tests by the Bömer method, the Polenske procedure giving false indications of adulterations in 2 case. Hydrogenated vegetable oils give a positive Bömer test and can be distinguished from beef tallow by the phytosteryl acetate test. The Bömer method is to be preferred for simplicity and accuracy. A. F. SEEKER.

Use of aluminium in the food industries (TRILLAT) 16. Fermentation of table sirups (OWEN) 28.

U. S., 1,149,627, Aug. 10. S. H. BUNNELL. Desiccating milk, or other solns. The material is placed in a closed chamber and vapors are drawn off from the chamber to conc. and cool the material and the conc. product thus formed is then desiccated by heating in bulk and flowing over heated rolls.

U. S., 1,149,914, Aug. 10. F. W. HAUSERMANN. Stable food product from potatoes; prepared by boiling and mixing with an equal amt. of boiled rice, flavoring with spices, kneading and forming into strips with heated rollers.

U. S., 1,150,269, Aug. 17. S. M. HEULINGS. Pasteurizing milk by heating to 60-65° and holding at this temp. for some time, then heating for a shorter time to 70-80° and rapidly cooling.

U. S., 1,150,303, Aug. 17. E. M. POTTER. Chicory root is prepared for use in beverages by boiling with H₂O, rinsing after removing the ext., and drying and roasting. This treatment removes the bitter principle.

U. S., 1,150,607, Aug. 17. L. KLEINBREDD. Carob is treated with steam under pressure to remove butyric acid and 85 parts of the carob are then mixed with chestnuts 5, potato flour 5, saloop 2, fats 2, gum arabic 0.5 and vanilla or other flavoring 0.5 part.

U. S., 1,150,733, Aug. 17. H. BARNHARD. A powder for preparing beverages is formed by drying and roasting thin slices of the root of *Daucus carota*, until they become dark and brittle, and pulverizing. The drying requires about 20 min. at 38° and the roasting about 10 min. at 74°.

Brit., 8,865, Apr. 8, 1914. J. W. BAILEY. A porridge-like pudding is made

by boiling a mixt. of cracked wheat, raisins, arachis nut oil, milk, sugar, and salt, with water.

Brit., 9,024, Apr. 9, 1914. J. MILBURN. Preserving foodstuffs, beverages, etc., by the addition of a mixt. of salicylic acid, Na sulfocarbolate, sulfurous acid, or a sulfite, and benzoic or boric acid or a borate.

Brit., 9,491, Apr. 16, 1914. J. LEROUX. Coffee berries are formed into tablets, which readily break up in H_2O , by subjecting them, in molds, to the action of shocks which continue as pressure without recoil, *e. g.*, the action of a fly press. The berries are subjected to successive compressions in different directions.

14. WATER, SEWAGE AND SANITATION.

EDWARD BARTOW.

Culture media employed for the bacteriological examination of water. I. The Schardinger-Dunham medium for testing for the presence of hydrogen sulfide-forming bacteria. E. M. CHAMOT AND H. W. REDFIELD. *J. Am. Chem. Soc.* 37, 1606-30 (1915); cf. *C. A.* 8, 2913.—To study the S.-D. medium (*J. Am. Chem. Soc.* 19, 591 (1897)), in which 3 factors may influence the growth of the bacteria (conc. of the peptone, conc. of the inorg. salt, reaction of the medium), Gibbs' triangular diagram was used. Filtered solns. of Kahlbaum's "Witte peptone" were used, the reaction of the medium being adjusted at 20°. An artificial sewage (0.02 g. fresh human feces shaken thoroughly in 1 l. H_2O and filtered through sterile cloth) was generally employed. From the numerous expts., reported in tables and a diagram, C. and R. conclude that: Regardless of the inorg. salts present and the acidity of the medium, concn. of 3-4% peptone in the final inoculated and incubated medium appears best for the most rapid and energetic production of H_2S ; the addition of beef broth increases the sensitiveness of the medium but not in proportion to the increased trouble and labor involved; if NaCl is added, not more than 1.5% must be used (more H_2S is obtained when NaCl is present); in 3% peptone media, 0.5-1.0% KCl is decidedly beneficial, giving quicker, better and far more uniform results than any other inorg. salt studied; positive results may be obtained in 18 hrs.; truly "clean" natural waters produce no H_2S in 72 hrs. while contaminated waters give much H_2S in 12-24 hrs.; feces of domestic animals contain bacteria capable of producing as much H_2S in a simple peptone medium as human feces; the large amts. of H_2S rapidly produced by sewage organisms appear not to be due primarily to members of the *B. coli* group; this group of H_2S -producing bacteria does not actively ferment carbohydrates, hence testing for their presence is of special value in polluted waters free of the *B. coli* group; H_2S is apparently more rapidly produced in waters containing mixed bacterial flora than by the isolated pure cultures alone. II. Lactose-peptone media. E. M. CHAMOT AND C. M. SHERWOOD. *Ibid* 1949-59.—The triangular diagram was used for the system of 4 components, concn. of nitrogenous material, of inorg. salts, of acid, and of carbohydrate; only one can be kept const. while the others are varied. The investigation was confined to bacteria of the *B. coli* group. Preliminary detns. showed that under the conditions obtaining in the prepn. and sterilization of the media the acidity was so low that no detectable inversion of the lactose occurred. In media prepd. from lactose, inorg. salt and Witte peptone alone, with the reaction unadjusted (*i. e.*, with a final acidity of 1-1.2% *N* HCl, due to the peptone), there was no perceptible change in acidity on sterilizing, but with meat and liver broths marked changes occurred on sterilization and subsequent standing. Tap H_2O gave more sensitive media than distd. H_2O . C. and S. studied the effect of variations in initial acidity, of lactose concn., of the presence of inorg. salts, of peptone concn. on the gas vol., of the size

of the fermentation tubes on the gas vol. and the comp. of the gas formed. They find that in H_2O contaminated with sewage, human and domestic animal feces and pure strains of the *B. coli* group the vol. of gas formed by lactose fermentation increases to a final max. with the concn. of the peptone, liver or meat ext.; the comp. of this gas depends on the concn. of the nitrogenous substance used (the analytical results will be published later); the addition of 0.5-1.0% KCl (and, to a less marked degree, of NaCl) appears to stimulate fermentation and assure more uniform results; nothing is gained by using the lactose in greater concn. than 1%; neutral media seem to yield slightly larger gas vols. than media slightly acid to phenolph., but media having a reaction of approx. 1% *N* HCl ferment considerably more rapidly and yield diagnostic results in several hrs. less time; the gas ratios of organisms of the *B. coli* group depend upon the concn. of the peptone or similar nitrogenous material; addition of meat infusion improves media of low peptone concn. but gives media whose reactions rapidly change; a very sensitive medium yielding uniform results and large gas vols. and changing but little on keeping consists of 3-4% peptone, 0.8% lactose, 0.6% KCl, with an acidity of 1% *N* HCl. III. Composition of the gases formed in lactose-peptone fermentation tubes. E. M. CHAMOT, C. M. SHERWOOD AND R. C. LOWARY. *Ibid* 2198-204.—Huge fermentation tubes, with a gas collecting tube of about 300 cc. capacity and a reservoir of about 600 cc. corresponding to the bulb of a standard fermentation tube, were used. In the gases formed, neither heavy hydrocarbons nor CO were detected in 100 cc. gas at any time. The vol. of gas increases rapidly with increasing concn. of peptone, meat or liver in lactose media up to 4% peptone but above 5% the increase is but slight. Below are the % of CO_2 and H, resp., in the gases obtained with media containing 1, 2, 3, 4, 5, 6, 8, 9 and 10% peptone: 26.9, 70.2; 34.2, 63.2; 37.7, 62.3; 38.0, 58.3; 39.0, 59.0; 39.5, 60.5; 39.8, 60.2; 39, 61.0; 40, 60. In the 1, 2, 4 and 5% peptone media were also obtained 2.9, 2.6, 2.7 and 2.0% not absorbed and considered as N. The variations in comp. in different runs with media prepd. at different times and inoculated with different sewage samples were smaller than anticipated. Dextrose media give gases of substantially the same comp. In only 3 cases was any evidence obtained of the presence of O, nor was any measurable vol. of CO_2 obtained after combustion, showing that only minute traces of CH_4 could have been formed, if any. The analyses were made, however, as soon as the max. fermentation was reached, *i. e.*, as soon as the gases ceased to increase in vol. (usually 20-6 hrs.). Since the passage from the closed tube to the bulb was relatively small (5 mm. in diam.), the growth in the fermentation tube may be properly considered as anaerobic. When varying vols. of pure sterile O (15-50 cc.) were introduced into the closed arm and the tubes, after inoculation with sewage, were incubated at 38° for 24-6 hrs. small amts. of CH_4 (0.2-0.4%) were obtained. The total vol. of gas formed, including the O, remained practically const., *i. e.*, the amt. of gas formed is proportional to the vol. of liquid in the closed arm. In the above expts. with 15, 42 and 50 cc. O, 4.23, 24.8 and 25.7 cc. O were recovered, while the % of CO_2 and H, corrected for the excess of O, were 42.3, 55.9; 42.4, 54.2; 41.3, 54.1, resp. (peptone, 3.5-4.0%), *i. e.*, a relatively enormous consumption of O by the bacteria does not materially affect the comp. of the gases formed, although excess of O seems to be followed by an increase in CO_2 and decrease in H; it does not increase the final acidity. The above results indicate that the "gas ratio" of a mixed sewage flora or of fecal bacteria will probably vary from $CO_2:H = 1:3$ with low to 1:1.15 with high peptone concns. Standard lactose media with 500 g. meat per l. and 1% peptone behave like media containing 1.5-2.0% peptone. With high peptone concns. to which meat had also been added, usually about 2% more CO_2 (and correspondingly less H) was obtained as compared with media containing no meat. "Enriching agents" (bile, bile salt, phenol) appear to affect neither the total vol. nor the comp. of the gases formed. Pure cultures of *B. coli* give results similar to those obtained with mixed sewage flora.

Determination of sulfates in water by benzidine hydrochloride. F. W. BRUCK-MILLER. *J. Ind. Eng. Chem.* 7, 600-2(1915); see C. A. 9, 1209. ISADOR MILLER.

The borderline in detecting a taste of potash liquors in drinking water. W. MARZAHN. *Mitt. kgl. Landesans. Wasserhygiene* 20, 37-57(1915).— $MgCl_2$ can be tasted in water when present in quantities of 168 mg. per l. The temp. of the water is of great importance in detecting the admixt. of foreign salts. Younger people perceive the taste more quickly than elderly people. Smokers are poor subjects for detecting a taste. •

ARTHUR LEDERER.

Prevention of corrosion and scale formation in steam boilers. G. C. JONES. *Chem. Trade J.* 57, 77-8, 101-2(1915); *J. Inst. Brewing* 21, 422-35(1915).—The detn. of H^+ and OH^- concn. by the Sørensen method of titrating is described and the Walker and Kay method of expressing the acidity or alkalinity is advocated. The practical methods of treating H_2O for boiler purposes are outlined and the relative value of such methods is discussed critically.

W. T. HALL.

Severe boiler corrosions. A. HEINZELMAN. *Der Klein u. Mittelbrauer* 1914, [2] 238; *Chem. Tech. Rept.* 38, 376(1914).—A feed water containing 30 p. p. m. of silicates, an equal amt. of nitrates and a moderate amt. of Cl and reacting alk., was uncorrosive when used in boilers operated at pressures of 4 atms. In boilers operated at 10-12 atms. it caused severe corrosion and samples tested acid. Hydrolysis at the higher pressure liberated silicic acid from Fe silicates; this in turn liberated HCl and HNO_3 . The trouble was remedied by the addition of Na_2CO_3 . H. notes that a method used in powder mills for estg. HNO_3 in nitrates depends upon heating the sample with a weighed amt. of H_2SiO_3 .

H. L. OLIN.

Boiler preservatives. W. KOHEN. *Chem. Ztg.* 39, 121-2(1915).—K. reports the following analyses of 3 preps. with same trade name purchased from 3 different firms, each sample being different from that furnished previously under same name:

	A.	B.	C.
Total ash.....	15.09%	3.88%	12.97%
C_6H_6 insol. solid matter.....	62.66	4.25	25.24
Ash in solid matter.....	21.25	0.35	9.69
SiO_2	2.67	..	2.08
Al_2O_3	7.12	..	...
Fe_2O_3	...	..	1.4

The insol. matter in A contained metallic Al. On distn. A yielded between 70° and 130° about 6%; B from 60° to 100°, 9%; 100-150°, 12%; C from 75 to 100°, 6.6%; 100-150°, 4%; 150-200°, 8.6%. The material is used as a coating to protect boilers against corrosion and scale formation. K. warns against the use of any prepn. of unknown comp.

F. W. SMITHER.

Kinks in the control of hypochlorite at Denver. W. W. DEBERARD. *Eng. Record* 71, 393-4(1915).—Hydraulic mixers of the type used (*Am. W. W. Assoc.* 2, 442-5 (1915) in cyanide plants are employed to dissolve and mix bleach. Other novel details include the graduation of the scales on the soln. tanks in lbs. of soln. and the control of the flow from the const. head box by special long-lever controlled plug cocks.

F. BACHMANN.

Treatment of water for locomotive use. W. A. POWNALL. *J. Am. W. W. Assoc.* 2, 434-41(1915).—A general discussion.

H. P. CORSON.

Variations in practice disclosed by water sterilization statistics. FRANCIS F. LONGLEY. *Eng. Record* 71, 291-2(1915).

FRANK BACHMANN.

Automatic device for controlling hypochlorite application. E. E. LUDWICK. *Eng. Record* 72, 103-4(1915).—A detailed description..

FRANK BACHMANN.

Artesian waters in Chicago and vicinity. C. B. ANDERSON AND F. W. DEWOLF. *J. Am. W. W. Assoc.* 2, 318-23(1915); cf. *C. A.* 8, 2913.—Deep rock wells in the Chicago area furnish much water at low cost to many industries. Wells penetrating the Potsdam sandstone 1400 ft. deep often yield 300 and more gal. per min. W. F. L.

The water supply of Long View, Texas. P. E. GREEN. *J. Am. W. W. Assoc.* 2, 416-21(1915).—A 1,000,000 gal. mechanical filtration plant treats water from the Sabine River. H. P. CORSON.

The possibility of an improved water from deep wells in northern Ill. C. B. WILLIAMS. *J. Am. W. W. Assoc.* 2, 401-3(1915); *Munic. Eng.* 48, 306-7(1915); cf. *C. A.* 8, 2913.—Analyses of several deep well waters in northeastern Illinois indicate that the upper Potsdam strata furnish a better water from the standpoint of mineral content than the lower Potsdam strata or the St. Peter sandstones. H. P. C.

Minneapolis (Minn.) loses filter infringement suit. ANON. *Eng. Record* 72, 191(1915).—Gates operated from a single position and underdrains with holding-down screens in tapered bottoms are held to be inventions by the U. S. District Court.

FRANK BACHMANN.

The new filtration plant at Quincy, Ill. W. R. GELSTON. *Eng. Record* 71, 424(1915); *J. Am. W. W. Assoc.* 2, 446-54(1915); *Eng. News* 73, 626-7(1915); *Eng. Contrg.* 43, 355(1915). H. P. CORSON.

Filtration plant, city of Decatur, Ill. H. RUTHRAUFF. *J. Am. W. W. Assoc.* 2, 455-64(1915). H. P. CORSON.

Famous Bubbly Creek filter plant adopts liquid chlorine treatment. C. A. JENNINGS. *Eng. Contrg.* 43, 276-7(1915); *Eng. News* 73, 555(1915); *J. Am. W. W. Assoc.* 2, 401-3(1915).—Advantages are discussed. LANGDON PEARSE.

The International Joint Commission's investigation of sewage pollution of boundary waters. A. J. McLAUGHLIN. *Am. J. Pub. Health* 5, 555-9(1915); cf. *C. A.* 8, 1317, 2914.—M. discusses the technic of exam. and describes an anaerobic organism which ferments lactose bile, resembles *B. welchii* and generally appeared when material from the gas tubes was transplanted into hot agar. M. thinks that presumptive test (gas in lactose bile) alone for *B. coli* in certain waters is somewhat misleading unless a confirmatory test is made. J. GAUB.

Clarifying waste water and the removal of slimes at blast furnace plants. EMIL OPDERBECK. *Stahl u. Eisen* 35, 281-7, 336-46(1915).—The German laws forbid dumping slime-bearing water into the streams. The paper describes and illustrates methods for clarifying such waters and the disposal of the slime.

CARLE R. HAYWARD.

The purification of city waste waters in Germany by natural, biological methods. J. KÖNIG AND H. LACOUR. *Landw. Jahrb.* 47, 477-571(1914).—A detailed report giving statistics and observations as well as the results of experiments on the purification of waste waters from numerous cities in Germany. The advantages of the irrigation process whereby the fertilizer products of the water are utilized are pointed out and the authors suggest that this method be used wherever the conditions are suitable. A bibliography is appended. C. F. MILLER.

Biological observations on sewage purification plants. HERM. HELFER. *Mitt. kgl. Landesans. Wasserhyg.* 20, 70-112(1915).—The organisms of various purification plants near Berlin were thoroughly examined and tabulated. The lumbricoides, which are present in biologic filters in enormous numbers, undoubtedly participate largely in the decompn. of sewage matter. Spiders and sewage flies were also noted in very large numbers around the filters in the warm season. These larger organisms again attract birds. The microscopic fauna and flora remain substantially the same in the

coldest and warmest weather; the macroscopic organisms, however, are greatly influenced by the season.

ARTHUR LEDERER.

Biologic-microscopic investigation of sewage disposal on the coast. J. WILHELM. *Mitt. kgl. Landesans. Wasserhyg.* 20, 113-204(1915).—W. investigated the effect of the discharge of sewage effluents upon the sea water in various places along the northern coast of Germany. The plankton life was thoroughly examined. Such an exam. answers the question whether the water is polluted or not. *Chlamydothrix longissima* can serve as a typical indicator of salt water pollution. Self-purification is more active in fresh than in salt water. Suspended matter settles more quickly in salt water, resulting in sludge deposits near the sewage outlet. These deposits are apt to create a nuisance. Oysters are likely to become infected in such waters. The salt-water fauna shows a greater variety than the fresh-water fauna.

ARTHUR LEDERER.

Brooklyn sewage-aeration and activated-sludge experiments. E. J. FORT. *Eng. News* 74, 214-7(1915).—Studies have been made of sewage aeration by (1) compressed air passed upward from a pipe grid and shallow gravel bed through sewage passing downward in a deep tank containing 9 horizontal disk deflectors. The first expts. with plain aeration of sewage in the aerating tank were not very encouraging, an air supply of 0.75 vol. per vol. of sewage with 2 hrs. retention being insufficient to produce any marked improvement on crude sewage. The second expt. was carried on in an aerated contact bed. The improvement was very marked, the 24 hr. samples being almost of drinking water quality. The third expt. dealt with the activated-sludge process and was carried on in the same tank as expt. (1). The continuous flow and fill-and-draw plan was tried alternatively. 24 hrs. aeration resulted in 100% relative stability.

ARTHUR LEDERER.

Operating records of Atlanta sewage treatment plant. CHARLES C. HOMMON. *Eng. Record* 72, 4-7(1915).—The Proctor Creek plant consists of a sand trap, grit chambers, Imhoff tanks, a revolving screen, sprinkling filters, and sludge-drying beds. The preliminary bar screens remove about 30 lbs. wet screenings per mil. gal., which is disposed of by burying. The grit chambers remove about 0.3 cu. yd. of sand per mil. gal. of sewage treated. About 33 lbs. skimmings per mil. gal. accumulated on the settling chambers of the Imhoff tanks. Troubles with scum and foaming were overcome by withdrawing part of the sludge in the tanks. The sludge is removed from the tanks in small amts. every 2 weeks during the warm weather, thereby making it unnecessary to remove sludge in winter. It was found impracticable to use the Weand revolving screen on the Imhoff tank effluents. The filters were operated at a net rate of 2 mil. gal. per acre per day. Clogging was noticed during the winter months. Unloading took place in the spring, giving the effluent a dirty appearance. The effluents from the filters have a high relative stability and the nuisance which formally existed in Proctor Creek has been eradicated. Cost of treatment was \$3.93 per mil. gal. exclusive of interest on investment and depreciation.

FRANK BACHMANN.

Inquiry blank of the Kgl. Landesanstalt für Wasserhygiene regarding sewerage, sewage purification and disposal. ANON. *Mitt. kgl. Landesans. Wasserhyg.* 20, 1-11(1915).

ARTHUR LEDERER.

Expert opinion of the Kgl. Landesanstalt für Wasserhygiene on the experimental sewage purification plant of Karlsruhe. A. SCHIELE AND R. WELDERT. *Mitt. kgl. Landesans. Wasserhyg.* 20, 12-36(1915).—The plant consists of 2 screens of 2-mm. mesh. The screens are of the Riensch-Wurl and Geiger type. The Wurl type proved to be the more efficient and satisfactory.

ARTHUR LEDERER.

Sewage testing station at Decatur, Ill. LANGDON PEARSE. *Ill. Soc. Engr. and Surveyors* 1915; *Eng. News* 73, 555(1915); see C. A. 9, 1523.

L. PEARSE.

New methods of odor elimination at garbage plants indicated by New York tests. IRWIN S. OSBORN. *Eng. Record* 72, 16-7(1915).—O. found that the heat treatment of gases instead of acting as a deodorizer actually makes the gases more offensive. The heat renders the gases more sol. Final washing is necessary. F. BACHMANN.

Disinfectants and disinfection. J. J. BOYLE. *Chem. Eng.* 22, 1-3(1915).—Coal-tar products are the best general disinfectants, and should be purchased on phenol coeff. basis. Drip disinfecting machines are inefficient and should be abandoned. There is urgent need of legislation to cover the sale of disinfectants.

W. F. LANGEIER.

Electrolytic disinfectant. ANON. *Chem. News* 112, 10-1(1915).—A report upon the operation of a municipal plant for the manuf. of disinfectants indicates satisfactory results. Investigation of the treatment of swimming pool with electrolytic Mg hypochlorite showed the water to be free from objectionable organisms and odor.

W. F. LANGEIER.

Test for dirt in an air supply. S. A. MOSS. *Gen. Elec. Rev.* 18, 622-5(1915).—The test consists of collecting dirt upon cotton screens exposed in cleaned and uncleaned air for periods of sufficient length to collect the same amount of dirt from each. The relative length of periods indicates the cleaning power of the air-washer. Four forms are described. Testing screens have as base, a section of coarse wire screen ($\frac{1}{2}$ in. mesh). One surface is coated lightly with shellac and absorbent cotton is pressed upon it. When the shellac dries, the surplus cotton is peeled off.

W. H. BOYNTON.

Sanitation of the city of Vera Cruz. J. T. B. BOWLES. *Am. J. Pub. Health* 5, 119-33(1915):

J. GAUB.

The smoke nuisance (O'CONNOR) 21.

U. S., 1,150,117, Aug. 17. V. HENRI, A. HELBRONNER and M. VON RECKLINGHAUSEN. Apparatus for sterilizing water or other liquids with ultraviolet rays. Cf. C. A. 9, 945.

Brit., 9,031, Apr. 9, 1914. R. FREIBERR VON WALTHER. Removing oxygen from water by passing it over, or filtering it through, easily oxidizable metals or alloys, such as Fe, Mn, Al, Zn, or Cu, either in their normal condition or after the metals have been purified by treatment with acids or have been "rendered active." Hydroxides produced are retained by filtration or periodically removed by spraying, and dissolved Fe, e. g., FeO, by filtering in contact with CaCO₃ or permutite. Oxide forming a coating on the metals may be removed by treatment with acids.

Brit., 9,341, Apr. 15, 1914. R. NÜBLING and A. KRAUSS. Treating sewage sludge, after preliminary drying, by distg. it in retorts heated by the hot waste gases after use in heating gas retorts.

Brit., 9,396, Apr. 16, 1914. C. HAYTHORPE. The efficiency of feed-water purifiers is increased by means of elec. currents generated by connecting various parts such as Zn partitions and the walls by strips of a dissimilar metal such as Cu.

15. SOILS AND FERTILIZERS.

R. O. E. DAVIS.

Amino-acid nitrogen of the soil and the chemical groups of amino acids in the hydrolyzed soil and their humic acids. R. S. POTTER and R. S. SNYDER. *J. Am. Chem. Soc.* 37, 2219-27(1915); cf. Lathrop, C. A. 9, 501, 948.—This work was under-

taken to correlate, if possible, the amts. of the various chem. groups of NH_2 acids in the soil with its humic acid, and of these groups in the soil and its humic acid with the kind of org. fertilizer previously applied to the soil and with similar groups in pure proteins, and finally to compare the amts. of NH_2 -acid N as such in the soil with that found by hydrolysis. P. and S. find that the amt. of N pptd. from a neutralized alkali ext. of soil varies qual. inversely with the strength of the acid; the amt. of humic N (found by the Van Slyke method) extd. by dil. alkali from the soil is very high as compared with the amts. in proteins; dil. alkali does not ext. any typical class of org. compds. from the soil; the amt. of NH_2 -acid and peptide N found in the soil is very small as compared with the amts. of NH_2 acids formed by hydrolysis. CHAS. A. ROUILLER.

Analyses of Nova Scotian soils. L. C. HARLOW. Normal Coll., Truro, N. S. *Trans. Nova Scotian Inst. Sci.* 13, 332-46(1913-14).—A large number of analyses has been made of the soils of Nova Scotia. The results thus far obtained show that although these soils have a good supply of potash it is only slightly available; that the phosphoric acid, which is present in small amts., is about $\frac{1}{2}$ available and hence soon used; that, while volatile matter is quite high, it is deficient in N, and that lime is very deficient in many soils. H. JERMAIN CREIGHTON.

Fallow land, its physiology, farms, purpose, significance and distribution formerly and now. A critical study. WILLY MAKKUS. *Landw. Jahrb.* 47, 673-718(1914).—The author points out, citing the literature, how weathering, chem. decomp., oxidation and other favorable changes brought about by natural forces or agents, come into play to a much greater extent in a fallow soil than in one under cultivation or in one neglected entirely. C. F. MILLER.

The effect of arsenite of soda on the soil. W. T. MCGEORGE. Hawaii Agr. Expt. Sta., *Press Bull.* 50, 16 pp.(1915).—The use of either Na_2AsO_3 or Na_2HAsO_3 as a spray for killing weeds is discussed. The poison is assimilated by the plants as shown by analysis. It has a deflocculating action on the soil. It exercised a variable influence upon soil bacteria, depending upon the type of soil. The arsenite is strongly fixed by the soil and is extremely hard to leach out, accumulating therefore in the top zone (first 4 in.). B. E. B.

A municipal fertilizer plant at Los Angeles, Cal. BURT A. HEINLY. *Eng. News* 73, 1063-4(1915).—This plant permits a compost of manure, lime and wood ashes. 10,000 cu. yds. a year are made at a cost of \$1.38 per cu. yd. L. PRARSE.

The composition and value of farm manures. O. F. JENSEN. Mich. Agr. Expt. Sta., *Circ.* 25, 7 pp.(1915).—J. gives the av. compn. of different manures in lbs. per ton; the variation in quantity and compn. of manure caused by feed; fertilizing constituents and their value in one ton of feeding stuffs; value of fertilizing constituents in one ton of manure from different animals; location of fertilizing elements in the excrement of the cow and the horse; amt. and value of the voidings of farm animals in 24 hrs.; and, finally, the amt. and value of manure produced in one year. B. E. B.

U. S., 1,149,390, Aug. 10. C. N. MERIWETHER. Phosphate fertilizer is made by mixing 10 parts of Fe in small pieces with 90 parts of pulverized phosphatic limestone, fusing the mixt., adding K compds., pulverizing the product and removing any excess of Fe from it.

U. S., 1,150,815, Aug. 17. C. W. DRURY. A fertilizer from feldspar is made by fusion of a mixt. of feldspar 50, CaO 16.8 and FeO 13.5 parts.

16. FERMENTED AND DISTILLED LIQUORS.

ROBERT WAHL.

Classification of alcoholic liquors. EUG. ROUX. *Ann. fals.* 8, 189-95(1915).—A discussion of the meaning of the terms applied in France to various alcoholic beverages, and typical analyses of 50 different liquors. H. S. BAILEY.

The detection of citric acid in wine. E. BAIER AND P. W. NEUMANN. *Z. Nahr.-Genussm.* 29, 410-1(1915).—B. and N. have extended the Denigès test for citric acid in order to identify the ppt. obtained. Neutralize 25 cc. of wine with NaOH and render distinctly acid to litmus with acetic acid. Then add 3 g. of pure blood charcoal (free from CaCO_3), allow to stand with frequent shaking for 10 min., and filter. To 10 cc. of the clear filtrate add 1 cc. of Denigès' reagent, heat to boiling and, if a ppt. appears, filter. Then add 1% KMnO_4 soln. drop by drop until Mn oxides begin to sep. Remove these by adding a drop or two of H_2O_2 . A flocculent white ppt. indicates citric acid. To identify this ppt. as the Hg salt of acetonedicarboxylic acid centrifuge the mixt., remove the liquid by decantation, transfer the ppt. to a small filter, and wash with a little cold water. Dissolve the ppt. in 2-3 cc. of 10% NaCl soln., passing this through the filter several times to insure complete soln. To this soln. add a drop or two of weak FeCl_3 soln. (1 pt. 10% FeCl_3 and 10 pts. water), the formation of a raspberry-red color confirming the presence of acetonedicarboxylic acid. A. F. SEEKER.

Detection of small quantities of oxalic acid in wine. HANS KREIS AND W. I. BARAGIOLA. *Schweiz. Apoth. Ztg.* 53, 397-400(1915).—To 50 cc. of wine add, cold, 2.5 cc. of a 5% CaCl_2 soln., 2.5 cc. of glacial AcOH, 5 cc. of a cold satd. soln. of NaOAc (cf. C. A. 8, 2215), allow to stand 24 hrs. On shaking, Ca tartrate adheres to the bottom while CaC_2O_4 becomes suspended. Centrifuge, then rinse the ppt. with the aid of the clear liquid into a small centrifuge tube whose lower end is about 2 mm. wide, and centrifuge again. This process will yield an amt. of CaC_2O_4 crystals sufficient for microscopical identification if only 0.001% of $\text{H}_2\text{C}_2\text{O}_4$ is present in the wine. The crystals are uniformly characteristic plates, about 1×3 ; or, heat 50 cc. wine to boiling, add 2-3 cc. of 5% CaCl_2 and NH_4OH to distinct alk. reaction. Add at once while boiling 50% AcOH to slight acidity, cool, centrifuge, and exam. the residue microscopically. This detects 0.002% $\text{H}_2\text{C}_2\text{O}_4$. CaCl_2 is used so as to lessen the solubility of CaC_2O_4 . It is notably sol. in presence of $\text{H}_2\text{C}_4\text{H}_4\text{O}_6$ in the wine, also of SO_2 . No $\text{H}_2\text{C}_2\text{O}_4$ was found in 50 wines of known purity and 25 others, showing that CaC_2O_4 crystals in the cells of the grape do not pass into the wine. The presence of $\text{H}_2\text{C}_2\text{O}_4$ is due to manipulation to reduce the amt. of Ca. S. WALDBOTT.

Determination of sulfurous acid in wine. L. FERRÉ. *Ann. chim. anal.* 20, 151-5 (1915).—*Principle of Method:* SO_2 is distd. off by means of a current of CO_2 and received in a standard soln. of I (1 cc. corresponding to 1 mg. SO_2). To the distg. flask is connected a condenser to make sure that only CO_2 and SO_2 pass through the I soln. The CO_2 coming from the I-absorption bulb is passed through a 2nd bulb contg. a definite quantity of $\text{Na}_2\text{S}_2\text{O}_3$ soln. of a concn. equiv. to that of the I soln. *Procedure.* (A) *Total SO_2 :* Fill 40 cc. I soln. into a Strauss-Wurtz absorption bulb and 5 cc. $\text{Na}_2\text{S}_2\text{O}_3$ soln. in a 2nd and similar bulb, connect these two bulbs, avoiding contact with rubber tubing, and connect this absorption train with a condenser fitted to a distn. flask. Into the latter introduce 100 cc. wine and 2 cc. sirupy H_3PO_4 , pass a slow CO_2 current through the whole arrangement, heat (after expelling air) and keep gently boiling for 0.5 hr., continuing passing CO_2 through the app. The I and $\text{Na}_2\text{S}_2\text{O}_3$ in the absorption bulbs are then united in a beaker and the unconsumed I detd. by titration with $\text{Na}_2\text{S}_2\text{O}_3$ soln. (1 cc. corresponding to 1 mg. SO_2). If N cc. more $\text{Na}_2\text{S}_2\text{O}_3$ were consumed, then the total $\text{SO}_2 = 10 [40 - (N + 5)]$ mg. per l. (B) *Combined*

SO₂: For this purpose Mathieu-Billon's method was rendered volumetric. To 100 cc. wine are added as many cc. of I soln. as necessary to oxidize the total SO₂ and then the same quantity of an equivalent Na₂AsO₃ soln. After this prepn. the combined SO₂ is detd. in exactly the same way as the total SO₂ under (A). (C) **Free SO₂:** This is found by difference. The results with this procedure are compared with those obtained by Ripper's, Mathieu-Billon's and Haas's methods and found to be highly satisfactory. L. W. HAAS.

New method of determination of hydrocyanic acid and benzaldehyde in cherry brandy. J. GOLSE. *J. pharm. chim.* 12, 44-56(1915).—G.'s method was worked out to obviate the several sources of errors in the official process. Put 200 cc. of "kirsch," with 1 cc. of NaOH (d. 1.32-1.36), into a 500 cc. flask connected with an efficient condenser. Distil very slowly to avoid loss by foaming, collect 175 cc. of distillate, which contains part of the HCN having escaped fixation by NaOH, and all of the benzaldehyde. Cool the flask, apply a 55 cc. receiver containing 5 cc. NH₄OH, add to the contents of the flask through a separatory funnel, 50 cc. of dil. H₂SO₄ (1:10) and again distil very slowly, collecting 55 cc. This contains the bulk of the HCN originally present. To the 175 cc. of first distillate, add 5 cc. of phenylhydrazine bisulfite reagent (cryst. AcONa 10 g., glacial AcOH 5 cc., H₂O 100 cc.; 200 cc. of this mixt. + 3 cc. glacial AcOH + 1 cc. C₆H₅NHNH₂ (liquefied), + 1 cc. NaHSO₃ soln.) and distil again over a flame until 50 cc. are collected, and another fraction of 50 cc. to 75 cc. according to the % of EtOH present. Join these fractions to the above 55 cc. distillate. Replace the flame by boiling water bath, always continuing to cool, but preventing entry of air. When the pptd. hydrazone has collected (in 1 or 2 hrs.), cool and filter, wash with H₂O, drain and dissolve the ppt. with 10 cc. of abs. EtOH, washing twice with 10 cc. Et₂O. Evap. in a tared dish *in vacuo* and then weigh. The weight of the hydrazone times 2.7 gives wt. of benzaldehyde per liter of "kirsch." The HCN soln. is treated with 1 cc. of 10% KI, then titrated with 0.05 N AgNO₃ to opalescence. The number of cc. times 13.5 gives mg. of HCN per liter of "kirsch." Detn. of % of EtOH, mg. of HCN per liter and mg. of benzaldehyde per liter in 3 authentic samples gave the following results: (I) 48.8, 23.6, 30.2; (II) 50, 35.8, 37.3; (III) 50, 17.6, 29.7. In 3 doubtful samples, the corresponding results were: (IV) 48, 24.3, 108; (V) 48.5, 8.1, 73.4; (VI) 48.7, 18.9, 52.9. Previously recorded analyses based on the official method are untrustworthy. S. WALDBOTT.

The use of raw sugar in Austrian breweries. E. WEINWURM. Brunn. *Chem. Ztg.* 39, 601(1915).—Sugar may replace as much as 30% of the malt with satisfactory results. J. H. MOORE.

Examination of hops. E. MOUFANG. Kirm a.d. Nahe. *Allgem. Z. Bierbrau.-Malzfabrikation* 43, 227-31(1915).—Various samples of hops were first extd. with CHCl₃ and subsequently with water and the exts. examd. separately as to their phys. and chem. properties. The results led to the conclusion that for the practice of hopping beer worts it is suitable to separate the extractive substances of hops by water extn. into a readily sol. part (= A) and a difficultly sol. part (= B). Part A, since it plays only a minor role as carrier of hop-bitter and flavor but possesses a strong protein-pptg. power, ought to be added to the boiling wort after Part B (which eventually has been modified by boiling under pressure) has yielded its ext. to the wort as completely as possible. If worked in this manner the undesired darkening of wort during hopping may be eliminated, for Part A was recognized as the carrier of the substances that cause the darkening. L. W. HAAS.

Preservation of potato-slop by acidification with pure culture lactic acid. WILHELM VÖLTZ. *Z. Spiritusind.* 38, 255-6(1915).—The hop slop is discharged into water-proof pits and 0.5% sugar or the corresponding quantity of other saccharine material

(molasses, sugar beets, sweet potato-mash), previously sterilized by cooking, incorporated. After cooling the mixt. to 50° or below, it is best inoculated with 0.5% of a mixed culture of *Bacillus delbrücki* and *B. cucumeris fermentali*. In 2 to 3 days the max. acidity is obtained. To protect the acidified slop from contact with air, it is covered with a layer of oil 1 cm. thick. In an analogous way sugar-beet mash may be preserved. As a medium for the lactic bacteria, for which rye grist is unsuitable, a mixt. of 20-25% of grated sugar beets and 75-80% water may be used or sweet potato-mash of corresponding concn.

L. W. HAAS.

Losses of nutritive substances in rye-distillery materials. WILHELM VÖLTZ. *Z. Spiritusind.* 38, 245-6(1915).—Expts. on omnivora and ruminantia show that the working up of rye (and auxiliary material) for alc. implies a loss of 4% of total digestible nutritive substances for the latter as against 15% for the former over the raw material.

L. W. HAAS.

The caramel malt question. FR. LOWITZ. *Allgem. Brau.-Hopfen-Ztg.* 55, 823(1915).—A short review of the theory and technic of the prepn. of caramel malt.

L. W. HAAS.

The use of aluminium in the food industries. A. TRILLAT. *Bull. soc. encour. ind. nat.* 122, 555-74(1915).—A discussion of the properties of the metal with special reference to its adaptability for use in the distilling, brewing, and dairy industries.

H. L. OLIN.

Utilization of waste sulfite liquors (LANDMARK) (RINMAN) 23. Peroxidase in beer yeast (BACH) 11A.

U. S., 1,149,700, Aug. 10. A. P. STITZEL. A non-alcoholic beverage is made by removing the alc. from mashed and fermented wort by distn., flavoring the dealcoholized beer by mixing with hops or ginger and then cooling, settling, filtering and carbonating.

U. S., 1,149,704, Aug. 10. R. WAHL. Beer is flavored by mixing with it a hop ext. prepd. by treating hops with 20 times their wt. or less of a 1% soln. of NaOH at about 82° to ext. the hop-bitter acids and distribute them in colloidal form in the beer. The natural acid of the latter neutralizes the NaOH of the ext.

17. PHARMACEUTICAL CHEMISTRY.

M. I. WILBERT.

The analysis of essential oils. ANON. *Perf. Essent. Oil Record, Year Book 1915*, 8-15.—A general discussion including a brief outline of methods usually adopted in the exam. of essential oils (detn. of phys. constants, chem. tests, detection of adulteration, etc.).

E. J. C.

The solubility of water in essential oils. J. C. UMNEY AND S. W. BUNKER. *Perf. Essent. Oil Record, Year Book 1915*, 7.—These expts. were conducted to det. the amt. of water occurring in com. essential oils, the influence of this water on their keeping qualities and the relation between the chem. nature of the constituents of oils and the solubility of water in them. Oils representing the following groups were examd.: terpenes, alcs., aldehydes, phenols, esters, lactones and ketones. The phys. constants of these oils were detd. and the proportion of water that could be absorbed was calcd. from the rise in refractive index after drying. From the tabulated results the authors conclude: (1) Those essential oils which consist almost entirely of terpenes, of which oils of nutmeg, lemon, orange and juniper are types, are incapable of dissolving water to any appreciable extent. (2) Those essential oils whose chief constituent is an

oxygenated compd. or other terpene deriv., dissolve water in general to the extent of 0.5%, and in such oils the solubility of water is independent of the chem. nature of the chief constituent. (3) Higher solubility is observed in the case of Turkish geranium and Java citronella, but the lactone type, *e. g.*, eucalyptus, and the ketone type, *e. g.*, caraway, appear to be almost incapable of dissolving water. (4) None of the results obtained justifies the statement, which has frequently been made, that santal oil is capable of dissolving from 1 to 2% of water, and, in fact, it appears that it must be regarded as possessing a lower solvent power than the average. Even the small quantity of water which is found to occur can and does cause considerable inconvenience in the blending of oils. There is no doubt that the presence of water interferes with their keeping properties.

R. J. C.

The chemistry of the British pharmacopeia, 1914. CHARLES H. LA WALL. *Am. J. Pharm.* 87, 368-73(1915).—A review.

W. G. GAESSLER.

New way to extract lemon oil. LIOTTA. Catania, Italy. *Am. Perfumer* 10, 34(1915).—A new process which is said not to affect the oil in any way, such, *e. g.*, as causing changes in the properties and odor of the essence, is carried out as follows: the lemons are mashed in a large receptacle and an acid, the nature of which is kept secret, is added. This acid causes the essential oil to sep. and rise to the surface; it is then drawn off. A chem. reagent, that liberates the acid and permits its recovery, is then added to the acid mixt. The residue, consisting of lemon juice, pulp and peel, and foreign matter, is then sold to citrate manufacturers. The new process will save about 2.5% more oil than the old hand process; the cost of extn. is 2.3 c. per 1000 lemons and the time required 22 mins. Present methods used in Italy and France are discussed.

W. G. GAESSLER.

Manufacture of alcohol for use in perfume. F. E. STOCKELBACH. *Am. Perfumer* 10, 94-6, 109(1915).—An address including a comprehensive discussion of the points of most interest to the manufacturing perfumer and also a review of the various processes both for the manuf. of alc. from raw materials such as grapes, sugar beets, cane sugar molasses, potato starch, and grains, and the subsequent purification of the raw alc. to eliminate by-products which are especially objectionable in perfumery.

W. G. GAESSLER.

The manufacture of pharmaceutical products. ERNEST FOURNEAU. *Bull. soc. encour. ind. nat.* 122, 444-75(1915).—An extensive review of the economic aspects of the industry from the standpoint of the French manufacturer.

H. L. OLIN.

The manufacture of synthetic perfumes. JUSTIN DUPONT. *Bull. soc. encour. ind. nat.* 122, 476-91(1915).—An address reviewing the status of the industry.

H. L. OLIN.

Determination of methoxyl in beechwood tar. J. SUREDA BLANES AND ADOLFO GONZÁLEZ. *Anales soc. españ. fis. quim.* 13, 158-60(1915).—Inasmuch as the com. and therapeutic value of beechwood creosote is principally due to the guaiacol content B. and G. propose the detn. of methoxyl by the Zeisel method as an index of its quality. The Me of the MeO group is transformed by the action of HI into MeI which, being quite volatile, is passed through an alc. soln. of AgNO₃ with consequent formation of the compd. AgI.2AgNO₃; the latter loses its content of AgNO₃ when washed with H₂O and the wt. of MeO may then be calcd. from the wt. of the dried AgI. The Zeisel and Fanto app. was employed. The MeO content obtained represented the sum of the wts. of the MeO groups of the guaiacol, creosol and methylcreosol present in the creosote. Since mineral pitch does not contain a MeO group, sophistication of beechwood tar with this pitch may be readily detected by detn. of the MeO content. The distn. of guaiacol from beechwood tar may also be detected in the same way. Data

for n , b. p. and MeO content of a no. of samples of beechwood tar and mineral pitch are given.

H. S. PAINE.

Displacement curves of some organic bases and application to the determination of some alkaloids. R. GOUBAU. Univ. Ghent. *Bull. sci. acad. roy. belg.* 1914, 63-90.

—G. has applied the displacement curve of a base (*i. e.*, the curve which represents the variation of elec. cond. of a soln. of a salt of the given base resulting from the addition of increasing amts. of a base capable of displacing the 1st base) to the detn. of alkaloids. The exptl. procedure usually consisted in adding a known amt. of HCl to a known wt. of the weak base so that the soln. (aq. or alc. or both) contained an excess of acid; the cond. was then measured at a known temp. and also after successive additions of 0.1 cc. N (or 0.1 N) NaOH. The curve representing the variation in cond. usually consisted of 3 portions, a curve of neutralization, a curve of displacement and a portion which represents the increase in cond. corresponding to the addition of an excess of a strong base. The curve of neutralization was rectilinear, descending from left to right (conds. as ordinates and vols. of added NaOH soln. as abscissas); its direction depended especially on the nature of the acid present in excess in the soln. and on the nature of the strong base used for neutralization. The curve of displacement ascended from left to right when the velocity of migration of the cation of the strong base was greater than the velocity of migration of the cation of the weak base. This curve was horizontal when the velocities of migration of the 2 cations were equal; it descended from left to right when the velocity of migration of the cation of the weak base was greater than the velocity of migration of the cation of the strong base. The curve of displacement showed 1, 2 or 3 points of inflexion in case the base was di-, tri- or tetraacid, resp.; these points were not always distinct. The 3rd portion of the curve (which represents the increase in cond. corresponding to the addition of excess of a strong base) was rectilinear in case too high concns. were not employed; it was necessarily ascending from left to right. The angle formed by the curve of neutralization and the curve of displacement was the more distinct the less the degree of hydrolysis of the organic salt; this angle was not perceptible in the case of complete hydrolysis. The angle formed by the curve of displacement and the 3rd portion of the cond. curve was the more distinct the weaker the organic base. Tabulated data and cond. curves for a number of alkaloids are given. Cocaine may be detd. when present in amts. as small as 0.01 g. Atropine may be detd. with precision in pharmaceutical preps. of belladonna, provided the foreign substances (resins, chlorophyll, etc.) present in these preps. be first removed from the acid soln. of atropine by extrn. with Et_2O or CHCl_3 ; resins cause erroneous results even in the presence of large amts. of alc. Homatropine and coniine may be readily detd. by this method; the fact that the angle formed by the displacement curve and the 3rd portion of the cond. curve is quite obtuse indicates that coniine is a strong base with salts which are only slightly hydrolyzed. The cond. curve for nicotine was ill defined and difficult of interpretation. Aconitine may be accurately detd. in official preps. of aconite provided all resins are first extrd. by Et_2O . The points of inflexion of the cond. curve for pilocarpine are very distinct and the method yields accurate results; detn. of pilocarpine may be made in quite dil. solns. Measurements with morphine-HCl and morphine-AcOH yielded cond. curves which were composed of 3 ascending portions, *i. e.*, a portion AB corresponding to the displacement of morphine, a portion BC corresponding to the formation of Na morphinate (*i. e.*, a curve of the neutralization of a weak acid by a strong base) and a portion CD corresponding to the addition of an excess of a strong base; a 4th portion EA corresponding to the neutralization of excess of acid or base was also observed. Morphine may, therefore, be detd. in an alk. soln. of the morphinate (provided other alkaloids or other interfering substances are absent) or an acid soln. of a salt (acetate or

hydrochloride) of morphine. It is preferable to use an aq. soln. with no alc. present; an amt. as small as 0.01 g. morphine-HCl may be detd. with great precision. Codeine may be readily detd. by this method. In measurements with quinine, cinchonine, cinchonidine and quinidine, either individually or in mixt., it was impossible to obtain a distinct 1st inflexion point (end of the neutralization of the excess of acid) in the cond. curve. This was due to the pronounced hydrolysis of the salts of these alkaloids; the last inflexion point was always quite distinct. It is, therefore, not possible to det. the cinchona alkaloids by means of the displacement curves. The total amt. of acid present in a salt of 1 of these alkaloids may be detd., however, from the elec. cond. The first 3 of the 4 portions of the cond. curves of these alkaloids were replaced by a continuous curve in which it was not possible to distinguish a point of inflexion. Strychnine and brucine may both be detd. with considerable accuracy by this method; the fat which is present in large amt. in nux vomica should first be removed by Et_2O from pharmaceutical preps. in case it is desired to det. strychnine and brucine in the latter by this procedure.

H. S. PAINE.

Use of iron cacodylate (preparation of ferrous cacodylate). A. C. BARBANO. Turin. *Giorn. farm. chim.* 63, 145-9(1914).—A prepn. compounded from the following formula of Piccaluga is extensively used with good results in the region around Alba, Italy, in the treatment of various forms of anemia, chlorosis, etc.: 1 g. Fe''' cacodylate, 2 g. tincture of nux vomica, 100 g. distd. H_2O . B. proposes to improve this formula by substituting Fe'' cacodylate for Fe''' cacodylate; inasmuch as the former is not readily available in the solid state, the following procedure is recommended. Slake 17.00 g. pure CaO (from marble) with a small amt. of distd. H_2O , reduce in a mortar to a homogeneous mass and add sufficient distd. H_2O to give 50 cc. vol. Add this milk of lime to a soln. of 83.63 g. pure, crystd. cacodylic acid in 100 cc. distd. H_2O , shake, close the receptacle and allow to stand for some time; 95.15 g. Ca cacodylate are thus obtained. Add this soln. to a soln. of 84.25 g. FeSO_4 (crystd. from alc.) in 100 cc. of a 10% aq. soln. of lactose (to prevent oxidation of Fe'' cacodylate), shake, allow to stand in a closed vessel for several days, then filter rapidly and complete the vol. of the filtrate to 300 cc. with a 10% soln. of lactose in distd. H_2O ; this final vol. should then contain 100 g. pure Fe'' cacodylate. Although this soln. contains a Fe'' salt, it does not possess a pronounced green color; such color is developed, however, if 10 g. citric acid be added before completing the vol. to 300 cc. A proportion of 30 cc. of the above soln. of Fe'' cacodylate, 20 g. tincture of nux vomica and sufficient 10% soln. of lactose in distd. H_2O to make 1000 g. corresponds to the original formula of Piccaluga; 10 g. of this prep. contain 0.10 g. Fe'' cacodylate and 0.20 g. tincture of nux vomica. B. proposes the following as an improved formula for this prep.: 30 cc. Fe'' cacodylate soln. (prepd. as above), 20 g. tincture of nux vomica, 500 g. 10% soln. of lactose in distd. H_2O , 100 g. 95% alc., 5 g. citric acid and sufficient neutral glycerol (31°) to make a final wt. of 1000 g.

H. S. PAINE.

Vetiver oil. ANON. *Bull. Imp. Inst.* 13, 308(1915).—Samples of roots of the vetiver plant (*Vetiveria zizanioides*) collected at different seasons in various parts of India gave yields of oil varying from 0.37 to 1.14% on steam distn. The quality of the oil depends mainly on the season at which the roots are collected; other factors such as soil and locality are of minor importance.

R. L. SIBLEY.

Incompatibility of urotropine with lithium benzoate and some official medicaments. ANON. *Bull. soc. pharm. Bordeaux; Schweiz Apoth. Ztg.* 53, 440-2(1915).—A dry mixt. of urotropine with BzOLi kept in paper begins to cake the first day, and is liquid the 3rd day. No chem. decompn. takes place; no NH_3 nor HCHO is given off. In moist air, a mixt. of 0.25 g. of each substance gains 0.35 g. in 2 days. Drying restores the original mixt. Urotropine itself is slightly hygroscopic. Mixed with Li_2CO_3 , or with

BzOH, or with BzONa, or BzONH₄, or Na salicylate, salol or salophene, the same liquefaction is produced. With Na₂CO₃ or NaHCO₃, chem. decompn. takes place in addition, NH₃ being liberated. With aspirin, AcOH is set free, soon followed by HCHO. With antipyrine (cf. C. A. 6, 2669) the odor of phenol appears and the mixt. liquefies.

S. WALDBOTT.

Bismuth preparations of the Codex. F. GOLDBY. *Pharm. J.* 94, 826-7(1915).—The following changes are suggested: In *mist. bismulhi comp.* and *mist. bismulhi comp. cum morphina*, substitute an equiv. amt. of carmine for the unsatisfactory liquor carmini, Brit. Pharm. Cod. In the prepn. of *mist. bismulhi comp. cum pepsino*, substitute sol. Bi tartrate in scales for Bi citrate and NH₃. Take Bi tartrate, 9.15; stronger glycerin of pepsin B. P. C., 12.50; soln. of strychnine B. P., 7.50; tinct. of cudbear B. P. C., 7.50; dil. HCN, 3.34; CHCl₃-H₂O (1 in 200), to make 100 parts. The Bi tartrate dissolves completely in about 63 parts of H₂O (shaking for 1 hr.), the finished mixt. is bright, needs no filtering, and seems permanent. The reaction is slightly acid, favorable to pepsin, and cudbear is preferable to carmine. The mixt. can be made readily in large or small quantities.

S. WALDBOTT.

History of the salicylic compounds and of salicin. GORDON SHARP. *Pharm. J.* 94, 857(1915).—The history, pharmacology and therapeutics of these compds. are recorded.

S. WALDBOTT.

Examination of pulvis rhei compositus (Gregory's powder). G. D. ELSDON and HERBERT HAWLEY. *Pharm. J.* 95, 100-1(1915).—The Brit. Pharm. 1914 gives the comp.: Light MgO 66, powdered rhubarb root 22, powdered ginger 12. A reasonable limit for H₂O is 4%; 15 com. samples contained 2.1 to 5%. The av. % of H₂O in MgCO₃, Brit. Pharm. (3 samples), was 0.5, rhubarb (10 samples) 9.5, ginger (10 samples) 10.5. Amt. of ash calcd. is 67.5%; 15 com. samples gave 57.1 to 72.5%. Alkalinity of ash (detd. with N HCl and Me orange) is about 4.5% less, due to CaO and non-alkalinity of ash in rhubarb and in ginger. The amt. of CO₂ (partly due to absorption) should not be more than 3%. More than 5% indicates adulteration with MgCO₃. Its amt. is detd. by the nitrometer method of Paul and Cownley, 1898, with E. and H.'s correction for absorption of CO₂ by 10 cc. 0.2 N HCl = 7.5 cc. (When 0.5 g. MgO are dissolved, the vol. is only 5.1 cc.) With 0.5 g. of powder, the corrected number of cc. of CO₂ obtained at 65° F. and 760 mm., times 0.364, gives % of CO₂. The combined amts. of rhubarb and ginger are detd. as the sum of cold H₂O ext., residue of 0.5 N AcOH ext. and 10% allowance for H₂O. The relative amts. of rhubarb and ginger may be calcd. from the detd. alcoholic or aq. exts. of the mixt., and the established corresponding values of each constituent. Ginger (30 samples) gave 13.3% H₂O ext., 5.8% alc. ext.; rhubarb (15 samples) 44.0-30.0% H₂O ext., 36.4-28.8% alc. ext. For 7.8% alc. ext. of the mixt., the calcd. ratio is 62:38. A table gives results of analyses of 21 samples, viz., H₂O, ash, alkalinity of ash as MgO; CO₂; cold H₂O ext.; amts. insol. in 0.5 N AcOH.

S. WALDBOTT.

Extraction by immiscible solvents. P. A. W. SELF. *Pharm. J.* 95, 164-5(1915).—A discussion of the adaptabilities of Et₂O, CHCl₃, petroleum ether, amyl alc., C₆H₆, CS₂ and CCl₄; also an account of the methods of preventing, and of sepg. emulsions. S. lays stress on the use of large vols. of solvent for the purpose of counteracting emulsions.

S. WALDBOTT.

A short history of the synthetic aniline alkaloidal derivatives, phenazone, phenacetin and acetanilide. GORDON SHARP. *Pharm. J.* 95, 197-8(1915).—An account of the pharmacology and therapeutic action of these compds. is included. S. W.

Merzalin, a substitute for vaseline. HESSELAND. *Pharm. Zentralk.* No. 19 (1915); VASTERLING. MANNICH AND KATHER, *Apoth. Ztg.* Nos. 45, 46(1915); *Schweiz. Apoth. Ztg.* 53, 353-4(1915).—For merzalin, white, V. finds I no. 1.56, sapon. no.

o, m. p. 43.5, H_2O , etc., 10.44%, ash 30.68%, of which 4.86% is sol. in HCl . Merzalin, yellow, I no. 9.0, sapon. no. 0, m. p. 40-42° (indistinct), H_2O and volatile hydrocarbons 12.4%, ash 43.91%, HCl -sol. 4.11%. M. and K. find 37% talcum, about 8% H_2O and 55% of mineral fats, i. e., a vaseline "stretched" with H_2O and talcum.

S. WALDBOTT.

History of pharmacopeias. C. BUEHRER. *Schweiz. Apoth. Ztg.* 53, 354-6, 367-71, 381-5, 400-2 (1915).—Special reference is made to the development of the Swiss pharmacopeia.

S. WALDBOTT.

Essential oils. SCHIMMEL & Co. *Semi-Ann. Report* Oct., 1914-Apr., 1915, 114 pp.—*Ageratum oil*, distd. from *Ageratum conyzoides*, L., Annam, yield 0.0054%, d_{15} 1.1090, opt. rot. $-1^{\circ} 20'$, acid no. 0.9, ester no. 11.2, nearly all sol. in 5 + vols. of 80%, in 0.5 vol. of 90% EtOH. Two samples of *alant oil* partly deprived of alantolactone, were thick, dark brown and gave d_{15} 1.0407 and 1.0430, n_D^{20} 1.52324 and 1.52245, acid nos. 14.9 and 10.9, ester nos. 155.6 and 167.3, acetyl ester no. (of one oil) 181.6. Both oils gave clear soln. with 95% EtOH up to 1 vol. The yield of *ammoniacum oil* was 0.19%, d_{15} 0.8875, opt. rot. $+1^{\circ} 37'$, n_D^{20} 1.47250, acid no. 3.7, ester no. 40.5, acetyl ester no. 106.4. The oil was deep yellow, of peculiar, unpleasant odor, sol. in 0.5 + vol. 90% EtOH. *Cajuput oil* from Annam contained 40.5% cineole (resorcinol method), d_{15} 0.9198, opt. rot. $-2^{\circ} 36'$, sol. in 1.8 vols. of 70%, in 0.5 vols. of 80% EtOH. (*Bull. Roure-Bertrand Fils*, April, 1914.) *Calamus oil* from Japan recently shows neg. rotation, the other consts. are normal and the aroma is strong; d_{15} 0.9846 to 0.9863, opt. rot. $-5^{\circ} 36'$ to $-11^{\circ} 25'$, n_D^{20} 1.51655 (one detn.), acid no. 0.9 to 1.1, ester no. 1.3 to 9.1. Sol. in about 2 vols. of 80% EtOH and in 0.4 vols. or less of 90% EtOH. Com. *cananga oils* had been mixed with fatty oils as shown by high ester nos. (38.2-42.9), insolubility in 10 vols. of 95% EtOH and the characters of the products of distn. with steam. *Korarima cardamom oil*, yield 1.2%, gave d_{15} 0.9038, opt. rot. -3° , acid no. 3.6, ester no. 22.1, sol. in 0.5 vol. 90% EtOH. Its odor differs from that of regular cardamom oil. (E. M. Holmes, *Perfum. Essent. Oil Rec.* 5, 302 (1914).) To det. the amt. of rosin in *cassia oil*, dissolve 5 g. of oil in 20 cc. of 70% EtOH, add 10 cc. or more of $Pb(OAc)_2$ soln., wash ppt. with 70% EtOH and dry at 100° to const. wt. The amt. of rosin added in certain regions is believed to be 10%. (*Perfum. Essent. Oil Rec.* 5, 264 (1914).) *Copaiva balsam* from Manaos gave the consts. d_{15} 0.9280, opt. rot. $-29^{\circ} 30'$, n_D^{20} 1.50457, acid no. 23.2, ester no. 5.5. It yielded 81% of oil, d_{15} 0.9036, opt. rot. $-32^{\circ} 28'$, n_D^{20} 1.50092, acid no. 0.6, ester no. 6.4. Two more samples of Manaos balsam yielded 83.4 and 79.6% of oil, d_{15} 0.9068 and 0.9095, opt. rot. $-16^{\circ} 4'$ and $-30^{\circ} 6'$, n_D^{20} 1.50045 and 1.53012, acid nos. 0.3 in both, ester nos. 3.7 and 0.9. Both were sol. in 6+ vols. of 95% EtOH. *Cubeb oil*, distd. in England (6 samples) gave d_{15} 0.919-0.924, opt. rot. -27.2° to -29.4° , n_D^{25} 1.4928 to 1.4950. 14 to 32% distd. below 250°; 64 to 80% between 250 and 280°. One other sample showed d_{15} 0.927, and 50% distd. below 250°; 44% between 250 and 280°. (J. C. Umney and E. T. Brewis, *Perfum. Essent. Oil Rec.* 5, 256 (1914).) *Daniella thurifera*. Balsam received from W. Lenz (cf. C. A. 8, 2921) yielded by distn. with steam 58% of colorless oil, d_{15} 0.9216, opt. rot. $-5^{\circ} 43'$, n_D^{20} 1.50670, acid no. 0, ester no. 1.9, not clear soln. with 10 vols. 95% EtOH; b. p. 268°, with decompn.; 74% b. r. 95 to 108°. Cadinene was abundantly present. Artificial *bergamot oil*. Two samples gave d_{15} 1.0432 and 1.0858, opt. rot. $+7^{\circ} 30'$ and $+7^{\circ} 30'$, acid nos. 0.3 and 0.9, ester nos. 403.3 and 577.1. The bulk of the ester was not linalyl acetate, but phthalic ester in one case and glyceryl acetate in the other (about 70% of each). *Mandarine oil*, Japanese. Three samples received were colorless, showing that the oil was made by steam distn., not by pressure as in Italy. The odor was mainly that of limonene. The consts. of the 3 oils were, resp., d_{15} 0.8489, 0.8528, 0.8541; opt. rot. $+92^{\circ} 35'$, $+73^{\circ} 36'$, $+68^{\circ} 5'$; opt. rot. of the first 10% of distillate $+91^{\circ} 32'$, $+66^{\circ} 10'$, $+60^{\circ} 48'$,

acid nos. 0.3, 0.3, 0.3; ester nos. 3.7, 3.6, 4.6; sol. in 90% EtOH, 5.5+, 5.5+, 5+ vols. Three samples of *mikan oil* showed similar consts. d_{18} 0.8483, 0.8478, 0.849; opt. rot. +92° 20', +90° 56', +90° 35'; sol. in 6+, 6.2+ and 10 vols. of 90% EtOH. The limits for *Italian mandarin oil* are: d_{18} 0.854 to 0.859; opt. rot. +65 to +75°, opt. rot. of the first 10% of distillate little less or up to 2° higher than that of the original oil; acid no. up to 1.7, ester no. 5 to 11; more or less cloudy soln. with 7 to 10 vols. of 90% EtOH. *Oil of sweet orange* from Jamaica showed the following limits: d_{18} 0.8481 to 0.8491; opt. rot. (20°) +97° 43' to +98° 3'; opt. rot. of the first 10% of the distillate +96° 14' to +97° 30', always somewhat lower than the original oil; n_D^{20} 1.46984 (1 detn.) evapn. residue 1.4 to 2.0%. Detn. of aldehyde (calcd. for decylaldehyde) with PhNH.NH₂ 2.3, 2.7 and 3.8%. *Oil of bitter orange* from Jamaica: d_{18} 0.8517 to 0.8537; opt. rot. (20°) +92° 57' to +96° 58'; opt. rot. of the first 10% of distillate +92° 20' to +96° 40' (in 1 case higher than the original rotation); n_D^{20} 1.47171 (one detn.); evapn. residue, 2.6 to 3.2%; aldehyde, 0.75 and 1.5%. *Pine needle oil of Pinus heterophylla* gave the following consts.: d_{18} 1.48568, acid no. 0.6, ester no. 10.1, sol. in 7+ vols. of 90% EtOH with turbidity. About 70% of the oil distd. up to 72° (3 mm.). The distillate contained: *l*- α -pinene, *l*- β -pinene (probably also camphene). From the residue, NaHSO₃ extd. traces of an aldehyde having the odor of lauric aldehyde. It faintly appears in the odor of the oil. The oil of *Pinus palustris* gave d_{18} 0.8849, opt. rot. -30° 15', n_D^{20} 1.48277, acid no. 0.9, ester no. 4.6, sol. in 6 vols. 90% EtOH with slight opalescence. About 57% of the oil distd. up to 40° (6 mm.). The residue again gave with NaHSO₃ traces of a lauric aldehyde odor. The high-boiling portions, also of the oil of *P. heterophylla*, had the odor of sesquiterpene. The low-boiling fractions, b. 164-5° (d_{18} 0.8701; opt. rot. -17°) contained *l*- α -pinene and β -pinene. The oil of *Pinus ponderosa* did not react with NaHSO₃ soln. It had the consts. d_{18} 0.8796, opt. rot. -17° 16', n_D^{20} 1.48033, acid no. 0.6, ester no. 8.6, sol. in 5.5+ vols. of 90% EtOH. About 10% of the oil boiled between 159° and 164°, yielding small amts. of a nitrosochloride, m. 104°, indicating α -pinene. About 50% boiled from 164 to 170° (opt. rot. -18° 38') and contained *l*- β -pinene. From the fractions above 176° traces of an alc. having the odor of borneol were obtained. Com. *iris oil* differed markedly in the consts. for pure oil and in solubilities. It was adulterated with about 50% of castor oil. The oil obtained by distn. with steam did not conform to pure iris oil. The nature of the second adulterant was not detd. *Oil of Lavandula dentata* examd. by S. & Co. in 1905 and 1908 under the erroneous name of *Lavandula stoechas*, L., was yellowish brown and had a camphor-like odor, d_{18} 0.9620, opt. rot. +35° 30', n_D^{20} 1.47909, acid no. 5.16, ester no. 13.1, acetyl ester no. 67.9, sol. in 2+ vols. 70% EtOH, the dil. soln. is opalescent. The oil contained *d*-camphor (m. p. 175-175.5°, oxime m. 117-118°, semicarbazone m. 231°) and *d*-fenchone (oxime m. 165°), possibly also fenchyl alc. *Lavender oil* obtained by distn. with dry steam is said to become more sol. in 70% EtOH with time (*Perfum. Essent. Oil Rec.* 5, 147(1914).) This is doubted by S. & Co. *Lemongrass oil*, from Madras Presidency, has recently become poorly sol. in 70% EtOH, possibly due to the use of another grass species. Oil from Madras *white stalk* grass was yellow, resembling citronella oil in odor, etc., d_{18} 0.909, opt. rot. -10° 50', aldehyde (NaHSO₃ method) 9%, sol. in 0.8 + vol. of 80% EtOH, slightly turbid at 4 vols., insol. in 70%. Oil from *red stalk* grass was reddish brown and had the typical lemongrass odor, d_{18} 0.925, aldehyde (NaHSO₃ method) 71.5%, with 5 vols. 70% EtOH no clear soln., with 0.8 + vol. of 80% a clear soln. clouding with 5 vols. Upon steam distn., 78.7% of the oil passed, containing 81% aldehydes, and giving a clear soln. with 2.4 + vols. 70% EtOH. The residue was a reddish brown, viscid oil. The botanical origin of either grass is undetd. (*Bull. Imp. Inst.* 12, 222(1914).) Annam lemongrass oil, so-called "West Indian" oil, gave d_{18} 0.8846, opt. rot. -0° 4', sol. in 0.25 vol. 80%, milky with more EtOH. Citral

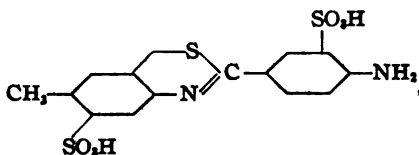
75%. Oil from Mayotta gave d_{15} 0.8917, opt. rot. $-0^{\circ} 22'$, sol. in 0.4 vol. 80% EtOH, strongly turbid with 2+ vols. Aldehydes 87%. (Bull. Roure-Bertrand Fils, Apr., 1914.) The low-boiling portions of oil of mastic (156° to about 170° , d_{15} 0.8599, opt. rot. $+32^{\circ} 57'$) contains chiefly *d*- α -pinene, with very little *dl*- α -pinene, and another terpene not as yet recognized. The solid fatty acid contained in *musk-seed oil* proved to be palmitic acid. The yield of *clove oil* from Mauritius cloves (cf. C. A. 8, 2598) was 10.2 and 11.5%; from the leaves, 1.62%. *Palmarosa oil* from Java is of good quality, d_{15} 0.8906 to 0.8920, opt. rot. $+0^{\circ} 30'$ to $+0^{\circ} 42'$, acid no. 1.2 to 1.8, ester no. 37.5 to 51.6, acetyl ester no. 272.7 to 276.8, corresponding to 94.3 to 96.0% total geraniol; sol. in 3 to 3.5+ of 60% EtOH; the dil. soln. was in some cases faintly opalescent. *Grains of paradise oil*, yield 0.5%, light brown and of a characteristic odor, d_{15} 0.8970, opt. rot. $-3^{\circ} 10'$, n_D^{20} 1.49116, acid no. 2.7, ester no. 41.2, acetyl ester no. 63.9. It is insol. in 90% EtOH, miscible with less than 1 vol. of 95% EtOH to a clear liquid. *Oil of Roman Chamomile* was distd. from double flowers (official) with a yield of 1.75%, d_{15} 0.9097, opt. rot. $+1^{\circ} 10'$, n_D^{20} 1.44418, acid no. 11.2, ester no. 277.2, sol. in about 6 vols. of 70% EtOH with sepn. of much paraffin. Opt. rotation may reach $+3^{\circ}$, but S. & Co. repeatedly obtained distillates also with faint neg. rotation, e. g., $-2^{\circ} 30'$, detected by the aid of E. Beckmann's lamp (C. A. 7, 1639). *Rose oil*, Russian, from Tiflis, gave d_{15} 0.8618, opt. rot. $-2^{\circ} 28'$, congealing p. $+19^{\circ}$; stearoptene, 23%; free acid calcd. as AcOH, 0.37%; ester calcd. as rhodinyl acetate, 2.79%; rhodinol (citronellol), 27.53%; geraniol and β -Ph Et alc. 41.44% terpenes, 4.77%. (Cf. C. A. 9, 352.) *Oil of turpentine* from *Pinus Jeffreyi* gave d_{15} 0.7051, opt. rot. $-0^{\circ} 10'$, n_D^{20} 1.39653, acid no. 0, ester no. 5.2, acetyl ester no. 8.7, sol. in 5.5 vols. of 90% EtOH. The balsam yielded 9.4% of oil. Most of the oil distd. between 96 and 100° , consisting chiefly of *N*-heptane (A. W. Schorger, C. A. 8, 1513). The aldehyde contained in the higher fractions is not citronellal (Schorger) but *N*-decylaldehyde (d_{15} 0.8212, opt. rot. $\approx 0^{\circ}$). Its *thiosemicarbazone* m. 99° to 100° , that of *N*-nonylaldehyde m. 77° , of *N*-octylaldehyde m. 94 to 95° , of citronellal m. 54 to 55° . Linalool and Me-chavicol were also present. *Oil of vetiver* from the Fiji islands, received from the Imperial Inst. (London), gave d_{15} 1.0164, n_D^{20} 1.52058, acid no. 31.1, ester no. 17.3, acetyl ester no. 143.7, sol. in 1 vol. 80% EtOH, turbid with 2+ vols. The constns. of oil from East Indian root detd. by the Imp. Inst. are d_{15} 1.0052, opt. rot. $+15^{\circ} 25'$, n_D^{20} 1.51880, acid no. 29.6, ester no. 12.5, acetyl ester no. 141.2, sol. in 1.5+ vols. of 80% EtOH. For oil from the Seychelles, S. & Co. detd. d_{15} 0.9863 to 0.9977, opt. rot. $+10^{\circ} 30'$ to $+19^{\circ} 25'$, n_D^{20} 1.52253, acid no. 8.2 to 16.3, ester no. 10.7 to 17.2, acetyl ester no. 103.3 to 130.5. Two samples were sol. only in 90% EtOH (0.5+ vol.), 3 gave clear soln. with 1.5 vols. 80% EtOH, clouding with 3+ vols. *Ylang-ylang oil*: Of two samples from the Seychelles, the constns. of the first point to a cananga oil, of the second, to a true ylang-ylang oil, d_{15} 0.9200, 0.9567; opt. rot. (21°) -30° , (20°) $-28^{\circ} 5'$; acid nos. 4.2, 3.3; ester nos. 42.2, 126.0; acetyl ester no. (for second) 181; sol. in 1 vol., in 0.8 vol. of 90% EtOH, then turbidity. The odor of the second oil is somewhat pungent, and far inferior to that of a good Manila distillate. The constns. of the first oil 3 yrs. later, were d_{15} 0.9250, opt. rot. (24°) $-28^{\circ} 36'$, acid no. 2.6, ester no. 53.5, sol. in $1\frac{1}{2}$ vol. 90% EtOH, then cloudy. A Mauritius oil gave d_{15} 0.9883, opt. rot. (20°) -30° , acid no. 7, ester no. 173, acetyl ester no. 211, sol. in 0.1 to 2.5 vols. 90% EtOH, then cloudy. (Bull. Imp. Inst. 12, 230 (1914).) *Copahillo oil*, probably from the Mexican wood of *Exothea copahillo* Radlk., gave d_{15} 0.8304, opt. rot. $+0^{\circ} 50'$, acid no. 10.2, ester no. 13.1, sol. in 0.5+ vol. 90% EtOH, contains at best small amts. of linalool. *Oil of the herb "Dox"* from Bombay, derived from a var. of *Artemisia maritima*, is a dark green oil of peculiar odor, yield 0.24%, d_{15} 0.9696, acid no. 1.8, ester no. 4.2, sol. in about 3 vols. 70% EtOH, sepg. paraffin. *Oils of false camphor tree*, *Hernandia peltata* Meissn. were distd. from the trunk wood

(I), the wood of the root (II), the whole fruits (III), the seeds (IV). Yields were 1.03-2.06% (I), 0.5% (II), 0.5% (III), 1.38% (IV); d_{15} 0.958 to 0.963 (I), 0.9667 (II), 0.9528 (III), 1.0044 (IV); opt. rot. $+83^{\circ} 45'$ to $+104^{\circ} 12'$ (I), $+126^{\circ} 15'$ (II), $+50^{\circ} 16'$ (III), $+87^{\circ}$ (IV); n_D^{20} 1.49695 to 1.50111 (I), 1.50383 (II), 1.49554 (III), 1.50614 (IV); acid no. 4.4 (I), 7.3 (IV); ester no. 47.1 (I), 110.4 (IV); % of aldehydes, detd. by means of Na_2SO_3 , 75-80 (I), 92.5 (II), 49 (III); solubility in EtOH, 2.5 to 4+ vols. of 70% (I), 2.5+ of 70% (II), 0.3+ vol. of 90%, more than 10+ vols. of 80% (III), more than 10 vols. of 70%, 0.5 vol. of 80% with opalescence (IV). All these oils except (III) had the characteristic odor of perilla aldehyde. *Himalaya cedar oil* from *Cedrus deodara* (Roxb.) Loud., is light brown, of balsamic odor, d_{15} 0.9530, opt. rot. $53^{\circ} 8'$, n_D^{20} 1.51565, acid no. 2.9, ester no. 14.9, acetyl ester no. 39.2, not entirely sol. in 10 vols. of 90%, miscible with 95% EtOH. The bulk of the oil is a sesquiterpene, not identified. It gave no positive test for cadinenene. *Oil of Libocedrus decurrens*, California; the odor recalls that of savin oil, d_{15} 0.8756, opt. rot. $-0^{\circ} 51'$, n_D^{20} 1.47544, acid no. 0.9, ester no. 4.6, sol. in 7+ vols. 90% EtOH, turbid. 22% of the oil boiled between 158° and 160° , containing *l*- α -pinene. *Oil of Melaleuca hypericifolia* from German East Africa, d_{15} 0.9145, opt. rot. $-0^{\circ} 18'$, n_D^{20} 1.46271, sol. in 2.5+ vols. 70% EtOH, eucalyptol content 72%. The const. of the oils from a broad-leaved (I) and a narrow-leaved (II) var. of *Melaleuca leucadendron* (Ger. E. Africa) are d_{15} 1.0019, 0.9056; opt. rot. $-3^{\circ} 44'$, $-0^{\circ} 22'$, n_D^{20} 1.52500, 1.47936; acid nos. 0.4, 0.7; ester nos. 7.6, 11.8; acetyl ester nos. 15.2, 84.8; sol. in 0.6+, 1.5+ vols. of 80% EtOH. Both oils differ essentially from cajuput oil (III) and from each other. Eucalyptol essential in (III) is absent in (I), and present in (II) only in small amt. 78% of the oil (I) is Me eugenol which is not found in (III). *Mother clove oil*, yield 2.03%, d_{15} 1.0933, opt. rot. $-3^{\circ} 11'$, n_D^{20} 1.54332, sol. in 1.8+ vols. of 70% EtOH; phenols (detd. with 3% NaOH), 88% (d_{15} 1.1210), 60% of which is eugenol, 40% a solid phenol insol. in H_2O , sol. in alk. and organic solvents, cryst. from EtOH, m. p. 44 to 45.5° ; b_{714} 309° to 310° , b_4 $146-9^{\circ}$, opt. rot. $=0^{\circ}$, d_{15} 1.188, Bz compd. m. 87 to 88° . *Oil of yama-nikkei bark* (wild cinnamon bark), gave d_{15} 0.9245 opt. rot. $+8^{\circ} 34'$, n_D^{20} 1.47779, acid no. 0.6, ester no. 14.8, sol. in 1+ vol. 80% EtOH; yield, 1.77 to 2.1%. The oil has a strong odor of camphor with faint odor of ginger. The fraction b_4 $40-75^{\circ}$ has the odor of terpenes and cymol. From the bulk of the oil b_4 $75-95^{\circ}$, camphor seps. in large amt. *Hardwickia balsam* received from Imperial Inst. (London) was viscid, reddish brown, greenish in thin layer, of faint, unpleasant odor. d_{15} 1.0222, acid no. 104.0, ester no. 32.6. Distn. with steam sepd. about 35% of colorless oil of faint odor, d_{15} 0.9080, opt. rot. $-6^{\circ} 7'$, n_D^{20} 1.50026, acid no. 0.3, ester no. 3.9, sol. in 5.5 + 95% EtOH, very slight opalescence. The residual resin was brittle, acid no. 160.6. *Vanillin*: A com. specimen from Italy contained only 18% of vanillin; the remainder was salicylic acid.

S. WALDBOTT.

Composition of Spiritus aetheris nitrosi (MARSHALL) 11H.

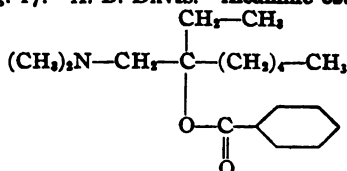
U. S., 1,149,582, Aug. 10. J. HUISMANN. Dehydrothiitoluidinedisulfonic acid of the formula



yellow leaflets, sol. in H_2O with a yellow color, forming a Na salt easily sol. in H_2O and an easily sol. yellow diazo compd., is made by heating the monosulfonic acid with $\text{H}_2\text{SO}_4 + \text{H}_2\text{O}$ for several hrs. to drive off all the H_2O .

U. S., 1,150,579, Aug. 17. C. COUTELLE and A. MORR. Copper salts of polymethylenebisimino acids, such as β -methyltetramethylenebisiminoacetic acid or tetramethylenebisiminoacetic acid, cryst. compds. sol. in H_2O and difficultly sol. in organic solvents, therapeutic agents for the treatment of tuberculosis, are formed by boiling the acid with H_2O and $CuCO_3$.

U. S., 1,150,580, Aug. 17. A. B. DAVIS. Alcamine ester of the formula



a local anesthetic, is produced by treating chloromethyl ω -bromopropyl ketone with EtMg bromide, condensing the tertiary alc. thus formed with dimethylamine to form dimethylaminomethylethylamylcarbinol and esterifying with BzCl . It forms white crystals.

U. S., 1,150,654, Aug. 17. R. BERENDES. Gallocoxylic acid compound containing iodine and bismuth; a red-brown powder, containing about 20% I and 45% Bi, insol. in H_2O and difficultly sol. in alc., ether, C_6H_6 and ligroin; split by dil. HCl with production of gallocoxylic acid; made by heating gallocoxylic acid and Bi oxydide together in H_2O at 100° . The compd. is an antiseptic and astringent. Cf. C. A. 8, 2220.

Brit., 8,917, Apr. 8, 1914. AKT.-GES. FÜR ANILIN FABRIKATION. Ureide of aminoanthraquinones, and aminoanthraquinones themselves, are prepared by heating ureide of 3-aminobenzoyl- α -benzoic acids with H_2SO_4 . Substituted acids containing Br, Cl, or I, or methoxymethyl, and sulfonic groups may be used. Ureide of 3-aminobenzoyl- α -benzoic acids, containing or not substituents such as Br, or Cl, and Me, methoxy, or sulfonic groups, are prepared by treating the alkali salts of the acids with COCl_2 in the presence of chalk, soda, etc. 3-Nitro- and -amino-4-sulfo-benzoylbenzoic acids are successively obtained by treating 3-nitro-4-chlorobenzoylbenzoic acid with Na_2SO_3 , and subsequently reducing the product. 4-Methyl-2'-benzoyl-3',4',5',6'-tetrachlorobenzoic acid and its 3-nitro and 3-amino derivs. are successively obtained by condensing tetrachlorophthalic anhydride with toluene, and then nitrating and finally reducing the nitro product. 3-Nitro- and -amino-4-methoxybenzoylbenzoic acids are successively obtained by treating 3-nitro-4-chlorobenzoylbenzoic acid with MeOH -potash lye, and subsequently reducing the product.

Brit., 9,237, Apr. 14, 1914. GES. FÜR ELEKTRO-OSMOSE. In mfg. a solution of silicic acid of low molecular weight, an alkali silicate soln. of 5-10% strength is placed in an anode compartment, the electrodes being preferably perforated and placed close to the diaphragm. To prevent passage of silica, in consequence of the presence of traces of foreign acids, the diaphragm is made of a material giving practically a zero potential, for instance a mixt. of carborundum and corundum, the process of 2,626, 1911 (C. A. 6, 1883), being employed. When the product is to be used medically, the anode is of Pt netting; otherwise it may be of Pb-Sb alloy. Brass wire netting may serve as cathode. The elec. pressure, initially low may be raised to 60-70 v. to remove the last of the alkali. Traces of foreign acids are then sepd. by transferring the silicic acid to a vessel serving as cathode and containing an anode surrounded by a diaphragm which may be of parchment paper; the elec. pressure may be gradually increased during this treatment. Reference is made to the prepn. of sol. silicic acid by decomposing SiS_2 or the methyl or other ester of silicic acid by prolonged b., and by the action of H_2O on SiCl_4 .

Brit., 9,261, Apr. 14, 1914. *GES. FÜR ELEKTRO-OSMOSE*. Stable metal sols are obtained by the use of sol. silicic acid; the pure silicic acid described in 9,237, 1914 (*supra*), is suitable. The process may be carried out by reducing the metal salt, *e. g.*, a Au or Ag salt, by a suitable reducing agent, such as hydrazine hydrate, in presence of the silicic acid soln. The prepn. may be purified electro-osmotically from electrolytes.

Brit., 9,472, Apr. 16, 1914. *BAYER & Co.* Ureas are prepared by treating with COCl_2 the compds. obtained by condensing nitrobenzoyl halides or their substituted derivs. with 1,8-aminonaphtholsulfonic acids and subsequent reduction of the nitro group. By repetition of the condensation and reduction processes, acids containing several aminobenzoyl residues may be obtained, and then converted into ureas. The ureas have a destructive action on blood parasites such as trypanosomes, and also have an affinity for cotton fiber. Azo dyes result by the combination of the above-described ureas with diazobenzene and other diazo compds.

18. ACIDS, ALKALIES, SALTS AND SUNDRIES.

T. LYNTON BRIGGS.

Purification of commercial hydrochloric acid. A. COIGNARD. *Ann. chim. anal.* 20, 145-6(1915).—Simple distn., rejecting about the first third of the distillate to remove all As, yields a very weak acid and is therefore too expensive on account of loss. Houzeau's process based on the addition of KClO_3 to convert As to AsCl_3 and then distg., collecting distillate from the start, yields a product free from Fe (best to add 2 to 3 cc. of H_3PO_4 to retort), H_2SO_4 or residue. However, it is very difficult to remove all Cl. All of the As is supposed to remain in the retort; but AsCl_3 is stable in HCl soln. only when cold, being slowly decomposed by conc. HCl on heating with the formation of AsCl_5 and Cl. FeCl_3 favors this reaction. The total distillate therefore contains As. By collecting the first products of distn. it is possible to eliminate the As, but the loss is considerable and the purity of the product uncertain. Bettendorf adds SnCl_4 to acid of over 16° Bé. to ppt. the As, lets stand 24 hrs., removes excess of SnCl_4 with HgCl_2 , decants from the ppt., filters if necessary, and distils till just pasty (if H_2SO_4 is present, add 3 to 4 g. NaCl before distg.). The product is free from As or other impurities. With acid of an initial concn. of 20 – 22° Bé. and the complete removal of the ppt. before distn., there is no danger of any As or SnCl_4 passing into the distillate. Duflos' process requires less care and yields a high grade product. Dil. the crude HCl to 17° Bé., add a pinch of MnO_2 or KClO_4 if SO_2 is present; add a few pieces of cleaned com. Cu foil and let stand 24 hrs. at about 30° . Remove and clean the foil, return to the acid and let stand 24 hrs. All As is pptd., free Cl removed, FeCl_3 converted to FeCl_2 . Decant and distil in the presence of Cu shavings. Distn. may be carried quite far, as in the preceding. Methods based on the use of 4 to 6 g. of $\text{K}_2\text{S}_2\text{O}_8$ per l., H_2S or BaS to remove As before distn. are not as good as the preceding. In the processes of Houzeau and Duflos any Sb remains in the retort; in that of Bettendorf traces of Sb may be entrained with the impure acid. F. W. SMITHER.

Calculations for the operation of the cooling tower. WM. KENT. *Industrial Eng.* 13, 68(1915). C. G. F.

Method of transferring acid without waste. ANON. *Elec. World* 66, 367(1915).—The app. consists of a bronze centrifugal pump and flexible tubes connected with inlet and outlet. A short suction hose is inserted in the container while a long hose conveys the acid to the battery jars. Corrosion is minimized by forcing NH_3 and H_2O through the pump after each use. W. H. BOYNTON.

The feasibility of continuous causticizing. R. W. S. *Met. Chem. Eng.* 13, 514-5 (1915).—A discussion of the feasibility of adapting continuous agitation and contin-

uous countercurrent washing to causticizing soda ash by means of CaO, according to the equation $\text{Na}_2\text{CO}_3 + \text{CaO} + \text{H}_2\text{O} = 2\text{NaOH} + 3\text{CaCO}_3$. According to the flow sheet of the proposed process CaO and Na_2CO_3 sufficient for 24-hrs. operation are to be reduced to $\frac{1}{4}$ in. and smaller and stored in the hoppers, from which the CaO and Na_2CO_3 would be fed continuously and in the desired proportion to the first Dorr agitator of the series. Weak soln. from the washing system would be transferred directly to this agitator. A series of agitators is advisable, the size of the agitators being a function of the time required to reach chem. equil. The heat necessary to maintain the desired temp. would be supplied by steam coils in each agitator. The mixt. would gravitate between the agitators and finally to the first of the series of Dorr thickeners; overflowing from this thickener would be the clear NaOH soln. for storage and use. The CaO mud as it settles out would be discharged and transferred to the succeeding thickener by means of a pump, being thoroughly mixed with the wash liquor flowing from the third thickener in the feed launder before entering the tank. The overflow from the second thickener would be transferred to the first agitator and the CaO mud discharged and transferred to the third thickener. Wash H_2O would be introduced into the feed launder of the last thickener and mixed thoroughly with the CaO mud which would be discharged from this last machine with a very low NaOH content. The "mud" from the last thickener could be fed to a continuous dewatering filter and thence to calciners and the CaO so obtained returned to the causticizing system. *Advantages:* the personal element would be reduced to a minimum. The reaction would proceed under the most favorable conditions for the production of a soln. of a given strength, thus insuring the highest possible yield of NaOH and the washing would be accomplished with the least possible H_2O . A relatively large amount of NaOH soln. of uniform strength would be made in a very compact plant (a space of 40 ft. sq.). Power consumption would be very small (10 h. p. delivered to a line shaft). Labor required would consist of filling the feeding hoppers. The principles set forth are the same that have largely taken the place of intermittent decantation and filtration methods in the treatment of metalliferous ores.

F. W. SMITHERS.

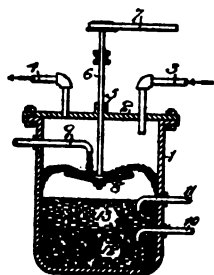
The Norwegian chemical industry and the war. ANON. *Chem. Ztg.* 39, 561-4, 582-3 (1915).

J. H. MOORE.

The activity of the "Berufsgenossenschaft" of the chemical industry in the war. H. GROSZMANN. *Chem. Ztg.* 39, 604-5 (1915).—A compilation of accidents in the various branches of chem. manuf.

J. H. MOORE.

Vacuum pans (KERR) 28.



U. S., 1,148,194, July 27. B. R. SEIFERT and W. LEIBROCK. Sodamide is made by the action of NH_3 under atm. or higher pressure on a finely divided molten alloy of Na 8% and Pb 92%. See fig. The molten alloy is supplied through the pipe 9 and comminuted by the rapidly rotating centrifugal wheel 8. NH_3 is supplied through the pipe 3. The material seps. into 2 layers, 13 and 12, composed of amide and unchanged alloy, resp.

U. S., 1,149,233, Aug. 10. F. S. WASHBURN. Obtaining high grade phosphoric acid from crude phosphoric acid liquors, made by volatilization from phosphate rock in an elec. furnace. The crude acid, which contains compds. of Ca, Si and other impurities, is treated, as fast as formed, with H_2SO_4 in sufficient amt. to break up any silico-phosphates and phosphatic Ca compds. present and effect pptn. of the impurities.

U. S., 1,149,443, Aug. 10. F. W. HOCHSTETTER. Composition for restoring

worn moving-picture films; formed of glycerol 8 oz., camphor 5 drams, alc. 2 oz., and ether 4 drams. Cf. C. A. 9, 1723.

U. S., 1,149,510, Aug. 10. F. HABER, C. BOSCH and A. MITTASCH. **Producing ammonia synthetically.** A catalyst is prepared by reducing WO_3 or NH_4 tungstate with H and a current of H and N is passed over this catalyst under pressure at 550° . The W power or W-N compd. has about 100 times the catalytic power of Zn.

U. S., 1,149,653, Aug. 10. W. S. LANDIS. **Producing ammonia from commercial calcium cyanamide.** The cyanamide is treated with steam at a temp. of about 150° while mixed with about 6% of KOH or NaOH to reduce the formation of dicyanodiamide.

U. S., 1,149,777, Aug. 10. E. L. MOORE. **Water-soluble protective coating for the hands;** formed of gum tragacanth 7-10 lbs., flour, starch and dextrin 9-12 lbs., glycerol 7-10 oz., H_2O 11-15 gals., oil of wintergreen 4-6 drams and coloring matter. The mixt. is for use by painters, machinists, etc., to facilitate cleansing the hands.

U. S., 1,149,974, Aug. 10. C. CHISHOLM. **Lithographic plates** are prepared by embedding powdered Cu in one surface of a flexible celluloid sheet and electrolytically depositing Cu and Ni successively on the powdered Cu.

U. S., 1,150,208, Aug. 17. J. A. KOSOVSKY. **Fur-glaze** composed of H_2O 9 and alc. 1 part with very small amts. of C_{10}H_8 and oil of rosemary.

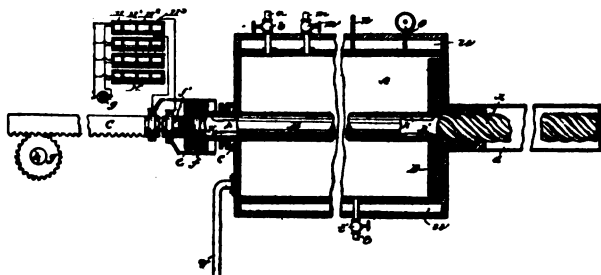
U. S., 1,150,337, Aug. 17. R. H. BROWNLEE and R. H. UHLINGER. **Producing nitrogen and carbon dioxide.** Combustion products from an internal combustion engine are mixed with combustible gas and the mixt. is burned in a mass of highly heated refractory material in a closed chamber to produce as large an amt. of CO_2 as possible. The CO_2 is absorbed in $\text{Ca}(\text{OH})_2$ to remove it from the N.

U. S., 1,150,415, Aug. 17. H. B. BISHOP. **Hydrofluoric acid** is made by reaction of H_2SO_4 upon CaF_2 in a rotating drum while agitating sufficiently to keep the material broken up and prevent the formation of a hard cake of CaSO_4 .

U. S., 1,150,642, Aug. 17. H. STOCKHAUSEN and R. GRUHL. **Condensation products of phenol with formaldehyde.** See Brit., 14,481 (C. A. 9, 164).

U. S., 1,150,688, Aug. 17. A. MAGGIA. **Antiseptic mattresses** filling for use in coffins to assist in preserving corpses; formed of wood shavings mixed with about 8% C_{10}H_8 and 8% of permanganic acid and 1% of "potash." The mixt. is intended to liberate CH_3O gas from exuding embalming fluids containing CH_3O soln.

U. S., 1,150,786, Aug. 17. H. D. RANKIN. **Apparatus for making nitric acid.** Air is compressed in the vessel A in which is placed a terminal head D having a number of positive and negative terminal points, connected with an induction coil. The terminal head is simultaneously reciprocated and rotated while the air is subjected to the elec. sparks from the terminals to cause formation of N oxides, which are passed through g to H_2SO_4 in a tank for absorption.



Brit., 8,820, Apr. 7, 1914. H. B. FOX-BOURNE and W. FOX-BOURNE. **Homogeneous articles** such as bottle-stoppers and buttons are made from a mixt. of a body material, such as powdered asbestos or hard wood, and of a binder, such as pitch or

shellac, by disintegrating the body and binder, mixing, compressing into a solid block, heating until the binder becomes viscous or liquid, cooling, disintegrating the block and again mixing, and compressing the re-mixed materials into solid form. The binder may be in such small proportion that even when the mixt. is hot it does not become plastic or dough-like.

Brit., 9,148, Apr. 11, 1914. H. SPENCE, W. B. LLEWELLYN and SPENCE & SONS. In mfg. aluminium sulfate by a process of the kind described in 23,036, 1904, the soln., *e. g.*, obtained by dissolving bauxite in H_2SO_4 , contains from 5 to 10% more Al_2O_3 than that in the normal $Al_2(SO_4)_3$, and is brought to a sp. gr. of about 1.25 to 1.3 and a temp. of about 50° . A K salt is then added in quantity less than in the previous process, an example being about 2 mols. of K_2SO_4 to 3 mols. of Fe_2O_3 . The mixt. is agitated throughout the purification, which may last for 12 to 20 hrs. The undissolved residue of the bauxite may be present during the purification. Cf. C. A. 9, 996.

Brit., 9,259, Apr. 14, 1914. T. FUJIIYANA. Nitrogen compounds. See U. S., 1,125,998 (C. A. 9, 697).

Brit., 9,295, Apr. 14, 1914. C. T. THORSSELL and H. I. R. LUNDEN. Distilling or evaporating liquids at or near their critical temps. and pressures in order to eliminate losses due to latent heat of evapn. Suitable app. is specified.

Brit., 9,370, Apr. 15, 1914. J. S. CAMPBELL. A plastic composition of comminuted leather, animal fat, fatty oil, or resin oil, or a combination of these, together with powdered filling-material, such as $MgCO_3$, lime, and French chalk, and a resilient vulcanizable binder, with or without alkali or fibrous material, is used for making leather and rubber substitutes and waterproof and elec. insulating materials. The compn. may be combined with a vulcanizing agent, such as S, with or without tannic acid and bark ext., and subsequently vulcanized; or it may be softened or rendered fluid by means of a solvent, and applied to a canvas or other backing, with or without subsequent vulcanization. The materials may be boiled together and partly or completely dried before vulcanization, and the resilient vulcanizable binder, which may be in soln., may consist of Jelutong, rubber, gutta, balata, rubber waste, etc. $K_2Cr_2O_7$, borax, and metal dust may also be added. The calendered sheets may be wound upon a drum and immersed in a tank containing a soln. of alum and boric or tannic acid or bark ext., the tank being heated in a vulcanizing pan to a suitable temp. The product may be used for tires and tire covers, washers, jointing, boot soles, machine belting, etc.

Brit., 9,384, Apr. 15, 1914. GENTHNER CARTONPAPIERFABRIK GES. Mfg. metal or color foil from a compn. metal or color powder or metal leaf, by using a backing of thin paper or other fibrous material which serves as a support for the foil during its prepn., but is afterwards destroyed or "broken down," leaving the foil ready for use. A backing of thin paper satd. with a 10% of soln. of H_2SO_4 is coated with an adhesive and sprinkled with metal or color powder, or a mixt. of adhesive and metal or color powder, or with leaves of metal. The coated paper is then passed over heated plates or rollers to destroy or break down the fiber of the paper, leaving the foil ready for use. The residual acid may be neutralized before the strip is coated, or the strip may be treated with acid after coating.

Ital., 135,019, Sept. 4, 1913. P. CANTILENA. Mfg. sulfur di- and tri-oxides by igniting a mixt. of plaster of paris and clay (in the form of a paste), with the employment of portland cement. Common chalk may be used instead of plaster of paris.

19. GLASS AND CERAMICS.

G. E. BARTON, A. V. BLEININGER.

A chemical study of colored glasses of the middle ages. G. CHESNEAU. *Compt. rend.* 160, 622-4(1915).—C. reports analyses of violet, blue, green and red glasses

from the cathedral at Rheims: The results show that the 4 glasses have a common character and apparently the same origin. The powdered glasses are completely attacked by hot conc. acids, although they have resisted atm. agencies; after grinding away the lustrous outer layer, polishing with CaCO_3 reproduces the brilliant, lustrous finish. Impure pyrolusite was used as the coloring agent for the violet glass, the impurities (Fe, Cu, Co) giving the flesh tone that cannot be obtained with pure Mn oxide. For the blue glass apparently CuO was added to the zaffer obtained from cobaltite. The absence of Ni and the high Mn content indicate that the glass workers of the 13th century were familiar with the properties, uses, etc., of these elements. The tint of the green glass was obtained by a mixt. of CuO and Fe_2O_3 , the shade being influenced by a little Co and much Mn. The color of the red glass is due to an extremely thin enamel containing Cu_2O ; after removing this enamel, the glass is a clear green color, like ordinary bottle glass. The high K_2O content of the violet and green glasses was necessary to obtain the violet of Mn and the green of Cu, operating in a very oxidizing atm. (adding KNO_3 to the ordinary glass composition to avoid the reducing action of the furnace gases).

F. W. SMITHER.

Report of the British Science Guild with reference to the manufacture of optical instruments and matters relating thereto. *Chem. News* 111, 178-80(1915).—Chance Bros. have quadrupled their plant since the outbreak of the war and the supply for England of optical glass for telescopes, binoculars, range finders and other service instruments is sufficient. For photographic lenses the glass supply is quite inadequate; one reason is the scarcity of pure Ba compds. A wide range of optical glasses is not obtainable in England. Chance Bros. list 20 to 30 types while Schott lists 70. Ba glasses of high index and low dispersion are especially needed. The greatest difficulty is to find a refractory lining (for the clay pot) that will withstand the solvent action of the molten glass.

C. H. KERR.

A furnace for the production of hollow and pressed glass. *ANON. Glasind.* 26, No. 25/26(1915); 6 figs.

J. B. PATCH.

The preparation of metal patterns. F. M. *Diamant* 37, 345-6(1915); 3 figs.—A machine for electrolytically depositing metallic patterns and stencils upon decorative ware is described.

J. B. PATCH.

Report of the organization of talcum interests in Austria-Hungary. HEINRICH ROSENBERG. *Glashütte* 45, 156-8, 170-2(1915).—R. summarizes briefly the use of Mg silicate in the manuf. of enamels, refractories and glasses. Thirteen recipes are given.

J. B. PATCH.

The properties of kaolin and its behavior toward dyestuffs, caustic alkalies and alkali silicates. P. ROHLAND. *Glasind.* 26, Nos. 19-20-21-22(1915).—R. has tested the adsorptive power of clays with methyl orange, indigo and other dyestuffs. The amt. of adsorption is proportional to the amt. of colloidal matter present. He finds kaolin to be slightly superior in this respect to English china clay and hence more plastic. The acidity of the dyestuff is a factor. Methyl orange, for instance, in acid solns. is much more easily adsorbed by the clay than in alk. soln. Hence it is assumed that the acid soln. favors the formation of colloids and the alk., of crystalloids. Undissociated colloidal alkali silicates ppt. the quartz and sand grains in kaolin and hydroxyl ions coagulate the kaolin particles.

J. B. PATCH.

U. S., 1,150,467, Aug. 17. J. WEBER. Opaquing composition for use in vitreous enamels is formed by hydrated stannic oxide containing about 10% H_2O and 3-5% of alkali.

U. S., 1,150,772, Aug. 17. I. KREIDL. An opaquing material for white enamels is made from an alk. compd. of Zr or other opaquing metal by treating with a weak

acid and washing to remove part of the combined alkali and improve the opaquing effect of the material. Cf. *C. A.* 9, 701.

Brit., 8,892, Apr. 8, 1914. W. J. GEE. Drying china-clay, clay, fullers earth pigments, whitening, etc., with the aid of intense heat while the material is kept in motion by an endless permeable band to which it is supplied in thin films. Waste heat from the drier may be used to preheat the material. The permeable band may consist of a series of parallel wires.

20. CEMENT AND OTHER BUILDING MATERIALS.

C. N. WILEY.

Further results in investigating properties of high magnesia portland cements. P. H. BATES. U. S. Bur. of Standards. *Concrete-Cement Age* 7, C. M. S. 1-7(1915); cf. *C. A.* 8, 1653.—Further chem., petrographic and physical test data are given. Monticellite ($\text{CaO} \cdot \text{MgO} \cdot \text{SiO}_2$) is first noted in burn containing 8.03% MgO. Spinel is also observed in high MgO clinker. High MgO cements produced concrete showing as good a deportment as regards expansion as the low MgO cements. Satisfactory 13 and 26 week strength results are obtained with a cement containing 10.33% MgO. In a cement containing 18.98% MgO whose neat tensile specimens disintegrated before the end of 1 yr., cracks are noted filled with crystals of sulfo-aluminate of lime, brucite [$\text{Mg}(\text{OH})_2$] and $\text{Ca}(\text{OH})_2$.

A. A. KLEIN.

Oil-mixed portland cement concrete. Office of Public Roads. U. S. Dept. of Agr., *Bull.* No. 230(1915).—Admixtures of certain mineral oils in proportions not to exceed 10% of cement used do not lessen the tensile strength of mortars. The decrease in compressive strength of mortar and concrete is not serious. Concrete mixed with oil takes perhaps twice as long to set, but the increase in strength is nearly as rapid in the oil-mixed materials as in plain concrete. The former is not impervious to heavy water pressure but practically so under low heads. The oil should be a fluid petroleum product containing no fatty or vegetable oils. It shall have a d. not greater than 0.945 at 25° and a flash pt. of not less than 150° by the closed-cup method. When 1 part of oil is shaken with 2 parts of 0.01 *N* NaOH there should be no emulsification. To damp-proof an old surface a mortar of 1 part cement, 2 parts sand and containing 5% of oil should be sufficiently non-absorbent. Sand and cement should be first mixed with the proper amt. of H_2O into a stiff mortar, to which is added the correct amt. of oil, and the whole mass is again thoroughly mixed until all the traces of oil have disappeared. Extreme care must be exercised in proportioning, mixing and placing the concrete.

A. A. KLEIN.

Broken concrete as aggregate for paving. ANON. *Eng. Record* 71, 816(1915).—Old concrete broken up into $\frac{1}{4}$ to $2\frac{1}{2}$ " sizes was used as aggregate for paving at Kansas City. 28 day tests on 1:3:6 concrete showed an av. crushing strength of 1260 lbs. per sq. in.

A. A. KLEIN.

Specification for wood paving block oil. H. M. NEWTON, S. R. CHURCH AND H. VON SCHRENK. *Wood-Preserving* 2, 44(1915).—The following specification has been adopted by the Comm. on Standard Specifications of the Creosoted Wood Paving Block Bureau: (1) The sp. gr. shall not be less than 1.07 nor more than 1.11 at 38°. (2) Not more than $2\frac{1}{2}\%$ shall be insol. by continuous hot extn. with C_6H_6 and CHCl_3 . (3) On distn., which shall be made exactly as described in the rept. of the Committee D-7 of the Am. Soc. for Testing Materials, 1915, the distillate based on water-free oil shall be within the following limits: Up to 210°, not more than 5%; up to 235°, not more than 30%; up to 315°, at least 50%; up to 355°, at least 70%. (4) The sp. gr. of the distillate between 235° and 315° shall be not less than 1.03 at 38° com-

pared with water at 15.5°. (5) (a) The sp. gr. of the residue above 355° shall be at least 1.23 at 25° compared with water at 15.5°. (b) If the residue does not conform to requirements 5 (a), it shall be of a cryst. or granular nature and non-ductile, and it shall have a sp. gr. of not less than 1.14 at 25° compared with water at 15.5°. (If the residue falls within requirements 5 (b), the whole oil may have a sp. gr. of not less than 1.05 at 38° instead of 1.07 as required in (1).) (6) The sp. viscosity at 82° shall not exceed 1.2. The term "sp. viscosity" shall mean the number of secs. found for the sample tested divided by the number of secs. for water at 20° given in the official certificate for the viscosimeter used. (7) The oil shall not contain more than 3% of water. This specification was drawn up definitely to limit the proportions of tar that may be added to the distillate of creosote oil.

E. J. C.

The Port Reading creosoting plant. ANON. *Wood-Preserving* 2, 37-40(1915).—An illustrated description.

E. J. C.

U. S., Reissue 13,952, July 27. R. A. MARR. Preserving balsa, ceiba or other woods by impregnation with paraffin, rosin and diatomaceous earth. See original pat. 1,121,644 (C. A. 9, 364).

U. S., 1,150,295, Aug. 17. S. B. NEWBERRY. Recovering alkalies from the stack-gases of cement kilns. Flue-dust is sepd. from the gases, which are then cooled by passing over H₂O-cooled tubes, washed with H₂O and freed from liquid by passing through coke. Insol. material is removed from the soln. of alkali metal salts obtained and this together with the flue dust is returned to the kiln. Part of the soln. is evapd. and the remainder is used for further washing the gases. Cf. C. A. 9, 364.

U. S., 1,150,481, Aug. 17. J. H. AMES. Bituminous paving composition; made by mixing dry powdered CaO with earth, sand or gravel, slaking the CaO and while the mixt. is hot from the reaction adding 4 times the wt. of CaO of hot liquid bituminous or pitchy material, then adding more CaO and thin alk. cement mortar.

U. S., 1,150,499, Aug. 17. J. W. CARR. Wood-preserving composition composed of equal amts. of pine tar, linseed oil, rosin oil and kerosene.

Brit., 8,645, Apr. 6, 1914. A. ANKER. In a process and app. for slaking lime or other mortar material, the material is fed into an inner chamber having perforations and surrounded by an outer chamber revoluble about an axis. The material is fed in by an opening having a suitable closing-device, and steam is supplied to the outer chamber through one of the trunnions. After a time, the condensed H₂O is withdrawn and the app. is rotated. The material is discharged by the charging opening. Cf. C. A. 8, 2793.

Brit., 9,281, Apr. 14, 1914. M. A. POPKESS. App. for heating, drying, and pulverizing earthy substances, such as soil, loam, clay, or peat, for the purpose of making paving-material, consisting in providing an external drum having internal rotary means for raising the material to an internally heated and rapidly rotating pulverizing drum, the fine dust being sepd. out as fast as it is formed by means of a screen arranged between the 2 drums.

21. FUELS, GAS, TAR AND COKE.

J. D. PENNOCK.

Fuel and motor-fuel in war times. AUFHAUSER. Hamburg. *Chem. Ztg.* 39, 545-7(1915).—A general review of conditions in Germany.

J. H. MOORE.

Sampling in colliery work. T. W. D. GREGORY. *Iron Coal Trades Rev.* 90, 779 (1915); *Colliery Guardian* 109, 1168-9(1915).—In sampling by the coning and quartering method 2 distinct processes are entailed: (1) reducing the bulk of sample and (2) re-

ducing the size of particles of material. G. quotes results of expts. that show that to keep the error below 1%, with the max. size of particle 2 in., the amt. of sample should be 8,300 lbs.; with 4-mesh 1,100 lbs., 8-mesh 120 lbs., 20-mesh 3 lbs. Slack should be sampled at the screens; if in wagons it should be holed from top to floor in at least 3 places taking a center line down the length of the wagon. In sampling a face remove dust and fragments for a width of 4-5 ft. from roof to floor. In the middle of this remove the coal to a depth of $\frac{3}{4}$ in. and 9 in. wide. Take the sample by means of a pick cutting in the prepared surface, keeping 5-6 lbs. per foot of seam. Notes on sampling mine air and water are appended.

H. L. OLIN.

Coal. G. DE P. COTTER. *Rec. Geol. Surv. India* 44, 163; *Bull. Imp. Inst.* 13, 322(1915).—Analysis of 22 samples of coal found in Upper Burma and the region near the Yaw River showed comps. as follows: fixed C 29-39, volatile matter 32-37, moisture 15.6-21.6, ash 7.3-21.7% and calorific value from 4500 to 4835 cal. Owing to its high S content (2.1-5.6%) and low calorific value, it has no economic importance at present.

R. L. SIBLEY.

Coal from Somaliland. ANON. *Bull. Imp. Inst.* 13, 189-90(1915).—Analysis of a sample of coal from Somaliland showed a calorific value about 75% of that of Welsh steam coal. It burned to a light, cream-colored ash which did not fuse.

R. L. S.

Predetermination of the clinkering action of bituminous coals by laboratory tests. F. C. HUBLEY. *Proc. Eng. Club Phila.* 32, 35-85(1915).—Fusion tests were made of ash cones in a gas-fired Fletcher crucible furnace, the furnace being held 3 min. at the temp. where the cone began to lose its sharp sides or to swell. 4-5 cones of the same ash mixt. were then heated within a range of 100-200° on either side of the preliminary test, from which an arbitrary point was taken at which fusion occurs. On account of time required for cone detns. a "fusiometer" was designed; in this a pellet of coal formed under pressure was subjected during the furnace run to a load of 1.5 lbs. per sq. in. by means of a weighted C rod. The vertical movement of the C rod was magnified 12 times on a horizontal scale and the results plotted using temps. as abscissas and scale movements as ordinates. Sixty-mesh ash was used and temps. measured with a Pt-Rh thermocouple standardized against the m. p. of Cu and Ni cylinders under 1.5 lbs. pressure. The results showed that a long range ash with slow increase in softening produced a close, gummy clinker of high viscosity, with corresponding max. clinker formation in boiler firing; the other type is a short range, spongy, porous formation of low viscosity which is handled more easily under a boiler. Wide variations were found in viscosity between ashes fusing at approx. the same temps. Attempts to correlate the fusion point with the ultimate analysis were made; Fe appeared to be the most potent flux while no relation was found between fluxing point and CaO or S content. Prost's formula and the "F" modulus were applied with variable results; better agreement was obtained with the "H" modulus, in which fusion is made proportional to 100% minus SiO₂ and inversely proportional to the product of SiO₂ and Fe. A max. temp. error of 160° F. was obtained in this way. Fusion ranges of various ash constns. were made, from which it is concluded that any combination of SiO₂ and Fe in the fuel bed is probably in the form of ferric silicate (cf. Fieldner and Hall, *C. A.* 9, 1837-8). Variations of fire box temp. with rate of combustion or boiler load tests, causes the adoption of a specification requiring the application of a load of 1.5 lbs. per sq. in. and a fusion temp. not under 1482°. The curve from the fusiometer develops fusing range, m. p. and viscosity of melt and if lower fusing point is specified the viscosity of melt must be considered. Duplicate results may be obtained within 10° and the time required averaged 26 min. per test.

A. J. PHILLIPS.

Four points in the indictment of the smoke nuisance. JOHN O'CONNOR, JR. *Pop. Sci. Monthly* 87, 244-9(1915).—A statement of our present knowledge of the:

effects of smoke on (1) building materials, (2) meteorological conditions, (3) vegetation and (4) health. E. J. C.

Formation of ammonia and cyanogen during the carbonization of coal. O. SMERSBACH. *J. Gas Lighting* 131, 246-7(1915); see C. A. 8, 3497. E. J. C.

Blast-furnace gas in steam production. S. M. MARSHALL. *Iron Coal Trades Rev.* 91, 45(1915).—Top gas may be classed under 3 heads: (1) waste, (2) that required for stoves, and (3) the remainder available for power. In well constructed plants waste is about 6%, stove consumption 24-30%, leaving 64-70% for blower and surplus power. The variation in the vol. and pressure of the top gas due to the checking of the blast in casting, prevents high efficiency in burning the gas. M. describes a regulating device for the burner, by the use of which boiler efficiencies are raised from 57 to 80%. H. L. OLIN.

The Morgan producer-gas machine. *Iron Age* 95, 1161-3(1915).—3000 lbs. coal per hr. are gasified. The fire bed is not stirred, but leveled and ashes removed at bottom once a day. The blast is evenly distributed by 3 hollow arms, and a pipe extending around the mantel. The walls are made thin so that water-cooling is effective on brick, preventing slagging action. Using 2,766 and 3,200 lbs. coal per hr. gives gas of following, resp., compn.: CO_2 , 2.8, 3.0%; C_2H_4 , 0.6, 0.9; CO , 27.3, 29.5; H_2 , 11.1, 11.8; CH_4 , 3.4, 2.6; B. t. u. total at 0° 179, 186. One-sixth lb. steam per lb. coal is required for power. H. V. MAIN.

The coking of coal at low temperatures with special reference to the properties and composition of the products. S. W. PARR AND H. L. OLIN. Univ. Ill. Eng. Expt. Sta., *Bull.* 79, 39 pp.(1915).—Coke resulting from the low temp. process contains from 18% to 22% volatile matter but retains no tar-forming constituents. In domestic appliances it kindles readily and burns with a bright, smokeless flame. A suction gas-producer test made with this fuel compared favorably in ease of operation and efficiency with similar tests of anthracite. The tar (d. = 1.069) contains less than 2% free C and is rich in low-boiling substances, many of which are suitable for use in internal-combustion engines. Tar acids (phenol, cresols, etc.), useful for preserving wood, constitute 30% of the crude material. The pitch residue, 30%, is low in free C. Naphthalene is absent. E. J. C.

Coking coal chain stoker. *Iron Age* 95, 1280-1(1915).—The Green Eng. Co. provide an inclined, agitated coking grate which permits the volatile matter to be distd. and burned. This grate deposits the coked coal on the chain grate. H. V. MAIN.

Utilization of waste sulfite liquors (LANDMARK) (RINMAN) 23. Stoking with bagasse (PRINSEN-GEERLIGS) 28.

U. S., 1,148,368, July 27. E. V. EVANS. Recovering nitrogen as ammonium salt from the hydrocyanic acid of coal gas by first converting the HCN into NH_4CNS soln. of about 20-30% strength and then heating this soln. to 80-110° with 1.5 times its vol. of H_2SO_4 of 70-80% strength. The resulting liquor is introduced into the saturator in which the ammoniacal liquor from the gas is distd.

U. S., 1,148,403, July 27. R. D. PRICE. Mixture for removing carbon deposits from internal combustion engine cylinders, formed of alc. 25, graphite 1, CS_2 25, kerosene 25 and lubricating oil 24%.

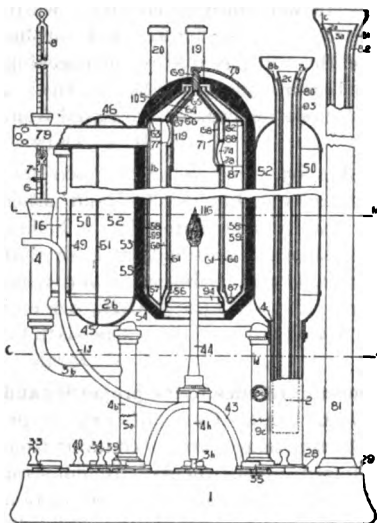
U. S., 1,149,536, Aug. 10. H. J. PHILLIPS and A. PHILLIPS. Coal briquets are made by grinding coal to a pulp with 45-60% its wt. of H_2O , molding under sufficient pressure to remove part of the H_2O , heating the formed briquets to 200-500° and then pressing again after heating sufficiently to slightly soften the briquet.

U. S., 1,149,611, Aug. 10. W. O. AMSLER. Gas-producer (grate and grate-operating mechanism). Cf. C. A. 8, 238.

U. S., 1,150,454, Aug. 17. A. E. ROBERTS. Apparatus for dehydrating and recovering oil from natural gas as it comes from the well.

U. S., 1,150,807-10, Aug. 17. H. A. CARPENTER. Coal-gas retort structures.

U. S., 1,150,836, Aug. 17. H. L. DOHERTY. Gas calorimeter. The gas to be



tested and a gas of known calorific value, are drawn from concentric tanks 50 and 52 at the same temp. and burned in a combustion chamber 116. The heat of combustion is absorbed in H_2O led to the thermometer well 4.

U. S., 1,150,837, Aug. 17. H. L. DOHERTY. Washing gases, *e. g.*, to sep. NH_3 from coal gas. The gas mixt. is passed upward in contact with a fine mist or fog of absorbing liquid and the mist is cooled and sepd. by passing the mixt. over surfaces covered by a film of the absorbing liquid.

U. S., 1,150,838, Aug. 17. H. L. DOHERTY. Recuperating heat of combustion gases of a furnace fired with producer gas. A portion of the combustion gases with a small amt. of air is passed through the fuel bed of the gas producer to reduce CO_2 to CO . The vol. of gases thus treated is in excess of that corresponding to the amt. of CO_2 which the fuel bed is capable

of reducing. Heat from another portion of the combustion gases is transferred to the gases discharging from the fuel bed and another portion is led to a recuperator to heat air and then is mixed with the second portion at a point in the recuperator where their temps. are nearly the same. The air from the recuperator is led to the producer.

U. S., 1,150,839, Aug. 17. H. L. DOHERTY. Fuel for gas producers is formed by mixing coal containing alumina, CaO or $CaCO_3$, Fe_2O_3 , and SiO_2 in such proportions that the other bases present will be at least equal in combining power to that of the alumina and that on combustion a silicate mixt., fusing at 1430° or below, will be formed.

U. S., 1,150,840, Aug. 17. H. L. DOHERTY. Method of heating gas-fired coke ovens.

U. S., 1,150,842, Aug. 17. H. L. DOHERTY. Method of regulating gas-combustion in furnaces.

Brit., 9,034, Apr. 9, 1914. W. B. DAVIDSON. Recovering pitch by fractional distn. of the tar in the hydraulic main of a gas plant by agitating the tar so as to cause constant change in the surface of the tar exposed to the hot gases passing therethrough. The pitch delivered by the dip-pipes or deposited by the gas is kept in soln. with the tar, and the formation in the main of solid pitch is prevented. Tar from the condensers, etc., may be introduced into the main. The agitation may be produced by gas jets, steam within limits, or by mechanical devices such as an archimedean screw.

Brit., 9,040, Apr. 9, 1914. G. H. BENTLEY and E. G. APPLEBY. To prevent caking of the fuel and the formation of clinker in gas generators, and to secure a large

gasification, the shell of the generator is given a rising and falling motion and is also revolved eccentrically around the grate. The grate may be revolved in the opposite direction to the casing.

Brit., 9,302, Apr. 15, 1914. W. B. DAVIDSON and A. J. LIVERSEDGE. Constructional modifications of gas-washing apparatus of the type wherein a vertical rotating shaft passes through a number of superposed compartments, through which gas passes upward and carries in each compartment sprayers and means for supplying liquid from the bottom of the compartment to the sprayers.

Brit., 9,587, Apr. 17, 1914. R. C. CONGDON. A stand-pipe for gas retorts, of the kind in which the gas passes upwards and a stream of liquid descends, is formed in one piece extending above and below a series of retorts, to which it is connected by short pipe lengths.

22. PETROLEUM, ASPHALT AND WOOD PRODUCTS.

F. M. ROGERS.

Motor fuels. V. B. LEWIS. *J. Roy. Soc. Arts* 63, 757-63, 773-80, 792-9(1915).—Lectures covering production, compn., properties, uses, and performance of petrol and petrol substitutes. Cf. *C. A.* 9, 1244. F. W. SMITHER.

Petroleum in Papua. ANON. *Bull. Imp. Inst.* 13, 185-9(1915).—A crude petroleum from the Vailal River region which consisted of a reddish brown, mobile oil, showing a bluish fluorescence and depositing a slight sediment of clayey matter on standing, was examd. and found to have $d_{40} 0.802$, and a flash point below 20° . Fractional distn. showed that 32.5% boils under 150° , 58.7% from 150° to 300° , and 8.8% over 300° . The oil is unsatisfactory for use as fuel oil for it has a low flash point and deposits solid paraffins at ordinary temp. The sample contained a high proportion of light petroleum and kerosene but the results are not very reliable for the sample was obtained from a shallow boring. R. L. SIBLEY.

Red charcoal from hop vines (REINKE) 23.

U. S., 1,150,589, Aug. 17. E. H. FRENCH. In the destructive distillation of wood the vapors are fractionally condensed to liquefy and sep. a portion of the tars and oils, then the tars and oils left suspended in the vapors are removed by centrifugal action and the condensable constituents are then condensed to obtain pyrolygneous acid.

Brit., 9,088, Apr. 9, 1914. SOC. E. BARBET ET FILS ET CIE. App. for the continuous fractional distillation of petroleum, benzene, etc., by passage through a series of bulk evaporators, maintained at successively increasing temps. and under the same pressure, is so arranged that the vapors generated in an evaporator working at a higher temp. are employed for heating the evaporator at the next lower temp., the vapors being made to circulate below the evaporator heated by them in the opposite direction to that taken by the liquid circulating in that evaporator.

23. CELLULOSE AND PAPER.

A. D. LITTLE.

Process for toughening ordinary filter paper. WILLIAM R. RANKIN. *Pharm. J.* 95, 36(1915).—Best English filter paper is dipped very quickly into conc. HNO_3 (d. 1.42), drained rapidly, placed in running H_2O and then immersed in 0.5% NH_4OH until all acid is neutralized. Wash well in running water, drain, and dry partially between blotting paper, then in water oven at 100° . When dry, the process is repeated,

and when finally dried, the paper will be ready for use. The linear shrinkage is about 9%. Drying above 100° would cause decompn. of nitrated cellulose, giving off pungent fumes.

S. WALDBOTT.

Waterproofing of paper. H. WANDROWSKY. *Papier Ztg.* 40, 500-1, 524-5, 579-80, 597-8, 615-6, 653-4(1915).—Waterproofing is dependent upon the destruction of the capillarity of the paper. It may be accomplished by 3 general methods: (1) impregnating the paper with a water resistant material; (2) spreading on the paper a resistant surface coating; and, (3) impregnating the separate fibers before forming the sheet. For impregnation, a variety of waxes, oils and varnishes is used, notably paraffin. The nature of the reagent used depends on the purpose to which the paper is to be put, crude ozokerite, *e. g.*, being used for certain low grade papers and fine beeswax being often employed in case the paper is to be used in direct contact with food products. Impregnation is accomplished by passing the paper through a bath of the reagent maintained about 10° above its m. p., excess being removed by squeeze rolls. For waterproofing of the separate fibers, Al acetate formed by decompn. in the web of Al sulfate by means of Pb acetate, or better by Ca acetate, is commonly employed. A well closed paper without filler is preferably used. Drying temp. after impregnation should not exceed 38°. Soaps of alumina behave similarly to the acetate. Papers treated by Al soap or Al acetate are water-resistant but are permeable to air. To obtain complete impermeability, impregnation by an emulsion of rubber, carnauba wax, paraffin, rosin and potash soap is recommended. To waterproof paper by surface coating with water-insol. reagents, glue after-treated by CH₂O or dichromate and casein after-treated by lime are recommended. Such surfacing, however, does not guard against edge penetration. Pptn. upon the fibers of certain metallic oxides, notably those of Fe and Al also has a waterproofing effect. The action upon cellulose of cuprammonium, ZnCl₂, and of long-continued beating is briefly touched upon. Technical operating hints are freely given and a brief bibliography is included in the article.

V. NUNEZ.

Preparation of rosin sizing. LEO SCHLICK. *Paper* 16, No. 8, 13-5(1915).—For most efficient sizing, rosin should be saponified with the least possible amt. of alkali. Sapon. should be slow and at const. temp. Use of soft water is important. The heat of the driers on the paper machine plays an important part in sizing.

V. NUNEZ.

Sizing paper with gelatin. F. CYSTER. *Chem. Eng.* 22, 23-5(1915).—All-cotton paper, engine-sized with 2.5% rosin size, absorbed about half as much gelatin, when tub-sized, as waterleaf paper, the intermediate points (2.0%, 1.5%, etc., rosin size) deviating slightly from a straight line curve. Gelatin size prepared without alum has considerably greater penetrating power than the usual gelatin size, but the paper made with it is less ink-resistant and has less rattle.

V. NUNEZ.

Utilizing cotton stalks. W. C. OLDS. *J. Roy. Soc. Arts* 63, 580(1915).—A paper mill to use cotton stalks as raw material is projected at Greenwood, Miss., U. S. A.

V. NUNEZ.

Manufacture of fiber, paper and red charcoal from hop vines. OTTO REINKE. Braunschweig. *Chem. Ztg.* 39, 597(1915).—Long weathering gave 20% of fiber of good quality. The residue treated with 6% NaOH soln. at 3 atms. pressure gave an excellent pulp. The roots also yielded a beautiful long-fibered, white material. Dry distn. at 330° gave a fine charcoal.

J. H. MOORE.

Papers with woven inlay. ANON. *Papier-fabrikant* 13, 197-201(1915).—Such papers are generally made by pasting a layer of woven fabric between two liners of paper. A slightly absorbent, rough finish paper, subject to but small dilation with increase in moisture, is desirable. Potato starch is the usual adhesive, the paste being

applied to both paper and fabric. The product is generally supercalendered and if desired is waterproofed by gelatin and lead acetate.

V. NUNEZ.

Causes of defects in sulfite cellulose. R. R. OLIVER. *Chem. Eng.* 22, 27(1915).
—Various causes of dirt in sulfite pulp are briefly referred to.

V. NUNEZ.

Utilization of waste sulfite liquor with especial reference to alcohol production. H. B. LANDMARK. *Papier Ztg.* 40, 495-6, 519-20(1915).—In the Landmark process a small amount of milk or whey is mixed with an equal vol. of waste sulfite liquor and warmed to 50° with HCl. The pptd. "ligno-casein" (a yellow powder, sol. in alk., and suitable for paper size) is separated and the filtrate added to the main vol. of waste liquor. The whole is then partially evapd.; this served the double purpose of driving off the free SO₂ from the liquid and of hydrolyzing the milk sugars. The easily fermentable sugars thus formed have a highly beneficial effect on the fermentation of the waste liquor. After neutralization of the residual traces of SO₂, by means of CaCO₃, the mash is fermented for 4 to 5 days with about 1/2% ordinary brewers' yeast. Yields of about 88 liters abs. alc. per ton cellulose are claimed at a production cost of 13 to 14 ore (3 1/4 to 3 1/2 cents) per liter. These figures are considerably better than the corresponding claims of the Ekstrom process. The alc. obtained is not potable since it contains a considerable % of MeOH but it is excellently suited for fuel or motor spirit. The liquor during the process has been concd. about 25% and after fermentation may be economically concd. for fuel, the "cell pitch" thus obtained having a fuel value of 3500 cal. "Cell pitch" per ton of cellulose is equiv. in fuel value to 372 kg. good steam coal. Concd. and dry distn. by the Strehlenert process is also possible.

V. NUNEZ.

Utilization of sulfate and sulfite waste liquors. E. L. RINMAN. *Papier Ztg.* 40, 559-60, 574-5(1915).—Application of the Rinman process to recovery of values from sulfate black liquor is meeting with some difficulties in practice particularly as regards dry distn. The general procedure is to add soda to the black liquor, causticize with lime, filter and conc. to 35° Bé. To the thick liquor are added 3/4 mol. Ca(OH)₂ (calcd. on Na₂O content of the original black liquor), the whole further conc. and finally subjected to dry distn. Presence of NaOH induces high yields of MeOH from the constituents containing methoxyl of the black liquor and presence of lime induces high yields of Me₂CO from those constituents which do not contain the methoxyl group. A modification of the Rinman process is applicable to sulfite waste liquor. The liquor is heated 5 hrs. at 180° with lime, the ppt. of CaSO₃ and humus separated and the CaSO₃ dissolved out by SO₂, the liquor thus formed being used in the cooking process. The residual humus serves for fuel. The liquor is concd., more lime added and the whole brought to dryness and distd. in the presence of water vapor. Sawdust may be added to the liquor prior to the heating with lime and is advantageous in increasing yields and ease of filtration. The liquor may be fermented prior to concn. The process is now in operation at Skutakär, using as raw material equal vols. of spent wash from alc. fermentation of sulfite waste liquor, and sawdust, with high yields and good results.

V. NUNEZ.

Inactive borneol formed by sulfite cooking. H. BERGSTRÖM. *Papier-fabrikant* 13, 229-31(1915).—When MeOH is distd. from waste sulfite liquor a heavy oil is obtained toward the end of distn. from which optically inactive borneol may be crystallized on cooling.

V. NUNEZ.

U. S., 1,149,420, Aug. 10. R. W. STREHLENERT. Separating organic and inorganic constituents of waste sulfite liquor. The free and combined SO₂ is oxidized into H₂SO₄ by the action of air or O under heat and pressure and the H₂SO₄ as fast as

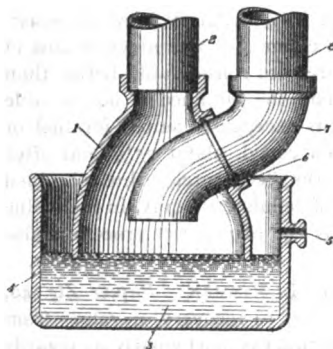
formed is allowed to act on the other constituents, in the presence of NaHSO_4 , which is added to retard the reaction, to cause pptn.

Ital., 134,462, Sept. 24, 1913. E. BERT. In the manuf. of cellulose products, a soln. of cellulose is prepared by means of H_2SO_4 of 77% at a temp. not exceeding 10° . The soln. is pptd. with 50% alc. at 20° .

24. EXPLOSIVES AND EXPLOSIONS.

C. E. MUNROE.

Liquid air as an explosive. M. PRYZBORSKI. *Z. Eis u. Kalte Ind.* 7, 93(1915).—A dry cardboard cartridge contains a perforated pipe, in which is a mixt. of infusorial earth with oil, asphaltum or lampblack and paraffin. A third inner tube serves as an exhaust for the volatile products. The liquid air is poured in the central tube. The charge ignites by a spark with a violent explosion. If the spark misses the air evaps. A. J. PHILLIPS.



U. S., 1,149,487, Aug. 10. C. A. WOODBURY. An Explosive formed of nitrated sugar 4%, nitroglycerin 30%, trinitrotoluene 10%, NaNO_3 42%, wood meal 13% and chalk 1%. The nitrated sugar gives the mixt. a low freezing point. Cf. C. A. 9, 717.

U. S., 1,149,585, Aug. 10. C. R. JAHN. Denitrating waste acid from making trinitrotoluene, etc. See fig. The waste acid is evapd. and the organic substances are removed from the gas and vapors by passing them through the pipe 2 over a body of H_2O 3 in the chamber 4. Part of the HNO_3 is absorbed by the H_2O and that remaining passes off through the pipe 8 to a condenser. The solidified organic compds. settle out in the chamber 4.

25. DYES AND TEXTILE CHEMISTRY.

L. A. OLNEY.

The manufacture of organic coloring substances. WAHL. Univ. Nancy. *Bull. soc. encour. ind. nat.* 122, 492-509(1915).—An address of a historical and statistical nature. H. I. OLIN.

The mechanism of the acid dye bath. II. M. FORT AND D. SWARES. *J. Soc. Dyers, Colourists* 31, 80-3(1915).—In Part I (C. A. 8, 3720) it was shown that wool absorbed H_2SO_4 which it later split off into the dye bath when an acid dye was absorbed, it being found that with both dye and acid in the bath more dye was taken up by the wool and less acid. The effect on the exhaustion of an acid bath by adding an acid dye has been overlooked although the converse has been well established. The present paper shows by comparative expts. that both color acids and acid dyes as salts, when used along with H_2SO_4 in the dye bath, cause an excess of H_2SO_4 to be left in the dye bath at the finish over what is left when the H_2SO_4 is used alone. It is also shown that dye and acid interfere with the exhaustion of each other when used together in the ordinary dye bath. It seems likely that the conception of additive salt formation between acid and wool fiber, is necessary to obtain a satisfactory theory of any dyeing or chemical process in which the action of acids upon animal fibers or

tissues is involved. Bleeding tests show that the presence of H_2SO_4 in the wool almost entirely prevents bleeding for a day or two when subjected to the continued action of water, but when the water has removed the H_2SO_4 the bleeding goes on rapidly. III. M. FORT AND P. ANDERSON. *Ibid* 96-100.—As in the previous work sets of 3 comparative trials were made in reflux condensers with (1) H_2SO_4 , (2) dye-stuff, and (3) dyestuff and H_2SO_4 , but with modifications to improve upon the accuracy of previous expts. It is now possible to express chemically the aid rendered to dye absorption by acid. Results are in agreement with the following reaction representing the specific combination of dye, crystal scarlet, with H_2SO_4 : wool basic hydrate- $\text{H}_2\text{SO}_4 + \text{C}_{20}\text{H}_{12}\text{N}_2\text{O}_2\text{Na}_2 \rightleftharpoons \text{wool basic hydrate} \cdot \text{C}_{20}\text{H}_{12}\text{N}_2\text{S}_2\text{H}_2 + \text{Na}_2\text{SO}_4$. This reaction may be reversed by treating the dyed fiber with Na_2SO_4 when stripping occurs. The common assumption that H_2SO_4 in the dye bath first liberates the free color acid is not supported by the results of F. and A. The following conclusions are drawn from the tabulated results: (1) The increased amt. of SO_4 found in the exhausted dye bath over that left in the exhausted acid bath containing no addition of dye is not enough to account for the production of Na_2SO_4 by interaction of the total dye used with H_2SO_4 . (2) The increased amt. of SO_4 found in the exhausted acid dye bath bears a simple relation to the extra dye caused to be taken up by the wool from the bath by the use of acid, *i. e.*, over and above that dye absorbed from a similar neutral bath. (3) One factor which precludes the attainment of theoretical results is the alteration in acid distribution between fiber and soln. which necessarily accompanies the formation of Na_2SO_4 and affects to some extent the quantity of SO_4 in the dye bath. (4) There is no reason for supposing that the case of crystal scarlet presents any unusual features which might render the result of individual and not general interest.

L. A. OLNEY.

The reeling of Tussar silk. ANON. *Bull. Imp. Inst.* 13, 101-2(1915).—Before reeling Tussar silk the cocoons must be boiled in an alk. liquid. The natives add the ashes of plantain leaves to water and boil the cocoons in this for 2 or 3 hrs.; they then leave them to ferment for some hrs. before winding. In some factories in Bengal, the cocoons with their stems cut off, are tied up loosely in a cloth; this is weighted down with stones and boiled for $\frac{1}{2}$ hour in a soln. contg. 3 parts of K_2CO_3 dissolved in 80 parts of water, oil and sugar being sometimes added. The cocoons are afterwards boiled for a few min. in water contg. a little glycerol. The silk is then reeled. The glycerol keeps the cocoons moist while reeling, and it is not then necessary to keep them in basins of water during this operation. Another method is to prepare a fine powder or paste from the chrysalides of tussar or mulberry insects; about one part by wt. of this is mixed with 2 parts by wt. of dry cocoons and the mixt. is tied up in a cloth, weighted, and immersed in water, which is then boiled for an hour. The mixt. is next left to ferment for 12 hrs., after which reeling begins, the cocoons being allowed to rotate in basins of hot water just as when mulberry cocoons are reeled. The reeled silk obtained by any of the above processes must next be immersed in a warm acid soln., then washed in a bath of boiling soap or washing soda soln., and finally rinsed in boiling water, wrung, dried, and baled for export. The acid bath can be prepared from tamarinds, using 1 part by wt. of tamarinds in water to every 4 parts by wt. of tussar thread.

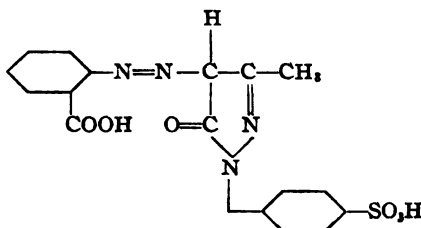
E. J. C.

Fiber from hop vines (REINKE) 23.

U. S., 1,148,377, July 27. P. J. GRANDSIRE. *Apparatus for bleaching and dyeing yarn, etc., on spindles.*

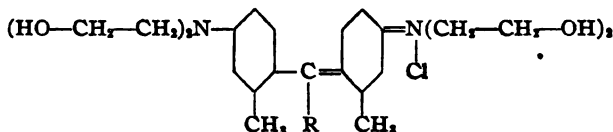
U. S., 1,148,401, July 27. E. PERZ. **Obtaining spinning fibers, insulating material and cork flour from osier bark.** The bark is first steamed under slight pressure, pickled in a bath containing 3% soap and 1% soda, drawn under pressure while wet to sep. the long fibers from the outer bark, then crushed and scraped, the outer bark removed and the long fibers are steamed under 3-4 atm. pressure, satd. with glycerol and dried with hot air.

U. S., 1,149,231, Aug. 10. H. WAGNER, J. ERBER and E. HOFFA. **Azo dye of the formula**



which forms a yellowish Na salt, readily sol. in H_2O , difficultly sol. in alc., C_6H_6 , ether and acetone; made by reaction of diazotized anthranilic acid upon 1-Ph-3-Me-5-pyrazolonesulfonic acid.

U. S., 1,149,575, Aug. 10. R. GARTNER and G. KÖHRER. **Triarylmethane dyes of the formula**



in which R is an aryl radical, *e. g.*, C_6H_4Cl , are formed by condensing diethylol-*m*-toluidine with aromatic aldehydes, *e. g.*, *o*-chlorobenzaldehyde, and oxidizing with PbO_2 . They are powders of metallic luster, sol. in H_2O and alc. with a greenish or bluish color and dye cotton green or blue when mordanted with tannin and tartar emetic.

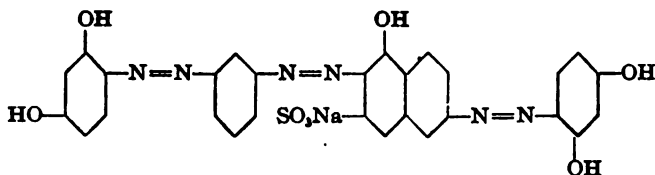
U. S., 1,149,738, Aug. 10. J. A. DEJEY. **A bath for producing etching resists** is formed by dissolving Na pyrophosphate 2 in H_2O 10 parts, gradually adding 2 parts of $SnCl_4$, washing the ppt. produced and adding 2 parts of Na pyrophosphate and 10 parts of boiling H_2O to it, dilg. the resulting soln. and adding to it roasted fecula 0.2, tartaric acid 0.25 and NaCl 0.6 part.

U. S., 1,149,876, Aug. 10. A. WAGANOFF. **Bast fibers of linden, lime or willow wood** are prepared for spinning and weaving by boiling with an alkali soln., then boiling for 15-30 min. in a 2-3% soln. of sol. silicate and dividing the softened bast into elementary fibrils.

U. S., 1,150,306, Aug. 17. W. W. SIBSON and T. ALLSOP. **Apparatus for dyeing yarn, etc., in circulating liquor.** Cf. C. A. 9, 724.

U. S., 1,150,685, Aug. 17. E. KRUSE. **Apparatus for dyeing, bleaching or washing hanks of yarn.**

U. S., 1,150,825, Aug. 17. F. KRINGEMANN. **Trisazo dye of the formula**



is made by coupling the tetraazo deriv. of *m*-aminophenylazo-2,5,7-aminonaphthol-sulfonic acid with 2 mol. proportions of resorcinol. Its alkali metal salts are dark red powders sol. in hot H_2O and dye cotton claret-red rendered fast by treatment with CH_3O .

Brit., 8,919, Apr. 8, 1914. H. KRANTZ. App. for dyeing, wherein hanks and skeins, instead of being threaded on rods or carriers, are suspended on them by folding, so that their median portion rests at 2 points on them, and their ends hang down in the form of loops on each side. Arresting planes or surfaces, perforated or not, are mounted above the hanks in the known manner.

Brit., 9,052, Apr. 9, 1914. N. WOSNESSENSKY. In dyeing or printing with basic dyes, the dyes and tannin are applied together in presence of resorcinol as solvent. The Sb salt may be applied simultaneously or subsequently. Examples are given of (1) a padding bath containing methylene blue, tannin, resorcinol, HOAc, and H_2O , the material being padded, steamed, and then treated with Sb salt, and (2) a printing-paste containing methylene blue, tannin, resorcinol, HOAc and tartaric acid, tartar emetic, and starch-tragacanth thickening, the material being printed and then steamed.

Brit., 9,102, Apr. 9, 1914. CHEM. FABRIK GRIESHEIM-ELEKTRON. Dyeing or impregnating cotton goods with azo dyes, with the aid of a soln. or paste containing a nitrosamine salt and an aryliide of 2,3-hydroxynaphthoic acid, and development by passage through a bath of a weak acid or an acid salt.

Brit., 9,252, Apr. 14, 1914. BAYER & Co. The azo dyes prepared from diazo compds. and acetoacetic esters are saponified, converted into the acid chlorides by treatment with thionyl chloride, PCl_5 , etc., and these converted into amides by condensation with aliphatic or aromatic mono- or di-amines.

Brit., 9,269, Apr. 14, 1914. FARBW. v. M. L. & B. Vat dyes of the dihydro-1,2,3',1'-anthraquinoneazine series are converted into a finely divided or amorphous form by treatment with H_2SO_4 under such conditions that the dye remains undissolved either as free base or as sulfate; if the sulfate is formed, it is dissociated by adding H_2O . If crude vat dye is treated by the process, it may be simultaneously purified from flavanthrene, etc., which dissolve in the acid. Suitable dyes for treatment are indanthrene RS or GC, the crude vat dye obtained from the alkali melts, or the coarsely subdivided forms obtained by blowing air into a vat of the dye, or by dissolving the dye in H_2SO_4 and pptg. with H_2O . The process can be carried out by treatment with a suitable quantity of H_2SO_4 monohydrate, forming H_2SO_4 , or acid of 60–66° Bé., and then dissociating the sulfate with H_2O ; or a weaker acid may be used which does not yield the sulfate, and the sepd. dye then washed free from acid; or highly concd. acid may be first used and the mass be then dild. with a little H_2O , so that the impurities remain in soln., while the dye or its sulfate is sepd. The production of the finely divided state may be assisted by the addition of aromatic acids, Na benzylsulfanilate, etc.

Brit., 9,433, Apr. 16, 1914. KALLE & Co. A dye that dyes wool blue shades from acid baths is obtained by fusing 1-naphthylamine-4,8-disulfonic acid with re-

ducing compds. of S in the presence of alkali; reducing-gases (SO_2 and H_2S) or their compds. are removed from the reaction product before pptn. of the dye. This is effected either by dissolving the melt in H_2O , and pptg. insol. compds. of these gases from the alk. or neutralized soln., or by acidifying and blowing in air; the latter process may also be employed subsequently to the pptn. process. The dye is finely pptd. by making the soln. neutral or alk. and heating it or blowing in air. The same process of working up the melt may be applied to the product obtained from 1-naphthylamine-3,6,8-trisulfonic acid described in 17,610, 1907. Suitable precipitants for the H_2S are FeSO_4 or FeCl_3 , and for the SO_2 , CaCl_2 or BaCl_2 . **Aminonaphtholsulfonic acids** are obtained as by-products in the above processes, and are pptd. on acidifying the solns.

Brit., 9,471, Apr. 16, 1914. **BAYER & Co. Dyeing coarse grained or finely powdered vegetable or animal substances, e. g., wood meal, leather shavings, and cork meal, by spraying with dyestuff soln. while they are kept in motion, so that the particles are continuously brought to the surface, or a fresh surface is continuously presented to the dye soln., which is sprayed in as concd. a form as possible.** This may be effected in an app. comprizing a double-walled drum rotating about a horizontal shaft, and capable of being heated, which is provided in its interior with a pipe having nozzles for the injection of the dye soln. The drum is about one-fifth filled with the material to be dyed and, while it is in motion, the concd. soln. is injected through the nozzles. Drying is effected in the same app., hot compressed air being blown in.

Ger., 283,232, Apr. 3, 1913. **W. MATHESIUS and M. FREIBERGER. Reviving the scalding tank liquors.** These liquors contain the alkali employed only in part in the original form, while a great part is converted into salts of the fatty acids. Furthermore, impurities have been taken from the textile material. According to this process these dirty liquors are purified for re-use by first destroying the dye substances of the lyes by treatment with a hypochlorite. The clearing of the lyes can be furthered also by a reducing treatment, in that by treatment with sulfites those substances which have resulted from the oxidizing action of the hypochlorite are destroyed. Any residue of hypochlorite is destroyed also. Before the treatment with hypochlorite and sulfites, the lyes are treated with $\text{Ca}(\text{OH})_2$, whereby the pptg. insol. Ca-compds. carry down suspended matter. This action can be favored by the addition of clay, as well as metal salts, which form voluminous ppts. (e. g., $\text{Fe}(\text{OH})_3$). E. g., 80 kg. $\text{Ca}(\text{OH})_2$ are added to 5000 liters of used lye, the mass is boiled, allowed to settle, the soln. is drawn off, and so much NaOCl is added that about 1 g. active Cl is present to 1 liter. The mass is heated again and then 3 liters NaHSO_3 soln. of about 35° Bé. are added. The regenerated liquor has a light yellow appearance and contains the Na in the main as free NaOH .

26. PAINTS, VARNISHES AND RESINS.

A. H. SABIN.

Proposed tentative methods for the routine analysis of white pigments. Report of sub-committee of committee D-1, American Society for Testing Materials. Chem. Eng. 22, 37-41(1915).—A previous report (cf. C. A. 9, 247) presented methods for careful and complete analyses of white pigments. The present report gives methods which are suitable for routine analysis.

E. W. BOUGHTON.

The history of writing ink. P. MARTELL. Schweiz. Apoth. Ztg. 53, 390-2, 403-5(1915).

S. WALDBOTT.

Practice in the manufacture of printing inks. O. PREISSER. Farben-Ztg. 20, 1087-8, 1110-1(1915).—A general descriptive article.

E. W. BOUGHTON.

The nature of American rosin. L. PAUL. *Strassburg. Seifensieder Ztg.* 42, 237-8(1915).—On the strength of some elementary work on com. rosin (cf. *C. A.* 8, 2626, 3379; 9, 972) P. claims that all former investigators have misjudged the true nature of rosin and that his work shows beyond doubt that American rosin contains up to 90% of a constituent called by him KS ("Kolophonium schwer löslich"), which has 2 m. ps., 70-71° and 76-77°; the remaining 10% consists of "KI," which is said to be a mixt. of a gum with a whole series of resins difficult to sep. from one another, and a small quantity of "KLM" which is left in soln. in the acid filtrate when rosin is salted out by excess of Na_2CO_3 and the Na_2CO_3 mother liquor decompd. by some acid.

P. ESCHER.

The abietic acids (POOTH) 10.

U. S., 1,149,171, Aug. 10. C. BAEDER. Insulating-varnish is formed of raw linseed oil 100 gals., refined para rubber 25 lbs., Mn borate 10 lbs., calcined sugar of lead 75 lbs., and turpentine 50 gals., mixed with additional thinner and Japan drier.

U. S., 1,149,519, Aug. 10. A. C. HORN. A plastic composition for waterproofing walls, etc., is formed of mineral filler or pigment mixed with Chinese wood oil which has been slightly vulcanized by heating to 205° with about 3% its wt. of S.

U. S., 1,150,516, Aug. 17. H. J. GREENE. Priming paint for wood, formed of white lead 100, ZnO 50, SiO_2 100, linseed oil 180, drier 10, turpentine 10 and C_6H_6 or xylene, or a mixt. of both, 30 parts.

Brit., 9,291, Apr. 14, 1914. L. V. REDMAN. A fusible resinous product is obtained by condensation of phenols with hexamethylenetetramine in the absence of H_2O , the proportion of phenol used being such that the resin contains more than 25% of free phenol. The process may be effected by heating the mixt. until self-heating occurs, allowing the reaction to proceed by self-heating only until the evolution of NH_3 slackens, and again applying heat until all the NH_3 is driven off. The NH_3 evolved may be collected and converted into hexamethylenetetramine for reuse. The product is converted into an insol., infusible product by treatment with suitable methylene compds., e. g., hexamethylenetetramine, HCHO , or HCHO and NH_3 . Fillers, such as kieselguhr, silica, powdered slate, stone, asbestos, wood fiber, or cellulose, may be added before the final step; the product may be colored by suitable dyes. The resinous product may be employed as a varnish, and the infusible product for elec. insulation.

Brit., 9,333, Apr. 15, 1914. E. BARTHELMESS. In the manuf. of lead oxide by the action of a stream of gas containing O upon atomized Pb, the H_2O necessary is added drop by drop in measurable quantities to the stream of gas, which is sucked into the oxidizing chamber.

Brit., 9,368, Feb. 15, 1913. P. FERRERE. Zinc oxide is prepared by burning Zn vapor as it issues from a retort in a burner supplied with air and steam.

27. **FATS, FATTY OILS AND SOAPS.**

R. SCHERUBEL.

New method for determining the melting point of solid fats. ROMOLO ROMANELLI. Arezzo. *Giorn. farm. chim.* 64, 151-3(1915).—A thermometer held in position by a cork is inserted into a 250 cc. flask. One end of a Pt wire is twisted around the bulb

of the thermometer and the other end is bent in a circle 8-9 mm. in diam.; the wire is bent in such a direction that the diam. of the circle is parallel to the stem of the thermometer. The flask is filled with distd. H_2O and the latter is boiled so as to expel dissolved air as well as air bubbles which are attached to the surface of the thermometer and inner surface of the flask. A portion of the fat to be examd. is then slowly melted in another vessel and allowed to cool at a temp. near the m. p. The wire loop mentioned above (detached from the thermometer) is then immersed in the liquid parallel to the surface of the latter and quickly withdrawn so that a thin film of fat remains within the loop. Some practise may be required in order to accomplish this readily. The film of fat is allowed to cool for 1 hr. The wire loop with film is then attached to the thermometer and the latter is inserted in the H_2O in the flask which is heated by a flame. As the temp. of the H_2O approaches the m. p. of the fat a transparent zone is observed at the periphery of the film. The temp. observed at the moment when the film becomes transparent throughout and breaks is the m. p. of the substance.

H. S. PAINE.

Rancidity of fats. HENRY L. SMITH. *Pharm. J.* 95, 4-5(1915).—A summarizing discussion. Rancidity does not run parallel with acidity. It may be induced by enzymes and microorganisms. The odor is due to extremely small amts. of ketones and aldehydes. To prevent rancidity, keep fats as free as possible from H_2O , shielded from light, and in minimum contact with air. In rancid fats, hot H_2O will remove sol. fatty acids; soln. of $KMnO_4$ is very effective in oxidizing aldehydes and ketones, and Na silicate will remove free acids, Na_2CO_3 in this case would produce emulsions.

S. WALDBOTT.

Fat conservation. J. LEIMDORFER. *Seifensieder-Ztg.* 42, 281-3, 303-4, 321-3, 343-4(1915).—A discussion of measures taken in Germany to conserve fats. E. S.

Oxidation and polymerization of soy bean oil. N. J. A. TAVERNE. *Z. angew. Chem.* 27, I, 249-51(1915).—Oxidation in the air at room temp. was carried out by Fabrian's method. The hydroxy acids of 3 g. of oil on 10 g. of cotton yarn were detd. after 30 days' exposure and found to be 38.4%. Oxidation at 70° was carried out in the app. of H. Genthe (*Z. angew. Chem.* 19, 2087) and was complete in 30 hrs. Oxidation in air at 150° was also carried out according to Genthe, by heating in a beaker. The mol. wt. rose in 10 days from 710 to 1730, a fact which indicated polymerization or condensation along with the oxidation. The oil became solid and contained 31.8% hydroxy acids and 63% fatty acids sol. in petroleum ether. The I no. decreased to 64.8. Heating for 14 days at 135° gave a thick oil of d_{16} 0.9588 with 27.2% hydroxy acids, and 66.5% fatty acids. I no. was 65.7. It is possible that soy bean oil can be used in the linoleum industry. Genthe states that siccative are inactive in the ultraviolet rays but T., on the contrary, obtained complete oxidation in 45 hrs. A Pb-Mn rosin compd. contg. 6.28% Pb and 5.76% Mn was found to be the most active agent for hastening oxidation. In the ultraviolet light at 70° oxidation was complete with 5% siccative in 580 min. Soy bean oil is readily polymerized, though not to so great a degree as linseed oil. T. heated 20 small flasks supplied with capillary stoppers in powdered graphite in an air bath at 150°; the mol. wt. and I no. were detd. daily in one of these. The I no. decreased from 137.5 to 90.5 but the mol. wt. remained const., and the oil remained liquid. Heating at 200° gave similar results. By adding 30% of linolic acid to the oil and heating to 250° the I nos. were reduced but the oil remained liquid. When heated to 300° the oil became solid in 12 days and after 17 days it was insol. in benzene. At the end of 10 days' heating at 300° the mol. wt. rose to 1200. By adding 1% oxidized soy bean oil to fresh oil and heating to 300° the mass became solid in 7 days.

E. SCHERUBEL.

Frugal use of lubricating oils. FR. WISSAWE. Cologne. *Chem. App.* 2, 176-9 (1915).—General remarks on the use, recovery, and purification of recovered oils, and substitutes for mineral oils. J. H. MOORE.

Soap. HENRY I. SMITH. *Pharm. J.* 95, 33-4 (1915).—A discussion of the chem. and phys. nature of soap, including special com. soaps, *e. g.*, marine soap, shaving soap, etc., and adulterations. S. WALDBOTT.

Qualitative test for ox-gall in soaps. F. STEINITZER. *Chem. Rev. Fett-Harz-Ind.* 22, 69-70 (1915).—Ox-gall may be added to soaps fresh, or after concg. to $\frac{1}{8}$ its vol., or after boiling and the addition of 5% ethyl acetate at 80°, then skimming and settling. Its coloring power is weak; ultramarine green or brilliant green, etc., is usually added to the soap. Qual. test (Pettenkofer's): Dissolve 2-5 g. of the soap in 50 cc. warm H₂O and set aside to let any ultramarine settle; filter and decompose with dil. H₂SO₄. The gall acids are changed almost entirely into fatty acids. Any albumin is filtered from the melted acids. Allow to solidify and transfer to a wide test tube, add 10 cc. 1:1 H₂SO₄ and heat in bath to 65-70°. Add 3 drops of a 10% sugar soln., shake well for $\frac{1}{2}$ min. and return tube to the 70° bath. The presence of gall is shown by a red to violet-red color, its absence by a yellow or yellowish brown color.

P. ESCHER.

Glycerol yields. O. STEINER. *Seifenfabr.* 35, 28 (1915).—Owing to demand for glycerol on account of the war, it is advised that all soap manufacturers use one of the fat-cleavage processes for sepg. glycerol because of the higher yields. E. SCHERUBEL.

The solubility of water in essential oils (UMNEY) 17. Determination of peanut oil in olive oil (LUND) 12. Cane wax (CROSS) 28. American rosin (PAUL) 26.

28. SUGAR, STARCH AND GUMS.

A. HUGH BRYAN.

The limits of accuracy in saccharimetric analyses. C. A. BROWNE. *Intern. Sugar J.* 17, 320-6 (1915).—B. has carefully considered each individual error in order to det. whether the final error of polarization is always too high or too low. (I) *Loss of moisture during mixing.* Atmospheric conditions must be considered so that evapn. or absorption will not result. By rapid mixing on glass the loss was not greater than 0.01%. (II) *Loss of moisture during weighing.* This step can be controlled with a loss not greater than 0.005%. (III) *Error in normal weights.* The usual method of correcting a normal weight is found to be inaccurate. If a loss of 2 mg. is restored by unscrewing the cap of the weight and inserting wire or foil and this procedure is repeated later after another loss of 2 mg. the av. value of the normal weight is always 1 mg. too small. The better plan is to distribute the limits of error above and below the true value, the av. wt. being then exactly correct. If the normal wt. has become 2 mg. too light, it should be corrected by making it 2 mg. too heavy. When this method of correction is used, the error in normal wt. becomes self-compensating, and does not need to be considered in computing the final total error in a long average of polarizations. (IV) *Vol. of ppt. in clarification* has been found by investigators to show an error of about +0.09° S. for the av. raw cane sugar of 96° polarization. (V) *Pptn. of levulose in clarification* by basic lead acetate causes (by occlusion) an increase in the polarization, the error for the av. raw sugar of 96° test being about +0.015° S. (VI) *Capacity of flasks.* Care must be taken that in a given lot of flasks the errors of calibration are distributed equally above and below the true value of 100.00 cc. and should

never exceed 0.05 cc. The errors then become self-compensating and need not be considered in computing the final total error. (VII) *Imperfect mixing* of contents of flasks may cause an excess polarization amounting in some cases to several tenths of a degree, the final runnings of the imperfectly mixed soln. being more concd. since the first runnings of the dil. upper part are usually rejected. (VII) *Evapn. during filtering*. When the funnels are covered practically no increase in polarization results, although when a portion of the soln. is poured back upon the filter for refiltering the increase in polarization due to evapn. may amount to several tenths of a sugar degree. (IX) *Length of polariscope tubes*. As in the case of flasks, it is highly important in a given lot of tubes that the errors of calibration be evenly distributed above and below the true value of 200 mm., and should not exceed the limit of accuracy permitted by the U. S. Bur. of Standards of ± 0.04 mm., corresponding to an error of $\pm 0.02^\circ$ S. in the polarization of pure sucrose. (X) *Omission of dichromate cell*. This produces an increase in the polarization of sugars, the av. error according to Schönrock for normal solns. of pure sucrose being 0.115° S. It is less for raw sugar as the yellowish color of the clarified soln. itself acts as a light filter. The error is negligible in the case of molasses sugars and varies between $+0.05$ and $+0.10$ for the higher grades of centrifugal sugars. Sensibility to rotation dispersion might cause an error either way so that the dichromate cell is absolutely necessary to obtain uniformity and accuracy. (XI) *Variations of temp.* According to the calcns. of Schönrock a one-way difference of only 1° between the temp. of making up to vol. and the temp. of polarizing will produce a const. error of 0.061° S. The necessity of using the polariscope only when it has acquired the temp. of the lab. atm. is therefore very evident. B. recommends a normal temp. lab. controlled by a small refrigerating plant to maintain a temp. of 20° . (XII) *Defects in scales of saccharimeters*. For raw cane sugar the scale divisions immediately above and below the 96° point are of most importance. If the av. error at this point is $\pm 0.025^\circ$ S. the correction may be made by applying $\pm 0.05^\circ$ to each polarization on alternate days. If the av. error is only $\pm 0.01^\circ$ the correction may be made by applying $\pm 0.05^\circ$ to each polarization on every 5th day. In this way the av. polarization may be controlled to 0.01° without carrying each individual polarization beyond the half tenth required by trade usage. The most correct method for treating "split readings" is to make several readings on each tube and take the reading of greatest frequency as the correct polarization. Thus a sugar polarizing 96.02 would usually show 3 readings of 96.00 and 2 readings of 96.05 and the result would be entered as 96.00. The average of the polarizations so taken would then always be correct. It is highly important that the av. results of at least 2 chemists be taken and not the single test of an individual. The extension of an average to the 3rd decimal is accurate enough for most purposes and practical needs would rarely, if ever, require the carrying out of an av. beyond the 4th decimal figure. B. shows that of the 8 errors averaging $+0.48$, the last four which together cause a $+$ error of 0.20° S. are wholly preventable and that the first four are reducible. The magnitude of the final residual $+$ error under a carefully regulated control is estd. as follows for the av. raw cane sugar of 96° test, the error due to different causes being given in sugar degrees: evapn. in mixing $+0.10$, evapn. in weighing out $+0.005$, vol. of ppt. in clarification $+0.090$, pptn. of levulose $+0.015$, total $+0.120$; the difference of 0.36 between the total errors of 0.48 and 0.12 is not an extreme example. While the cause of these differences is usually to be found among the errors enumerated, there are often other factors, such as use of too much ether for dispelling foam, optical activity of tube glasses, and neglect of zero point error of saccharimeter, which is in itself an error of great influence. B. suggests that only by eliminating or reducing all sources of error can the art of saccharimetry be maintained at its highest level of efficiency.

A. Gross.

Conducting the determination of reducing sugars according to Allihn. J. PRITZKER. *Z. Nahr.-Gennussm.* 20, 437-8 (1915); *Schweiz. Apoth. Ztg.* 53, 409-11 (1915).—The well-known precautions to be observed in detg. sugar by Allihn's method are mentioned. The directions of von Fallenberg (*C. A.* 8, 835) were adopted. P. describes a simple rack by means of which the filter tube containing the Cu_2O can be kept in an upright position while drying in a steam oven. By treating the well washed ppt. 3 times with alc. and once with ether and then drying for 25 min. in an upright position in a steam oven all moisture is removed, thus eliminating a common source of error in the detn. Prolonged heat will oxidize Cu_2O . A. F. SEEKER.

The determination of sugar in bagasse. H. PELLET. *Intern. Sugar J.* 17, 327-8 (1915).—P. uses a modification of the Norris method (*C. A.* 5, 1002). A fairly strong Cu basket of perforated Cu plate is placed in the interior of the app. to hold the bagasse. At the completion of the detn. the basket is placed in a screw press and the liquid removed from the bagasse and added to the main portion. In order to read directly the % of sugar in the product, the wt. of the bagasse used and the vol. of the liquid (including the water added, and that in the bagasse) have been modified. The liquid is polarized, using a 500 mm. tube, and the result obtained as % on the bagasse by reading from a table. P. insists that the following points are essential in order to obtain the exact av. amt. of sugar in bagasse: (1) A sampling of the bagasse the entire depth of the layer from the center as well as from both sides; (2) mixing sample and passing 2 to 3 kg. through a cutting machine to obtain a fairly fine and even material; (3) proper mixing of the divided sample and the detn. of the sugar in it by a method which is simple and of sufficient exactness; (4) the testing of the sucrose content of the bagasse as often as possible (at least every $\frac{1}{2}$ hr.), thus obtaining an exactly av. result at the end of the shift. P. believes that the app. and method proposed by Deerr (*C. A.* 9, 2323) may give every satisfaction, but not as quick results as obtained with the Norris app. A. GROSS.

The decomposition of reducing sugar under the conditions existing in cane sugar manufacture. T. VAN DER LINDEN. *Arch. Suikerind.* 22, 653-85 (1915).—An artificial juice was made of 225 g. sucrose, 50 g. of a soln. of 77% invert sugar, 5 g. Ca acetate, and enough CaCl_2 to give 0.3-0.4% Cl in the final soln. The whole was then dild. to 1.5 l. The CaCl_2 was added to furnish a point of reference, on the assumption that it would be unchanged and not affect the reactions. All results were compared, not as detd., but after calcg. to 100 Cl. Preliminary expts. showed that though there was some inversion on evapg., the (invert equiv. of sucrose) + (invert found) was constant. The above juice was subjected to clarification and evapn. by (1) defecation, (2) sulfuring directly after CaO at ordinary temp., (3) sulfuring at ordinary temp. 20 min. after CaO, (4) sulfuring and liming simultaneously at 60°, (5) the same at 80°, (6) single, and (7) double carbonation. These last 2 were carried out (a) by the "old" method, (b) De Haan's method (alkalinity controlled at about 0.25° CaO by gradual addition of CaO during carbonation), (c) old method followed by SO_2 , and (d) De Haan's method followed by SO_2 . Each method was tested as above, and also with juice in which half the Ca acetate was replaced by K acetate. All results are given in full. Owing to the small amt. of Cl in the solns., errors in its detn. were multiplied in the calcns., so that the final results (expressed as invert decomposed in % of invert introduced) are subject to an uncertainty of 1-2% on the thin juice, and 5% on the thick. No loss of invert could be detd. in method (1). No method of sulfuring gave a loss from raw juice to thin juice, and only (2) and (4) showed a loss from thin to thick. The losses were less with K acetate than with Ca acetate. In carbonation the greatest losses were from raw juice to thin juice, while from thin to thick there was no loss. Sulfuring after carbonation had no effect, and all tests by the old method gave greater

losses than by De Haan's method. The total losses from raw juice to thick juice (uncertain by $\pm 6-7\%$) were:

Method.	1.	2.	3.	4.	5.	6a.	6a.	6b.	6d.	7a.	7c.	7b.	7d.
Ca acetate.....	2%	16	6	11	4	10	10	5	..	11	..	12	..
K acetate.....	—1	3	6	3	13	9	8	7	3	12	13	5	6

In all cases a decompn. of invert was accompanied by an increase in polarization, showing that fructose was more rapidly decompd. than glucose. Since fructose is present only in small amts. in cane, these figures for invert should be higher than in practice. Figures from practice for 1912 are: loss of invert in % of invert introduced, in defecation, 12.3% (av. of 23); sulfitation, 15.0 (av. of 26); and carbonation, 21.5 (av. of 10). The difference is ascribed to more accurate control in the lab. tests, and to the presence in factory juices of organic acids which form Ca salts hydrolyzing to alk. reaction.

W. L. BADGER.

Deterioration of sugar and filtration of the juice. R. L. Y. GUIJARRO. *Louisiana Planter* 54, No. 4, 61-2(1915).—G. recommends the filtration of the raw juice to remove bagacillo and other suspended matter which carry organisms that infect the juice and cause subsequent deterioration of the sugar.

A. GROSS.

Deterioration of cut canes. W. E. CROSS AND J. A. BELLÉ. *Intern. Sugar J.* 17, 218-24(1915).—The deterioration is shown to be due to enzymic action. The enzyme is probably invertase which is known to be present in immature cane tops (Browne, La. Expt. Sta., *Bull.* 91, 17 pp.) The presence of an enzyme may be shown by macerating the tops and adding some of the juice to a pure sugar soln. of known strength kept sterile by a little CHCl_3 and toluene. In a few hrs. considerable inversion will take place. It was further shown that the enzyme is present in greater proportion in the stored cut canes than in the freshly cut canes. The enzymic action is thought to be connected with the prepn. of the plant for germination. When germination takes place the sucrose is used up but is first changed to invert sugar. It is noted that those varieties of cane which germinate most rapidly deteriorate fastest. The most successful methods for preventing deterioration are: (1) Cane stored in a heap, covered with trash, and kept wet by drenching. (2) Cane stored in a heap and covered with trash. (3) Cane stored in a shady place. Method (1) has been successfully employed in Java and the West Indies. Method (2) is best adapted for work in the field. Obviously, the better way is to treat all of the cane immediately after cutting.

H. R. SMITH.

The fermentation of table sirups and means for its prevention. WM. L. OWEN. *Sugar* 17, No. 8, 29-31(1915).—The species of yeast causing the formation of gas during fermentation resulting in a swelling of the tops and sides of the cans containing the sirup was found to be so resistant to high temps. that exposure for 15 min. at 90° was necessary for its destruction. In most of the cases the deterioration of the product was due primarily to a gaseous and not to an acid fermentation. Most of the infection is due to uncleanness.

A. GROSS.

Molasses. A. MCGILL. Inland Revenue Dept., Ottawa, Canada, *Bull.* 312.—The report contains the results of detns. of moisture, ash, reducing sugars, sucrose and organic non-sugars on 140 samples of molasses collected throughout Canada. The solids vary from 70 to 80%, the reducing sugars from 10 to 37%, cane sugar from 25 to 54%, and ash from 1 to 9%. Seventy-five samples contain less than 40% sucrose and are considered as doubtfully suited for human food under the name molasses; 38 samples contain more than 5% of ash and would undoubtedly be more correctly offered as *black-strap* than as molasses. No legal standards exist in Canada.

A. H. BRYAN.

The by-products of the cane sugar industry. II. Cane Wax. W. E. CROSS. *Intern. Sugar J.* 17, 311-3(1915); *Sugar* 17, No. 8, 37-8(1915); cf. *C. A.* 9, 2463.—The cane wax obtained by C. from filter press cakes in the province of Tucuman (Argentina) was of a greenish color (due to the presence of chlorophyll) and was much softer than the true cane wax, m. 60-70°. It consisted of a saponifiable and an unsaponifiable portion, the latter being true cane wax and the former consisting of fats, oils, etc., occurring in the cane. By fractional crystn. from benzine (the method recommended by Wynberg), it was possible to sep. the cane wax from the other constituents. The wax so obtained had the m. p. 78-80° and after purification and recrystn. it m. 81-83°. In its hardness and other properties it also corresponded with the true cane wax. As the extn. of the wax from filter press cakes by volatile solvents would not be profitable from an industrial point of view, C. carried out some expts. with the various products sepd. from raw juice by means of a large juice centrifugal, in which suspended substances of different sp. gr. appeared to collect in sep. chambers. It was found that one product contained pure wax to the extent of over 50%. The wax could be easily obtained by extn. with alc. and appeared to be almost entirely free from the fatty contamination found in the crude wax from filter press cake. After one crystn. a pure hard wax of a m. p. 82° was obtained. With the perfection and adoption of juice centrifugals C. expects the extn. of cane wax to become a com. success. A. GROSS.

Performance tests of sugar-house heating and evaporating apparatus. E. W. KERR, J. F. GUNTHER AND W. A. ROLSTON. La. Agr. Expt. Sta., *Bull.* 149; *Mel. Chem. Eng.* 13, 485-92, 506-7(1915).—There are two general types of vacuum pans, calandria and coil. The coil pans include single, double, triple, and quadruple coils with one or many manifolds. Among the calandria patterns are the straight, horizontal tube sheets, the inclined tube sheets, and the Express pan with inclined tubes as well as tube sheets. The heat transmission in vacuum pans is greater than in evaporators, the temp. fall with 60 lbs. steam at 26 in. mercury being 182°. Where exhaust steam at 10 lbs. gage is used, as is often the case with the calandria type, the temp. fall will be about 100°. The greater the hydrostatic head the greater will be the pressure, and the boiling temp. will be considerably higher than that indicated by the vacuum gage. For this reason it is better to employ pans with relatively large diam. and small height. The higher the density and the lower the purity of the boiling liquid the greater will be the rise in b. p. above the theoretical. The velocity of circulation of the boiling mass greatly affects the heat transmission. In coil pans the space between coils in horizontal directions affects the circulation. Also in placing the coils one above another the space from top to bottom should be as straight as possible in order to place the least possible resistance to the upward flow of the liquid. The supports for the coils should be placed with care. In some coil pans a circulation is maintained mechanically by a revolving screw in the vertical axis of the pan. In the calandria pans a more definite path for the circulation is produced. The Express pan is provided with a false shell, as a result of which the liquid rises in the center and flows down between the shells in well defined paths. A rapid flow of steam through the heating tubes increases the coeff. of heat transmission but no steam should be allowed to flow from the end of the coils. The water of condensation must be promptly removed in order to maintain high efficiency. In calandria pans this may be done by the use of traps or automatic receiver pumps. Coil pans are fitted with automatic receiver pumps, single traps, traps for each coil, or adjustable check valves. The condensed water is handled by the "closed" or the "open" system. In the former the water is returned to the boiler without releasing the pressure. In the "open" system the water is pumped to a storage tank from which it is conducted to the boiler. Diagrams representing each type are given and explained. In coil pans the length and diam. of the coil and its inclination

to the horizontal affect the draining qualities. The carrying-away capacity is proportional to the diam. and the condensing power is proportional to the length, so the ratio of length to diam. is important. This should not exceed 200. The heat efficiency depends entirely on the radiation. For this reason fast boiling is much to be desired. A series of tests on 23 pans of all types demonstrated that the coeff. of heat transmission is 40% greater in the Express pan than in the av. coil pan. The rise in temp. of boiling due to hydrostatic head, density, and purity was also less in the Express pan. This greater efficiency of the Express pan is undoubtedly due to the more rapid circulation of the boiling mass, and to the more efficient removal of the condensation. Efficiency tests involving steam consumption and heat balance showed no difference in economy for coil and calandria pans.

H. R. SMITH,

Results of experiments with stoking with bagasse. H. C. PRINSEN-GEERLIGS. *Louisiana Planter* 54, No. 5, 76-7(1915).—The furnace for the combustion of moist bagasse should be constructed so that the incompletely burned gases formed by destructive distn. in the higher strata of the fuel on the grate can be burned in a secondary current of air. This may be done by an inclination of the current of the gases which are forced back over the fire before being allowed to reach the boilers. Further, it is evident that the finer and more moist the bagasse is, the thinner must be the layer on the grate, and the finer the bagasse is, the slower must be the draught in order to prevent mechanical loss.

A. GROSS.

Estimation of raffinose (HUDSON) 7.

U. S., 1,148,453, July 27. A. S. HOYT. Laundry starch is prepared from wheat or other glutinous raw material by removing the gluten, sepg. the remaining albuminous material from the starch by centrifuging with a large vol. of H_2O , then removing all the H_2O present, except that required to prevent the starch from burning, cooking the starch to a jelly and drying the jelly.

U. S., 1,148,454, July 27. A. S. HOYT. Starch is prepared as in the preceding pat. and reduced to a powder which forms an opalescent jelly on the addition of H_2O .

U. S., 1,149,216, Aug. 10. C. S. PERKINS. Starch mixture for use in laundry work; formed of starch 6, NaCl 0.5, borax 0.5, and wax 5 parts.

U. S., 1,150,194, Aug. 17. W. D. HORNE. Removing iron compounds from sugar solutions. Na_2HPO_4 and H_2S or $(NH_4)_2S$ are added to the soln. A creamy aq. mixt. of $Al(OH)_3$ or clay may also be added to facilitate pptn. of the Fe.

29. LEATHER AND GLUE.

LLOYD BALDERSTON.

Influence of method of subdivision of leather on results of analysis. R. LAUFFMANN. *Ledertechn. Rundschau*, May 22, 161-4(1915).—The only notable differences between ground and cut samples are in water-sol. matter (higher in ground sample) and in the Proctor-Hirst test for sulfite cellulose ext. (stronger in cut sample, cf. C. A. 9, 2161). Small differences in % of SO_3 and of fat, L. attributes to influence of particles of iron from the mill in the ground sample.

L. B.

Filter papers. F. H. SMALL. *J. Am. Leather Chem. Assoc.* 10, 282-91(1915).—Report of collaborative work comparing S. & S. 590 with Munkell's 1 F in filtering

tannin solns. No difference was found and it was shown that variations in the wt. of filter paper did not affect the results. L. B.

Osage orange as a substitute for fustic. F. W. KRESSMANN. *J. Am. Leather Chem. Assoc.* 10, 347-51(1915).—Expts. on various fibers and on chrome-tanned calf leather show that osage orange from Texas and Oklahoma may be substituted for fustic in dyeing, giving practically identical results. The dyeing principles are chemically the same in the two woods, the amt. contained in osage orange being slightly less. Northern grown osage orange does not give good results. The supply in Texas and Oklahoma is large, and it can be placed on the market at a price which will enable it to compete with fustic. L. B.

Extraction of valonia. L. BALDERSTON. *J. Am. Leather Chem. Assoc.* 10, 417-20 (1915).—Time is an important factor. Spent valonia which had been leached for 6 days, yielding in the liquors as much tannin as was shown by the official analysis to be present, continued to yield tannin for 48 hrs. longer when extd. in a Teas extractor. A new sample placed in a Teas extractor yielded tannin for 72 hrs., and during 11 additional 24-hr. periods yielded amts. of extraction material ranging from 1.4% to 0.3%, the tannin-free extract containing a yellow dye similar to quercitrin. A quantity of this ext. was evapd. to dryness, the residue being subjected to dry distn. and the distillate treated with Br. A yellow ppt. formed; it is apparently the same as that obtained by Bennett's expt. on valonia ext. (*C. A.* 8, 3871; 9, 977). L. B.

Color due to copper extractors. T. G. GREAVES. *J. Am. Leather Chem. Assoc.* 10, 414-7(1915).—Chestnut wood was extd. in copper and glass extractors, and exts. prepared from the liquors were tested with the Schmidt and Haensch colorimeter as modified by Kerr (*C. A.* 9, 534). In every case the color of the copper extd. sample was darker. L. B.

Chemical control of the beamhouse. J. HELFRICH. *J. Am. Leather Chem. Assoc.* 10, 396-408(1915).—Results of several practical tests with packs of horse-hides and calf skins are given. Dissolved hide substance in the soaks was detd. by Stiasny's method. When skins are unhaired with Na_2S , they are afterward drummed with NaHCO_3 to neutralize the alkali remaining in the skins. After drumming for an hour the amt. of NaHCO_3 in soln. is detd., an excess showing the operation to be complete. Available lime in the lime liquors is detd. by titration with 0.1 *N* H_2SO_4 , first with phenolphthalein indicator and then with methyl red. The difference between the 2 readings may be assumed to indicate $\frac{1}{2}$ of the Na_2S present in the lime liquor. Total alkali is detd. by the first titration. Na_2S in lime liquors is detd. either by treating with CdCl_2 and CH_3COOH , dissolving the washed ppt. in HCl and titrating with 0.1 *N* I , or by titrating the filtered liquor with 0.1 *N* ZnSO_4 , using Pb acetate or Na nitroprusside as outside indicator. Hide substance in lime liquors is detd. by Stiasny's method. Bate liquors are examd. for $\text{Ca}(\text{OH})_2$ and pickle liquors for free acid. L. B.

U. S., 1,149,298, Aug. 10. W. S. SHAW. **Tanning hides.** The hides are immersed in a tanning soln. in a sufficiently high vacuum that the soln. boils at 24° or below, and the green hides are boiled in this soln., the temp. being so low that they are not injured; as the tanning progresses, the temp. and pressure are gradually increased.

U. S., 1,149,645, Aug. 10. C. W. GROSS. **Composition for toughening leather,** composed of rosin $\frac{1}{2}$ pint, linseed oil 1 pint, shellac $\frac{1}{2}$ pint, mutton tallow 1 pint, and gasoline 1 pint.

U. S., 1,150,047, Aug. 17. A. McLENNAN. Waterproofing leather. See Brit., 21,081 (C. A. 8, 1033).

Brit., 8,837, Apr. 7, 1914. J. H. YOCUM. Preserving fresh hides prior to tanning by salting them with a mixt. of a neutral salt of Na and a small % of normal sulfite of Na or a similar base, such as K or NH_4 . The mixt. is sprinkled on the hides in the usual manner and has the effect of eliminating salt stains in the tanned product. The preferred mixt. contains 97% of NaCl and 3% of Na_2SO_3 . The chloride may, however, be replaced by sulfate or other neutral salts of Na.

Brit., 8,877, Apr. 8, 1914. O. RÖHM. In leather manufacture, sulfonated oils or fats free from soap are used as a substitute for yolks of eggs in making glacé or kid leather or for treating vegetable-tanned leather before, during, or after tanning. Volatile substances sol. in oil, such as toluene or ethyl acetate, may be added. In tawing, the depilated hides may be treated with the sulfonated oils separately from the alum bath.

CHEMICAL ABSTRACTS

Vol. 9.

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No. 20.

I. APPARATUS.

L. C. JONES.

Simple automatic-zero buret. A. T. MERTES. *J. Ind. Eng. Chem.* 7, 786-7 (1915).—The excess overflow discharges directly into the main reservoir. I. M.

Two convenient forms of receiver for fractional distillations under diminished pressure. M. T. BOGERT. *J. Ind. Eng. Chem.* 7, 785-6 (1915).—An app. has been devised by which any number of fractions of large vol. can be collected separately without interrupting the vacuum. ISADOR MILLER.

Desiccator with an improved cover. ANON. *Z. angew. Chem.* 28, I, 324 (1915).—The cover described is provided with a vertical ring, which fits inside the body of the desiccator. The advantage claimed is that the desiccator may be easily carried from place to place without danger of the top slipping off. H. R. GUNDLACH.

A simple method of converting the Duboscq colorimeter into a nephelometer. W. R. BLOOR. Harvard Med. School. *J. Biol. Chem.* 22, 145-9 (1915).—The Duboscq colorimeter with movable cups can readily be transformed into a nephelometer by replacing the glass plate carrying the prisms with one fitted to receive 2 glass tubes. The colorimeter cups are replaced by 2 metal jackets. In the old-style instrument, with movable prisms, the change is more difficult. The nephelometer and the source of light, a 50-watt tungsten lamp, are enclosed in a light-tight box. I. GREENWALD.

Notes on micro-gravimetric analysis. J. DONAB. *Monatsh.* 26, 381-90 (1915); cf. C. A. 7, 2169.—Description of D.'s recent modifications in app. for micro-gravimetric analysis, such as filtering funnel, pptn. tubes, desiccator, drying oven, etc. E. W. BOUGHTON.

A reversion micrometer. O. LUBARSCHE. Berlin. *Z. physik. chem. Unterr.* 28, 198-200 (1915).—The app. consists of a graduated measuring buret and leveling tube adjustably clamped on a stand and connected with a strong rubber tube. The top of the buret is inclined at about 45° and a ground joint carries a receiver consisting of a short glass tube bent at the middle at 120°, the outer end closed and a separatory funnel of 6 cc. capacity fused in at the upper side of the bend. The substance is weighed into the receiver which is slipped into the ground joint, the H₂SO₄ run in from the funnel and let stand a few min. The receiver is then turned 180° so that the H₂SO₄ flows with the substance into contact with the Hg in the buret, causing the reaction to take place. Detailed directions for operating are given. J. H. MOORE.

A Kjeldahl distillation apparatus. J. M. PICKEL. *J. Ind. Eng. Chem.* 7, 787-9 (1915).—P. describes a simplified app. for which he claims many advantages. I. M.

G. Preuss's new apparatus for the determination of carbon. ANON. *Chem. Ztg.* 39, 652 (1915).—An ordinary evolution app. with a soda-lime tube fitted into the acid funnel to purify aspirated air. J. H. MOORE.

Continuous chlorine generator. A. VOSMAER. *Chem. Weekblad* 12, 576-7 (1915); cf. *Z. anal. Chem.* 27, 638 (1888).—The app. consists of a Wolff bottle, one opening of which is provided with a delivery tube for the Cl gas, and the other for the

admission of the acid supply tube, the latter reaching to the bottom of the bottle. A piece of glass marble is placed on the bottom, and upon this is placed the pyrolusite in lumps of 5 mm. diam. The HCl reservoir is placed 5 cm. above the generator flask. The HCl tube is provided with a 3-way stopcock, connecting in one position the reservoir with the generator, and in the other the generator with the outside air. In the latter position the Cl₂ will pass out of the bottle, thus interrupting the process. During the evolution of gas the app. is warmed to 50°.

P. VAN DER MEULEN.

A new filter press process. F. ULZEN. *Z. angew. Chem.* 28, I, 308(1915).—The new filter press cake makes use of the principle of electroosmosis in the filtering process, by which a rapid filtration of liquids containing very fine particles may be made without clogging the filter cloth. In general, when a current is passed through a liquid containing a solid phase, the solid phase, according to its elec. character, will either wander in or against the direction of the current, and will have the tendency to attach itself in a more or less dry state to one of the electrodes. In other cases the solid phase does not move in either direction of the current, but the particles settle to the bottom, while the liquid has the tendency to flow away from the electrodes. The design of the filter press is similar to the usual form; it consists of a number of chambers in which the filtration takes place. The difference is that electrodes are placed in each of the chambers, by which means the current is passed through the liquid. The chambers are filled with the liquid to be filtered, the current passed through and the solid phase then either wanders to one of the electrodes or falls to the bottom, leaving the liquid free to pass through the filter-cloth. This prevents a rapid clogging of the cloth and removes the necessity of high pressures to insure rapid filtration. This press efficiently separates the finest particles from liquids, and can be used for highly plastic clays, ceramic mixtures of plastic character, anhydrous colors, colloidal dyestuffs, barium sulfate, etc.

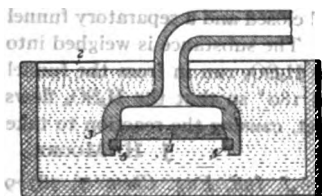
H. R. GUNDLACH.

U. S., 1,750,583, Aug. 24. D. R. WILLY. *Apparatus for separating liquids*.

U. S., 1,151,332, Aug. 24. R. BAGGLEY. *Apparatus for mixing fine dust with molten iron, copper mat, etc., or other powders with molten material.*

U. S., 1,151,801, Aug. 31. K. KUBIERSCHKY. *Apparatus for separating liquids from mixtures by distillation and scrubbing, e. g., sepg. cresote from brown coal-tar oils (using alc. for scrubbing) or sepg. PhNH₂ from H₂O (using C₂H₅ for scrubbing).*

U. S., 1,152,512, Sept. 7. H. W. JACOBS and H. H. LANNING. *Acetylene generator.*



U. S., 1,152,875, Sept. 7. C. J. BROCKBANK. *Apparatus for filtering corrosive liquids, etc.* The filter plate 4 is formed of carborundum, without any binder, and the supports 5 and suction bell 3 are formed of Si or an acid-resisting Si alloy.

Brit., 9,019, Apr. 22, 1914. W. A. STEDMAN. *The lower edges of the cloth of a filter leaf hang loosely down below the bottom frame member to*

form flaps which act as valves, closing under the vacuum but enabling the liquid used for dislodging the cakes to flow readily from inside outwards if the pressure inside exceeds that outside.

Brit., 9,221, Apr. 22, 1914. C. BUTTERS. In a filter for mixts., such as ore slimes, requiring aeration during filtration, the liquor is passed in a shallow stream over horizontal filtering surfaces in such a manner that the incoming stream of liquor produces a continuous circulation of the unsettled solid matter while the filtration proceeds.

172
The filtering surfaces have suction chambers below and are mounted so as to be tiltable for controlling the thickness of the cake and ultimately for discharging the cake by being placed approx. vertical. ~~Cylinder or other form~~ may be passed through the cake on the filtering surfaces.

Brit., 10,071, Apr. 23, 1914. R. NÜBLING and A. KRAUSS. Gas retorts and sewage distilling retorts in the same setting, with flues so arranged that the retorts are heated by the waste gases from the chamber surrounding the gas retorts. The gases generated in the 2 sets of retorts may be mixed. The retorts may be horizontal, inclined, or vertical.

Brit., 10,351, Apr. 27, 1914. DU PONT DE NEMOURS POWDER CO. App. for recovering volatile solvents used, e. g., for coating paper, textile fabrics, etc., by means of gas currents circulating by convection, comprises a drying chamber, into which the goods are placed or passed, adjacent to its lower wall; fitted adjacent to the upper wall of the app. are heating coils or other source of radiant heat, the distance between the goods and the heating means being relatively small. The gas current is circulated by cooling and heating means, between which is situated a condenser for the recovery of the solvent. Means for reducing the dimensions of the app. without interfering with the efficiency of the gas circulation are provided. E. g., an upwardly directed passage may be formed at the exit end of the drying chamber, or the cooling coils and the condenser coils are superposed.

Brit., 10,374, Apr. 27, 1914. G. ORNSTEIN. In apparatus for treating flowing liquid with a constant proportion of gas, e. g., for treating sewage with a sterilizing gas such as Cl, the gas is supplied under pressure and passed through a throttling orifice of known section, and a pressure-regulating device is arranged in front of the orifice and controlled by the pressure difference at different points of the current, which may flow through a Venturi tube.

Brit., 10,394, Apr. 27, 1914. H. A. A. J. LELARGE. A filter for removing impurities from gases and vapors, e. g., oil from exhaust gases or steam, or tar which is to be condensed, comprises a series of metallic spirals arranged in layers, the axes of those of adjacent layers being at right angles, and the spirals coated with a viscous liquid. The whole is arranged in an air-tight casing.

Brit., 10,400, Apr. 27, 1914. SCHÖLLER & CO. and M. ALBRACHT. In app. for detecting injurious gases in mines and other places, and working on the diffusion principle, the indicating U-tube is of such small section and the liquid is of such small mass that it can only be moved out of position very slowly by shaking; and the indicating tube is placed in the path of the rays of light from the miner's lamp on which the device is carried, and is arranged so that an increase in pressure of the liquid in the diffusion chamber causes a bubbling of gas through the liquid.

Brit., 10,522, Apr. 28, 1914. R. C. W. LYONS. A pulverizing machine for reducing specimens for assaying and other purposes, is constructed so that there are no ledges or projections inside the casing on which the ground material can settle.

Ger., 283,599, Nov. 28, 1913. G. BUNZOW. A fluorescent screen for X-ray rays, the fluorescent mass is applied to a base with mirror surface.

Ger., 283,704, Oct. 17, 1912. V. FRIEDL. Rotary condenser for gas.

Ital., 140,597, Mar. 25, 1914. CENTRALSTELLE FÜR WISSENSCHAFTLICH-TECHNISCHE UNTERSUCHUNGEN. App. for effecting gas reactions, in which H² or a mixt. containing H participates. Two vessels are provided, an inner vessel, chemically resistant and impermeable to H², and an outer vessel able to withstand pressure. The space between the vessels may be filled with an inert gas which may be maintained, by a suitable device, at the same pressure as that prevailing in the inner vessel.

2. GENERAL AND PHYSICAL CHEMISTRY.

WILLIAM D. HARKINS.

Assistants: E. B. MILLARD and A. B. CARTER.

Invariant, monovariant, and divariant equilibria. I. F. A. H. SCHREINEMAKERS. *Proc. Akad. Wetenschappen* 18, 116-26(1915).—A discussion of the position of the curves and regions representing the mono- and divariant equil. which may proceed from an invariant point in a P - T diagram. GEORGE W. MOREY.

Possible cause of the doubling of the Raoult effect in dilute solutions of electrolytes. RUD. KOHL. *Sitzb. K. Akad. Wiss. Wien*, 123, IIA, 26 pp.(1915); through *Chem. Zentr.* 1915, I, 1147.—K. has calcd. the internal energy of a substance from its equation of state, and from this the entropy and free energy in an explicit form. This equation allows the equil. condition to be calcd. from the thermodynamic potential, and then the expression for the Raoult effect (lowering of vapor pressure, f. p., rise of b. p., etc.) in a simple manner. To explain the anomaly of this effect in dil. solns. of strong electrolytes the theory of dissociation into ions is not required, and may be replaced by another equation of state, such as that of Eisenmann (*C. A.* 7, 303). The doubling of the effect is caused by the characteristic electromagnetic vibrations within the mol. E. B. MILLARD.

Experiments on supersaturated solutions. M. JONES AND J. R. PARTINGTON. *J. Chem. Soc.* 107, 1019-25(1915); cf. W. J. Jones, *C. A.* 7, 3057; 9, 876.—The existence of supersatd. solns. which deposit solid when the temp. is raised was established for $\text{Ca}(\text{OAc})_2$ and Ca butyrate, and (indirectly) for CaSO_4 . The theory, as applied to CaSO_4 , may be stated $RT/M \log_e S_r/S_\infty = 2\sigma/\rho r$, where M is the mol. wt. of the solute, σ the energy per unit area of the surface of sepn. of solid and soln., ρ the density of the liquid, and S_r and S_∞ the concns. of solute when spherical particles of radius r and plane surfaces of the solid, resp., are in equil. with the soln. If concn. is plotted against temp., a max. in solubility at about 40° is found for particles varying in size from $r = 0.5 \mu$ to $r = 50 \mu$. The influence of size has practically disappeared with radii greater than 50μ . Solubility was detd. from sp. cond. of solns. of pure gypsum powders. The existence of equilibria between finely divided gypsum and solns. in contact with it, with concns. different from those in normally satd. solns., was established by approaching the equilibria from both sides (supersatn. and undersatd. soln. + solid) and detg. the concn. from cond. The solubility agreed with that calcd. from the theory of Gibbs, according to which the solubility of a powder is greater than that of planes of the same substance by an amt. which may be calcd. from the energy located at the surface of discontinuity between solute and soln. E. B. MILLARD.

Molecular condition of mixed liquids. II. Application of Traube's atomic volume method to binary mixtures. W. R. G. ATKINS AND K. SHIPWAY. *J. Chem. Soc.* 107, 1117-21(1915); cf. *C. A.* 7, 3694.—The earlier results pointing to the existence of hydrates of the simple aliphatic alcs. should be attributed to the mixt. of highly associated liquids, for the mean of the association factors of H_2O and the alcs. is slightly above 2 and is lowered to almost exactly 2 by diln. with an equimol. wt. of another liquid. Owing to an error in calcn., in Part I, this conclusion was thought to be negatived by the values found. From detns. of the mol. vol. of each liquid in a binary equimol. mixt. in 46 cases it was concluded that in cases in which Traube's method indicates the absence of a compd., the result may be safely accepted, but the cases which apparently show the existence of a compd. are in need of further consideration, for in many cases the values found are due to the av. of the association factors of the mixed liquids having a value in the neighborhood of 2. E. B. MILLARD.

Absorption spectra of mono-substituted benzene compounds, and the benzene substitution law. E. C. C. BALY AND F. G. TRYHORN. *J. Chem. Soc.* 107, 1058-70 (1915); cf. *ibid* 87, 1332 (1905).—The chem. reactivity of a mol. depends on the condition in which its force field exists. If the field be entirely closed, the reactivity will be vanishingly small, and it will be necessary that the field be opened before any reactivity can be developed. This opening-up takes place in stages, one or more of which may be produced by means of a suitable solvent. The marked difference between *p*-xylene and its isomerides is shown in 3 ways: the amt. of light absorbed by the same mol. concn. is enormously greater, the band is more subdivided, and the persistence is much greater. When the 2 substituent groups are of the electropositive type, the force field of the para-isomeride is the least closed of the 3. Then when any mono-substituted C_6H_5 compd. shows a pronounced absorption band, it must give a para-disubstitution product, or at least that product will greatly predominate. It was also shown that meta-substitution renders the force field of a compd. relatively closed, in spite of the fact that the same substituting groups do not give a closed field when in other positions. The absorption curves of 22 mono-substituted C_6H_5 derivs. are shown, in all but 3 of which (benzyl ethyl ether, Et phenylacetate and benzonitrile) the absorption curves agree with the reductions from the force-field theory. E. B. MILLARD.

Relation between infra-red and ultraviolet absorption and the variation in absorption with concentration. E. C. C. BALY AND F. G. TRYHORN. *J. Chem. Soc.* 107, 1121-32 (1915); cf. preceding abstr.—The effect of the nature of the solvent and concn. has been investigated for several organic substances in a variety of solvents. On the addition of a solvent to a substance exhibiting selective absorption, the absorption band at first shifts toward the red until a minimum value of the central frequency is obtained, the concn. at which this occurs depending on the relation between the affinities of solvent and solute. Further dilution causes a progressive shift of the center of the band toward the shorter wave lengths, until at great diln. a const. max. frequency is reached. This max. frequency is the same as that exhibited by the absorbing substance in the state of vapor. Further confirmation has been obtained that the center frequencies of all absorption bands in the visible and ultraviolet regions are whole multiples of a fundamental frequency in the short-wave infra-red. The shift of the absorption band on diln. is due to the shift of this fundamental frequency caused by the solvent. There is also, accompanying these changes, an increase in the absorptive power up to a max. If K be the max. absorptive power, and k that at any concn., then $k/K = 1 - e^{-aV^{1/n}}$ where a is a const., V the vol., in liters, contg. 1 g. mol. of the solute, and n a number depending on the number of entities into which the mols. are reversibly resolved by the solvent. E. B. MILLARD.

The decolorization of fuchsin solutions by amorphous carbon. A. B. D. FORTUYN. *Proc. Akad. Wetenschappen* 17, 1322-5 (1915).—A 0.01% soln. of Neufuchsin on being decolorized with pure amorphous C and filtered resumes its color after the lapse of some time, the phenomenon being best observed when not enough C is added completely to decolorize the soln. The addition of AcOH to the soln. greatly accelerates the action. Crystal violet does not act in this manner. F. suggests a reconstruction of dye from uncolored dye-cations and Cl ions. B. RAYMUND.

Influence of temperature on the internal pressure of a gas. A. LÉDUC. *Compt. rend.* 161, 97-100 (1915); cf. *C. A.* 5, 3642.—Further calcns. on SO_2 extended to 1000°. The "internal pressure" at first falls rapidly with increasing temp., then more slowly. From the curve showing this pressure against temp. it appears that the internal pressure approaches a finite limit as T increases indefinitely, and does not approach zero as demanded by the equation of Clausius and Sarrau. E. B. MILLARD.

The probability of ionization and radiation of gas molecules due to collisions with electrons. K. F. NESTORCH. Petrograd. *Phil. Mag.* 30, 244-8(1915).—If one or the other takes place on inelastic collision in electropositive gases, the probability for ionization is 0.4 in argon and 0.9 in helium. G. L. WENDT.

Experimental determination of the law of reflexion of gas molecules. R. W. WOOD. Johns Hopkins Univ. *Phil. Mag.* 30, 300-4(1915).—A "one-dimensional gas" was produced by gently distg. Hg from an inclined neck through a sharp angle into a highly exhausted vertical tube immersed in liquid air. Laterally moving vapor particles rapidly condensed on the walls, leaving only the vertical stream. After passing through a narrow constriction the beam is wholly one-dimensional and even temp. and pressure are directional. Plates of polished glass and of mica placed obliquely in the stream and kept warmed reflect the molecules, but reflection is independent of the angle of incidence. Photographs confirm the usual assumption that the number of mols. reflected in any direction is proportional to the cosine of the angle between that direction and the normal to the surface. But when the angle is greater than 80° there is no reflection whatever. This is attributed to surface irregularities of molecular size. A preliminary expt. showed the gas stream to be elec. non-conducting.

G. L. WENDT.

Dynamics of isomeric change. Keto-enol transformation of cyanoacetate and its derivatives. H. M. DAWSON, R. SUGDEN AND A. TAYLOR. *J. Chem. Soc.* 107, 1030-8(1915); cf. *C. A.* 8, 1374.—The reaction between $\text{CNCH}_2\text{CO}_2\text{H}$ and the halogens proceeds too rapidly to permit of measurements at 0° , but the velocity was so much less when the Na salt was used that the reaction could be followed from the change in cond. produced by the HX formed. With Br the reaction proceeds to completion, but in the case of I a condition of equil. is reached which depends on the initial concn. of Na cyanoacetate and of I. The halogen substitution is auto-catalytic in character and appears to be preceded by the conversion of the inactive keto- into the active enol-form. It is probable that the Na derivs. of cyanoacetic esters are enolic compds. corresponding with the formula $\text{CN}:\text{CH}:\text{C}(\text{ONa})\text{OEt}$. From expts. in which a relatively large proportion of cyanoacetate was used, it appeared that the rate of disappearance of halogen from the soln. increased with the concn. of the salt but was independent of the concn. of the halogen. Further expts. were made in which solns. contg. 0.1 mol. of Na cyanoacetate per l. were mixed with relatively small and varying quantities of halogen at 0° , and samples added, after measured intervals of time, to KI solns., and the amt. of free halogen detd. by titrating the liberated I with $\text{Na}_2\text{S}_2\text{O}_3$. Here the velocity of the reaction was not entirely independent of the nature of the halogen (Br or I) as it should be if the rate of disappearance of halogen is solely detd. by the preliminary isomeric transformation. The velocity of the reaction is proportional at each moment to the quantity of halogen acid which has been set free in the substitution process. In consequence of the reaction between the Na cyanoacetate and the HX the auto-catalytic effect will be much smaller than that which would be produced by the unaltered halogen acid. E. B. MILLARD.

Allotropy and metastability of metals. ALFRED HOLT. *J. Soc. Chem. Ind.* 34, 693-7(1915).—The work of Cohen at Utrecht and of Smits at Amsterdam indicates that metals, as they are known, are not composed of similar molecules or molecular associations and that their properties are usually those of mixts. or solid solns. This, if true, is a matter of such great importance to the chemist, the physicist and the metallurgist, that it has seemed worth while to give a brief outline in English of the exptl. work that has been done and of the nature of the phenomena to which allotropy affords at least a plausible explanation. WILLIAM T. HALL.

The allotropy of sodium. L. ERNST COHEN. Utrecht. *Proc. Akad. Wetenschappen* 18, 91-8(1915); cf. *C. A.* 9, 987.—Careful measurements with Na in a dilatometer point to the conclusion that β -Na is monotropic in regard to the stable α -Na. No impurities could be detected in 10 g. of the Na, and it had a melting interval of from 97.22 to 97.51. The dilatometer had a vol. of 380 cc., diam. of bore 1.2 mm. The temp. of the thermostat used was controlled to 0.001°. G. W. MOREY.

Tension lines of the system phosphorus. IV. A. SMITS AND S. C. BOKHORST. Amsterdam. *Proc. Akad. Wetenschappen* 18, 106-16(1915).—New detns. of the vapor pressure line of liquid white P (cf. *C. A.* 8, 3146), with a dynamic isoteniscope similar to that previously used, but with a sensitive resistance thermometer immersed in the P, gave results which indicate, contrary to previous conclusions, that the v. p. lines of liquid white and liquid violet P are separate parts of the same curve. Both sets are well represented by the expression $T \ln p + 3.59 T \ln T = 37.62 T - 8257$, which gives the v. p. of liquid violet P from 169° (0.05 atm.) to 634° (56.8 atms.). Hence liquid white P is only supercooled liquid violet P; on this basis the P - T and P - X curves for the pseudo system are revized. GEORGE W. MOREY.

Crystal studies with the polarization microscope. P. METZNER. *Mikrokosmos* 1915-16, 86-90.—M. shows the application of the polarization microscope to the study of various crystals. Photomicrographs and methods of obtaining crystals of the following compds. are given: KNO_3 , Na_2CO_3 , CuSO_4 , NH_4NO_3 , $\text{C}_2\text{H}_4\text{O}_4$, NaNO_3 , and $\text{C}_6\text{H}_{12}\text{O}_6$. C. A. NOWAK.

The structure of the spinel group of crystals. W. H. BRAGG. Univ. Leeds. *Phil. Mag.* 30, 305-15(1915).—From the X-ray spectra and the molecular dimensions of a magnetite crystal B. concludes that it has fundamentally the same structure as the diamond, molecules of FeFe_2O_4 replacing the atoms of C. Intramolecularly, the O atoms lie all on 2 planes, while each trivalent Fe atom lies at the center of a regular octahedron of O atoms and each divalent at the center of a tetrahedron of O atoms. The (100) planes consist of Fe_2O_4 planes with the spacing 2.07 Å. interleaved with Fe planes. The (110) planes are Fe_2O_4 planes of spacing 2.94 Å. interleaved with FeO_2 planes. MgAl_2O_4 is exactly similar. G. L. WENDT.

Construction of the diamond with theoretical carbon atoms. ALBERT C. CREHORE. Columbia Univ. *Phil. Mag.* 30, 257-70(1915).—A discussion of the atomic forces involved. The length of the edge of the elementary tetrahedron is calcd. to be 2.528×10^{-8} cm. G. L. WENDT.

Phosphoric acid as mono- and di-basic acid. I. M. KOLTHOFF. Utrecht. *Chem. Weekblad* 12, 644-53(1915).—Qual. expts. showed that the reaction $\text{H}^+ + \text{HPO}_4^{2-} \rightleftharpoons \text{H}_2\text{PO}_4^-$ is endothermic; heating a soln. of Na_2HPO_4 which has been made neutral to phenolph. results in further hydrolysis, as shown by the indicator. Neutral salts have a marked effect on the color reaction of Na_2HPO_4 toward phenolph., and of NaH_2PO_4 toward dimethylaminoazobenzene; in the first case NaCl and NaNO_3 give a sharp color reaction on addition of a drop of acid. Potential measurements on mixts. of NaH_2PO_4 and Na_2HPO_4 with and without addition of NaCl soln. gave similar curves, the neutral salt soln. having a higher H^+ conc. H_2PO_4 can be titrated as a monobasic acid with dimethylaminoazobenzene, matching the color with a control soln. of NaH_2PO_4 , and it can be titrated as a dibasic acid with phenolphthalein, after addition of an equal vol. of dil. NaCl soln. GEORGE W. MOREY.

Different chemical activity of free and of combined water. H. C. JONES AND J. E. L. HOLMES. *Chem. News* 112, 73-4(1915).—The hydrolysis of HCO_2Me and AcOMe was studied in order to investigate the difference in chem. activity of free and combined water. The salts of Ca, Sr, Ba and Mg, which are strongly hydrated, in-

creased the reaction velocity to a greater extent than non-hydrated salts. The authors conclude that H_2O of hydration is more active than free H_2O . They assume that combined H_2O is more strongly ionized.

BERMAN.

Distribution coefficient and extraction velocity of some organic acids. J. PINNOW. *Z. anal. Chem.* 54, 321-45(1915).—For the detn. of extn. velocity, measured amts. of solns. of organic acids of known concn. were extd. in the Partheil-Rose app. (cf. *Ber.* 34, 3611(1901)), with ether which had been previously washed with NaOH and H_2O . The rate of application of the ether was such that the delivery of the ether from the condensing part of the app. was in drops too fast to be counted. The time of extn. was measured from the beginning of the rapid delivery of the ether from the condenser. Concns. of acid were detd. by titration, after the addition of 5 cc. of boiled water, with 0.5 N NaOH, using phenolph. indicator. In the case of AcOH water was added to lessen the volatility of the acid. Distribution coeffs. were detd. with ether purified as above. As com. lactic acid contains lactic anhydride, the latter was converted to lactic acid by treatment with concd. KOH and H_2SO_4 , the K_2SO_4 filtered off by suction and washed with ether; water was then added to prevent the reformation of lactic anhydride. For the other acids the prepns. of Kahlbaum were used. The extn. velocity coeff. was calcd. according to the equation $k = (1/t) \lg [a/(a - x)]$ where t = time in min., a = concn. at the beginning and $a - x$ the concn. at the end expressed in cc. of 0.5 N NaOH, $\lg$ = common or Briggs log. The distribution coeffs. between ether and water were detd. for the following named acids: acetic at 15°, succinic at 15, 20 and 25.5°, citric; tartaric, lactic and oxalic at 15°, and at 25-27.5°; also for oxalic after the addition of H_2SO_4 . The extn. velocity from aq. soln. of the acids named by varying vols. of ether with and without the presence of H_2SO_4 was detd. The extn. which follows essentially the formula for monomolecular reactions, is, within certain limits inversely proportional to the extg. vol., and approx. inversely proportional also to the distribution coeff. for 27°. The distribution coeff. of an acid at 27°, divided by 0.04, gives the time in min. for practically complete extn. Oxalic acid solns. should be treated with H_2SO_4 to the amt. of $1/6$ molar. A slight addition of H_2SO_4 to the other acids is recommended.

L. W. RIGGS.

Determination of the elementary electric charge from ferromagnetic properties and the magneton. JAKOB KUNZ. Univ. Ill. *Arch. sci. phys. nat.* 39, 488-93(1915); cf. *Phys. Rev.* 30, 359(1910).—Theoretical.

E. B. MILLARD.

Charged surface layers formed on the electrodes of vacuum tubes. K. T. COMPTON AND L. W. ROSS. *Phys. Rev.* 6, 207-12(1915).—The abnormal contact potentials produced on the electrodes by high potential discharges are due to and exist in insulating films such as grease or wax on the surfaces of the electrodes. Surface charges are produced on insulating films of small viscosity by convection currents in the film set up by the applied field, even though this field may be too small to produce a vacuum discharge. During a vacuum discharge a charged layer of gaseous ions is deposited on the surface of the insulating film. This charge is of a sign opposite to that of the potential of the electrode during discharge and is, therefore, opposite to that produced by convection currents. The apparent contact p. d. is the resultant of these effects, whose relative importance depends on the viscosity of the film and the nature of the discharge.

E. B. MILLARD.

Attempt to detect a change in the heat conductivity of a selenium crystal with a change in illumination. L. P. SIMS. *Phys. Rev.* 6, 213-8(1915).—No change was detected, possibly because the number of free electrons was so very small that even a 3-fold increase would be inappreciable, or possibly the no. of free electrons is not detd. solely by the state of light or dark, but largely by the elec. field intensity. The

source of light employed was able to change the elec. cond. 300% without producing a change as great as 5% in the heat conductivity. E. B. MILLARD.

Concentration cells built up from ammoniacal solutions of silver salts. A. REYCHLER. *Bull. soc. chim. belg.* 28, 222-7(1914).—R. considers the cell

Ag | NH₃ in excess, of uniform conc. | AgCl of concn. C | AgCl of smaller concn. c | Ag. In connection with the tendency toward equalization of the concn. of the Ag salt and consequent production of e. m. f., the passage of 96540 coulombs is associated with the transfer of $v/(u+v)$ moles of Ag salt from left to right (as above). The expression $96540 E = 2[v/(u+v)]RT \log (C/c)$ is then obtained by equating the 96540 E volt coulombs of elec. energy rendered available by the transfer of 1 g. atom of Ag and the max. osmotic work which corresponds to the isothermal dilatation of $v/(u+v)$ moles of AgCl from the concn. C to the concn. c (the Ag salt is considered totally dissociated at dilns. taken; hence the factor 2); if $2v/(u+v)$ be taken as unity, then $E = 0.058 \log C/c$. Values of E calcd. from this formula for various concns. C and c of both AgCl and AgNO₃, as well as NH₃, showed acceptable agreement with the experimentally detd. values observed by Bodländer and Pittig; this agreement indicates that the salts in question are quite simple and only contain 1 atom of Ag in the mol. R. next considers the cell

Ag | AgCl of uniform concn. | NH₃ of concn. C | NH₃ of smaller concn. c | Ag. Consideration of the possible concn. changes and assumption of the transfer of n mols. NH₃ by 1 atom Ag indicates that a possible complex Ag(NH₃) _{n} ...Cl does not participate in the production of the initial e. m. f., since it has initially the same concn. in both liquids; it is only necessary, therefore, to consider the concns. of free NH₃ and the max. work corresponding to the isothermal passage of n moles NH₃ from the concn. C to the concn. c . The expression $E = n \times 0.058 \log \{(\text{free NH}_3)/(\text{free NH}_3)_1\}$, is thus derived. Comparison of the exptl. values of Bodländer and Pittig with the calcd. values of E for various concns. of NH₃, as well as both AgCl and AgNO₃, showed that satisfactory agreement was obtained when $n = 2$. The Ag salts present in soln. in an excess of aq. NH₃ soln. are, therefore, to be represented by Ag(NH₃)₂...Cl and Ag(NH₃)₂...NO₃, resp. R. compares his theoretical deductions for these cells with the theory of Bodländer.

H. S. PAINE.

Metallic conduction. O. W. RICHARDSON. *London. Phil. Mag.* 30, 295-9 (1915).—Calcn. of the elec. moments of the doublets postulated by J. J. Thomson (*C. A.* 9, 2482) requires a distance between the charges of 2.92×10^{-8} cm. The number of free electrons per cc. is $6.2 \times 10^{22} d/d_1$, where d is the distance traveled by an electron in passing from one atom to another and d_1 is the distance between centers of neighboring atoms. The number of W atoms in a cc. is 6.16×10^{22} , so that if atoms are planetary systems and d is comparable to d_1 about half the specific heat of the substance is located in the free electrons; but if atoms have a definite boundary and electrons pass only where there is contact (d is zero) the electrons have no heat capacity. The former is regarded as more probable. G. L. WENDT.

The electron theory of metallic conduction. IV. G. H. LIVEN. Univ. Sheffield. *Phil. Mag.* 30, 287-95(1915).—A mathematical discussion of the law of distribution of velocities of free electrons, with especial calcn. of the mean time between two successive collisions of an electron. G. L. WENDT.

The effect of electric and magnetic fields on the emission lines of solids. C. E. MENDENHALL AND R. W. WOOD. Johns Hopkins Univ. *Phil. Mag.* 30, 316-20(1915).—No Stark effect was found with 50000 v./cm. for crystals of fluorite, ruby, monazite, Pr₂(SO₄)₃, Nd₂(SO₄)₃, Nd(NO₃)₃, and UO₂(NO₃)₂. The ruby lines, λ 6918, 6932, showed

corresponding absorption, synchronous resonance, and a decided Zeeman effect, but the fluorite line λ 5736 showed none of these and may not be a normal mode. G. L. W.

Absorption spectra of various derivatives of benzoic acid. J. E. PURVIS. *J. Chem. Soc.* 107, 966-73(1915); cf. *C. A.* 8, 2637, 3025; 9, 207, 2030.—The substances examd. were $C_6H_5CH_2COOH$, C_6H_5COOH , mandelic acid, cinnamic acid, phenylpropionic acid, and the *o*-, *m*- and *p*-forms of toluic acid, $C_6H_4ClCOOH$, $C_6H_4BrCOOH$, C_6H_4ICOOH , $C_6H_4NO_2COOH$ and nitrocinnamic acid. The app. has been described before; the condensed Cd spark was used as the source of light. Curves were drawn showing oscillation frequency against log. relative thickness of the alc. solns. The fundamental vibrations of the atoms in a mol. are influenced by the type and nature, as well as by the orientation and physical conditions, of the system, and the final adjustment of the oscillations producing absorption is controlled by these conditions and by the radiant energy which sets the vibrations in motion and reacts differently on the various atoms and atomic groups. The movements which determine the nature and extent of the absorption are modified by the interdependence and relationships of the various oscillating centers. Some centers, like NO_2 groups and the ethenoid linking, are more powerful than others in modifying the properties of a nucleus. Although there are various differences in the toluic acids, the introduction of I, as in C_6H_4ICOOH , does not destroy the bands as it does in C_6H_4 and $C_6H_5CH_3$. The introduction of I has more influence than Cl or Br, as shown by the decreased persistence and strength of the less refrangible band of the *o*- and *m*-compds. and the greater strength of the more refrangible band of the *p*-compd. The sepn. of the nucleus and the acid group by aliphatic chains has enabled the C_6H_5 nucleus to regain some of its former freedom (whereby the residues of various C_6H_5 bands are produced), but the type of intervening radical modifies the strength and persistency of the bands. E. B. MILLARD.

Fluorescence of frozen solutions of uranyl salts. H. L. HOWES. *Phys. Rev.* 6, 192-206(1915).—The changes produced in the spectra of aq. solns. of uranyl salts by slowly lowering the temp. from that of the room to liquid air temp. are: (1) a proportionate increase in the intensity of all the bands; (2) a shift either toward the red or the violet; (3) a narrowing of the bands, and in some solns. a tendency toward resolution; and (4) a slight change in the frequency interval between bands, although this appears to be const. at any given temp. The only exception to (4) is the fact that occasionally an extreme red or blue band does not join the const. interval series. A suddenly cooled soln. of $UO_2(NO_3)_2$ has a spectrum different from that of the same soln. slowly cooled. This is also true of the double nitrates. Diln. with acid produces larger shifts than diln. with H_2O and often radically changes the appearance of the bands. Alc. solns. invariably give dim, broad-banded spectra. On the basis of the (assumed) formation of different hydrates, the formation of different spectra by the same soln. could be explained. The extraordinary shifts and other changes in the spectra are most readily explained (cf. Nichols and Merritt in a paper to appear shortly) by assuming that the bands in such spectra are complex, and consist of overlapping components which vary relatively in intensity with changes in temp. A Hilger const-deviation spectroscope was used with a special Cu app. which enabled the temp. of the specimen to be kept at any desired (const.) temp. between 0° and -180° . Fluorescence was excited by rays from a C arc which had passed through a water cell, a focusing condenser and a soln. of ammonia- $CuSO_4$ which absorbed all of the exciting light of wave length greater than 0.478μ , so that the fluorescent light from the collimator of the spectrometer could be viewed on a black background. E. B. MILLARD.

Can the dissociation theory be applied to solid solutions in steels (CAMPELL) 9?
Rate of evaporation of ether from oils (BASKERVILLE) 11A.

3. RADIOACTIVITY.

WILLIAM H. ROSS.

The distribution of the active deposit of thorium in an electric field. G. H. HENDERSON. Dalhousie Univ., Halifax, N. S. *Trans. Nova Scotian Inst. Sci.* 14, 1-16(1914-15).—A new type of vessel for this kind of work has been developed and its advantages noted. It has been shown that in dry air all the Th rest atoms are initially positively charged. In pure Et_2O vapor all the Th rest atoms are initially uncharged, and in a mixture of Et_2O vapor and air the charged condition of the rest atoms depends on the relative amounts of Et_2O vapor and air present. The same appears to be true with H_2O vapor.

H. JERMAIN CREIGHTON.

A physical measurement of X-rays. HOWARD L. BRONSON. Dalhousie Univ. Halifax, N. S. *Trans. Nova Scotian Inst. Sci.* 14, 17-29(1914-15).—It has been shown that the action of Röntgen rays on a photographic plate and on a Sabouraud pastille is proportional to the ionization produced in the air immediately surrounding them. A simple app., making use of this principle, has been devised for measuring the intensity and hardness of the rays. It has also been shown that this same app. can be easily used to det. the length of time of exposure needed to produce radiographs of suitable density.

H. JERMAIN CREIGHTON.

Electrical density and absorption of beta rays. FERNANDO SANFORD. Stanford Univ. *Science* 42, 130-1(1915).—Evidence is given to show that the absorption coeff. of the elements for β -rays is dependent rather upon the electrical d. of the absorbing agent than upon its mass d. The former is obtained by dividing the at. charge of an element by its at. vol. in the solid state. This calcn. has been made for 11 of the elements included in the list of 32 elements whose absorption coeffs. for the β -rays of U were detd. by Crowther (*Phil. Mag.* 12, 379(1906)). It is thus seen that for these elements the values of the ratio of λ/D_e , where D_e is the electrical d., vary less from a mean value than do the values obtained for λ/ρ .

W. H. ROSS.

The asymmetric distribution of the secondary electronic radiation produced by X-radiation. A. J. PHILPOT. Univ. London. *Proc. Phys. Soc. London* 26, 131-6(1914).—The extent of asymmetry was investigated with radiations whose mass absorption coeffs. in Al vary from 0.5 to 5. In general, increase in hardness of exciting radiation corresponds with increase in asymmetry.

PAUL D. FOOTE.

A Röntgen tube without the rise of starting potential. J. E. LILLENFELD. *Ber. K. Sach. Ges. Wissenschaften, Leipzig* 66, 76-9(1914).—A Röntgen tube is described which produces a narrow beam of cathode rays of uniform velocity. A hot wire electrode, Ta or W, a pierced cathode, and the anticathode are mounted in a line, the wire electrode in one chamber, the anticathode in another chamber, and the pierced cathode in a neck connecting the 2 chambers. The electrons emitted by the electrically heated wire are driven through the hole in the cathode by an auxiliary field and are then accelerated to the anticathode by the high field in the main discharge chamber.

PAUL D. FOOTE.

Dielectric losses with the cathode ray tube. JOHN P. MINTON. *Proc. Am. Inst. Elec. Eng.* 34, 1115-65(1915).—It is shown that the cyclograph is well adapted to the detn. of dielectric losses in insulation. The watts do not vary as the square of the voltage but may vary from the 1.32 to the 2.52 power of the voltage. Empirical equations are derived that will express the dielectric losses, currents and power factors as functions of the voltage, temp. and absorbed moisture.

C. G. F.

Radiography of metals (DAVY) 9. Radioactive minerals in eastern Canada (ROBINSON) 8. Occurrence of radioactive minerals in Ontario (BRUNTON) 8.

U. S., 1,151,187, Aug. 24. B. KETMAN. Obtaining radiothorium and solutions containing thorium-X. The material under treatment is pptd. with NH_4OH and the mixt. of ppt. and supernatant liquid thus obtained is evapd. to dryness and washed with H_2O to remove the NH_4 salts and leave a dense pure radiothorium hydroxide from which a soln. containing Th-X is made by treatment with H_2O or dil. NaCl soln. and shaking.

Brit., 10,083, Apr. 23, 1914. GES. FÜR ELEKTRO-OSMOSE. In obtaining radium salts, the ions adsorbed in colloids are exchanged for other ions by treatment with a soln. of an electrolyte, the exchange being made selective by choosing suitable salt solns. at suitable concns. so that closely related elements, such as the rare earths, may be sepd. In an example, a MnO_2 adsorption product of Ra and Ba in a fine state of division is boiled with an NH_4Cl soln. of stated strength. The solid matter after filtration is stated to contain 32.7% of the Ba and 64.7% of the Ra originally present.

Ger., 281,380, July 24, 1913. C. SCHMIDT. Process of visualizing the α -rays upon the surface of radioactive substances, or material which contains a radioactive substance.

Ger., 282,619, Feb. 18, 1914. R. FÜRSTENAU. Addition to 280,709 (C. A. 9, 1876). Modification of a device for measuring Röntgen rays.

Ger., 282,578, Feb. 20, 1914. G. BUCKY. A fluorescent mass for application to a screen for Röntgen rays contains particles of metals, preferably in the colloidal state, metal powder, or metallic salts, of such properties that when the Röntgen rays impinge thereupon, comparatively feeble secondary Röntgen rays are given off by the metal atoms in large amt.

4. ELECTROCHEMISTRY.

COLIN G. FINK.

Electrochemistry and electric heating as applied to the metallurgical industry. F. FORSTER. *Electrician* 75, 778(1915). C. G. F.

Electro-metallurgical industries as power consumers of electric power. D. A. LYON AND R. M. KEENEY. *Bull. Am. Inst. Min. Eng.* 1915, 1707-30.—For ferro-alloys hydro-elec. power is high in U. S. and not favorably located for receipt of raw material and sale of products. For pig Fe, the process is practical only where charcoal or coke is high priced. The treatment of Cu and Zn ores is still in the exptl. stage. The West offers few advantages for the electro-metallurgical industries, but development on non-ferrous materials seems promising. W. H. BOYNTON.

Electric iron ore smelting in Sweden. J. A. LEFFLER. *Electrician* 75, 729(1915); *Engineering* 100, 131-3(1915).—A statement of the present condition of this industry. C. G. F.

The principal electric furnaces for the preparation of steel and wrought iron. O. DIEFFENBACH. *Chem. App.* 2, 149-52, 161-4, 173-6(1915).—Descriptions, with 21 cuts, of the Stassano, Héroult, Girod, Kjellin and Röchling-Rodenhauser furnaces. J. H. MOORE.

Electric furnaces for reheating, heat treatment and annealing. T. F. BAILY. *Proc. Eng. Soc. W. Pa.* 31, 255-72(1915); *Met. Chem. Eng.* 13, 558-64(1915).—A general discussion, special attention being drawn to the advantages of the elec. furnace for these purposes. E. J. C.

Electrothermic iron ore smelting in Scandinavia. ANON. *Eng. Mining J.* 100, 351-2(1915).—A discussion of the present status of elec. smelting to produce pig iron in Norway and Sweden. E. J. C.

Electric furnace for gold refining at the Alaska Treadwell cyanide plant. W. P. LASS. *Bull. Am. Inst. Mining Eng.* 1915, 1443-50.—Au ppt. from the Zn dust process is treated by the Pb smelting method. The furnace is constructed from an old acid drum by cutting over the top and introducing a Cu cable through the bottom and spreading the strands fan-shaped on the inside of the drum. Powdered graphite mixed with 10% cement is tamped wet into the bottom, around and covering the Cu wire. Graphite is carried to the bottom of the Pb well and acts as lower electrode. The melting chamber 14" × 20", is firebrick; upper electrodes of graphite or C 3" × 4" are arranged with threaded joints, enabling new electrodes to be connected without shutting down or wasting stubs. The cover has openings for charge feed, gas escape and electrode introduction. The furnace is operated on a lighting circuit through a 50 kw. transformer. A H₂O rheostat is used to regulate the amp. when furnace is started and later when the metal bath would conduct enough current to cause a short circuit. The charge consists of by-products 100 parts, old reverberatory hearths 20, PbO 20, coke 2, scrap Fe 3. The furnace acts like the arc type until hot. The charge is added and electrodes raised as the load increases until the entire chamber is filled with the charge and the upper electrodes extend about 1 ft. into the melt. The furnace automatically becomes one of the resistance type. Molten Pb and slag are tapped as in a blast furnace. Coke is the only cost, since cupels and mill scrap furnish PbO and Fe. Advantages claimed over blast furnace are: a saving in mechanical loss of Au due to neutral atm., a low grade slag giving quiet melting action, nicety of melting temp. regulation, and health benefit to operators.

W. H. BOYNTON.

Synthesis of nitrogen oxides in the electric arc. E. ROELLER. *Rev. Electrochim. Electrometall.* 8, 33-50, 97-117(1914).—A review.

C. G. F.

The effect of wave form upon the chemical action of the silent electrical discharge in ozone formation. G. LECHNER. *Z. Elektrochem.* 21, 309-24(1915).—L. first gives a historical review of the subject, then a discussion of the various forms of curves and their evaluation, detn. of O₃ obtained and the method of carrying out the expts., which were conducted at atm. pressure and room temp., using both a glass tube and a Au-plated brass tube. Both a. c. and interrupted d. c. were employed. It was found that when a. c. was used with the metal tube a partial rectification took place. By a detn. of the form factor of the curves the av. current was calcd. and the law of Warburg and Leithäuser, that the O₃ yield is nearly proportional to the current, was corroborated. The best results were obtained with the flattest wave form curves.

W. E. RUDER.

The hydro-electrolytic treatment of copper ore. R. R. GOODRICH. *Columbia Univ. Bull. Am. Inst. Mining Eng.* 1915, 1551-94; cf. *C. A.* 8, 1917.—Arizona porphyry Cu ore was used in lab. expts. This consisted of pyrite and chalcocite with small amts. of oxidation products: malachite and limonite. Some zircon was present. Analysis: Cu 6.04, Fe 10.9, S 12.70, SiO₂ 65.10%. Of the Cu, 1.7% was sol. in dil. HCl. Petrographic details are given. On the large scale, concn. and smelting had afforded a recovery of 66% of the Cu. By roasting at 600 to 725° all the Cu was extractable by hot 10% H₂SO₄. If the temp. of roasting reached 800°, Cu compds. insol. in that strength of acid were formed. What would pass 80-mesh was sufficiently roasted in 1½ hrs. If somewhat coarse, 2 hrs. were required. As the amts. roasted did not supply adequate quantities of soln., expts. on electrodeposition were made with a soln. of CuSO₄. Depolarization by SO₂ was most efficient when the soln. was satd. with SO₂ and C anode was used. The nature of the anode is important; no depolarization occurred when Pb anode was used. A step arrangement was worked out, by which the Cu deposition could be made continuous, the discharged liquor being barren of Cu.

E. WALLER.

The development of electrolytic copper refining. LAWRENCE ADDICKS. *Trans. Intern. Eng. Congress 1915*, 7 pp. (advance copy).—A brief review. E. J. C.

Electrolysis of solutions of the rare earths. II. L. M. DENNIS AND P. A. VAN DER MEULEN. *J. Am. Chem. Soc.* 37, 1963-76(1915); cf. *C. A.* 9, 560.—Nitrates were used in the previous expts., and no diaphragm was employed, so that the pptn. may have been due to NH_3 formed by reduction of HNO_3 during the electrolysis. About 1200 g. of Yt group oxides, from which Ce and almost all of the Di group had been removed, were added to warm HCl until a neutral soln. was obtained contg. 10% by wt. of the oxides. This soln. was electrolyzed in a large cell with Hg cathode, a porous cup diaphragm and C anode; after passing about 100-150 amp. hrs. through the cell at 9 volts, the pptd. hydroxides were removed, and the electrolysis continued on the remaining soln. Twenty fractions of 25-50 g. each were obtained. The at. wts. of the fractions dropped regularly from 124 in the 2nd fraction to 93 in the 20th. From absorption spectra it was shown that the colored salts Er, Ho, and Th were concd. in the early fractions, a small amt. of Nd which was present was concd. in the later fractions, and almost all of the Yt was pptd. in the last fractions. To det. if the decompn. voltages might be used to effect a sharper sepn. than the higher voltage employed in the expts., the decompn. potentials for the nitrates between Pt terminals were detd. as follows: Th 1.87 v., Nd 2.03 v., La 2.05 v., Ce^{III} 2.18. Two expts. were made with chlorides, giving Th 1.94, Ce^{III} 2.36. Fractional electrolysis of some nitrate solns., using a diaphragm, showed a sepn. similar to that obtained with the chlorides. The rate of pptn. was 4 times as great as from the chlorides, though NH_3 was shown to be absent. Fractional electrolysis of a soln. high in Er, Ho, Tm and Yt gave, in a series of 6 fractions, no appreciable sepn. of the first 3 from one another, but rapidly eliminated the Yt. In these expts. the hydroxides of the earths are pptd. in the order of the basicities of the earths. Rapid concn. of certain groups is attained in a short series of fractions. E. B. MILLARD.

The hypochlorite-carbon cell a new type of primary cell. A. THIEL. *Z. Elektrochem.* 21, 325-9(1915).—An analysis of the process of Hofmann and Rifter by which amorphous C is changed, by means of a powerful oxidizing agent, into CO_2 at room temps. with the production of available elec. current. It is shown that the principle reaction is not directly between the reagents hypochlorite and C, but upon the oxidation potential of the hypochlorite against the O liberated upon the C. The C electrode then acts as a depolarizer and uses up the O, forming CO_2 . The new cell is then a half electrochem. oxidation-reduction series. It is possible, therefore, that the O of the hypochlorite can be replaced by compressed atm. O of the same oxidation potential. It has not yet been possible to obtain elec. energy quantitatively corresponding to the energy obtained from burning the C. It is not necessary to look for electrochem. reactions at both electrodes; the reaction of depolarization may be a purely chem. one. The iodoform and nitrobenzene elements are given as other examples. In both of the cases the chem. depolarization takes place at room temp. W. E. RUDER.

Home-made charging panel for small batteries. ANON. *Elec. World* 66, 591 (1915); illus.—A set of series-parallel Ward-Leonard resistance units designed to fit Edison sockets are used in place of a lamp bank. C. G. F.

Gold and platinum plating. M. KATERIDGE. *Metal Ind.* 13, 108-9(1915).—Au is dissolved in *aqua regia*, diluted, pptd. with NH_4OH with const. stirring, washed and dissolved in KCN. It is made up so that 1 oz. of stock soln. contains 5 dwt. Au (or 195 g. Au per l.). A cheap acid-proof Au bath contains $\text{Ni}(\text{CN})_2$ and Ni anodes are used. Cu and Ag cyanides are used for rose and green Au effects. For Pt plating, the soln. contains Na_2HPO_4 , Na_2CO_3 , NH_4Cl and $\text{Na}_2\text{B}_4\text{O}_7$ and PtCl_4 , 2 dwt. in 1 qt. (or 3.3 g. per l.). W. H. BOYNTON.

Preparation and operation of leadplating baths. F. C. MATHERS. *Metal Ind.* 13, 184-5(1915).—A résumé of the different plating baths. Alk. baths are unsatisfactory. The simplest and cheapest bath contains 13 oz. $\text{Pb}(\text{NO}_3)_2$, 7 oz. concd. AcOH and 3 oz. of the gummy residue remaining from the extn. of aloes. This residue is dissolved by warming in AcOH , and is then added to the $\text{Pb}(\text{NO}_3)_2$ dissolved in 1 gal. H_2O . The bath is used without filtering. The deposit is fine and smooth, but brittle when thick. For successful plating, the bath should be kept strongly acid, anodes should be placed in closely woven cloth bags, and should be suspended by Cu wires reaching into the soln. W. H. BOYNTON.

A twentieth-century electroplating plant. G. W. GRUPP. *Metal Ind.* 13, 331-4 (1915).—An illustrated description of the Spirella Co.'s plant at Niagara Falls, N. Y., where a modern and splendidly equipped plating dept. is maintained. Excellent ventilation is procured by a fan system. W. H. BOYNTON.

Nickel-plating on zinc. W. H. WEBER. *Metal Ind.* 13, 336(1915).— NiSO_4 is reduced at the cathode to NiS , producing black streaks on the work. These are eliminated by substituting the following soln.: NiSO_4 8 oz., K or Na citrate 4 oz., NaCl 2 oz., H_2O 1 gal. or 60 g., 30 g., 15 g., resp., in 1 l. H_2O . Good results are obtained by adding NiCO_3 to neutralize free acid and 4 oz. alkali citrate. W. H. BOYNTON.

Bar nickel anodes vs. flat. J. A. HALL. *Metal Ind.* 13, 336(1915).—Bar anodes are best because they cause greater corrosion and less scrap, and may be used as long as Ni remains to be dissolved. W. H. BOYNTON.

Electroplating with cobalt. C. H. BUCHANAN AND T. HADDOW. *Metal Ind.* 13, 240-2(1915).—A historical sketch of the development. The deposit is of close grain and good color. $(\text{NH}_4)_2\text{SO}_4\text{CoSO}_4$ is used, adding CoSO_4 at intervals to replenish the electrolyte. H_3BO_3 and MgSO_4 serve as addition agents. The plate is smooth and stands bending. W. H. BOYNTON.

Removing grease by electricity. T. BROWN. *Metal Ind.* 13, 192-4(1915).—A steel or Fe tank is used, with steel, C or Cu electrodes and heating coils at the sides, but not touching. The work is hung on the cathode rod and the full v. used. The electrolyte (soda or potash) should be kept near the b. p. Machine oil must be scooped off the top of the soln. For removing baked enamels, japan, etc., NaOH or KOH soln. is used with c. d. 10-20 amp. per sq. ft., v. 6-12. W. H. BOYNTON.

Electrolytic mitigation. ANON. *Am. Gas Light J.* 103, 129-30(1915).—The order of the Manitoba Public Utilities Commission reproduced here shows the latest approved practice in preventing damage to underground cables and mains due to electrolysis by elec. current of the railway system. E. J. C.

The luminous arc lamp. R. B. HUSSEY AND S. C. ROGERS. *Elec. Rev. West. Elec.* 67, 399-403(1915).—A short history of this lamp is given. The lower or neg. electrode contains ilmenite to which a little magnetite is added to maintain the desired relative proportion of Fe to Ti. The magnetite, ilmenite, and chromite are first separately ground and purified and, from the analysis of each, correct proportions are mixed in a ball mill. This powdered mixt. is then packed into iron tubes for use. With the newest type an efficiency of 20 lumens per watt may be obtained at 4 amps. and 32 lumens per watt at 6.6 amp. These lamps need trimming and cleaning about once a month. The upper or positive electrode is usually made of hard drawn Cu in a steel or brass sheath. Various forms of reflectors and systems of illumination are described. W. E. RUDER.

Present status of arc lamp carbons. V. A. CLARKE. *Elec. Rev. West. Elec.* 67, 406(1915). C. G. F.

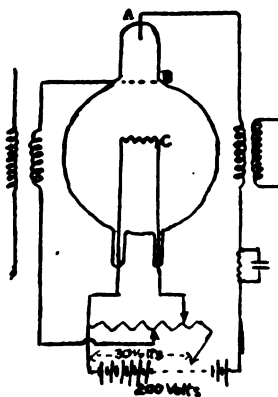
Modern arc lamps. C. E. STERNBERG. *Elec. Rev. West. Elec.* 67, 409(1915).—A review. C. G. F.

Effect of small quantities of methane and carbon monoxide upon the life of nitrogen-tungsten lamps. L. HAMBURGER. *Z. angew. Chem.* 28, I, 291-5(1915).—It is shown that the presence of small percentages of CH_4 (0.04-0.27) and CO in the N gas has a decided detrimental effect upon the life of the half-watt gas-filled W lamp. W carbide is formed in both cases and this is decomposed at the high temp. of operation, C being deposited upon the bulb. The filament becomes brittle and the resistance is increased.

W. E. RUDER.

Mazda C lamps and illumination progress. ANON. *Elec. Rev. West. Elec.* 67, 397(1915).—Present status of the N-filled W lamps is discussed. C. G. F.

The theory of oscillation valves and gas relays. R. S. WILLOWS. *Electrician* 75, 742(1915); see fig.—The relay described by De Forest and that described by Reisz are shown to be the same in physical principle. In the Reisz form the secondary terminals normally joined at B and C, are placed in series with a battery of about 30 v., B being connected with the positive pole. The terminals A, C of the valve



are connected to a battery of 200-300 v. in series with a telephone or another oscillation transformer. The current is dependent upon a plentiful supply of negative ions from the neighborhood of the cathode. Since the negative ions move much faster than those of opposite sign, there results an excess of positive charge in the gas which is most pronounced just in front of the cathode. This causes the elec. field to be more intense here than in any other part of the tube so that it is possible for positive ions also to produce others either by collisions or bombardment of the cathode surface. With a hot lime cathode the field is never so large as when a plain cold metal is used. Lime cathodes are constantly emitting

or absorbing gas, thus making it difficult to maintain constant sensibility, so it is predicted that a hot carbon or metal filament will be found more trustworthy though less sensitive.

W. E. RUDER.

Steel-reinforced aluminium cables. E. T. DRIVER AND E. V. PANNELL. *Elec. World* 66, 524-6(1915).—It is shown that this type of cable is now far beyond the exptl. stage, two companies alone using over 7,000,000 lbs. Owing to the compd. nature of the wire, it does not possess constant physical properties. Tables and curves are given whereby the sag and stress may be calcd. allowing a sufficient factor of safety with ice $1\frac{1}{2}$ in. thick and a 70 miles p. hr. wind.

W. E. RUDER.

Iron for electrical purposes 9. Place of copper in the engineering field (HAWKS) 9. Vanadium from oxide to steel (BLECKER) 9.

U. S., 1,150,917-19, Aug. 24. T. A. WILLARD. Storage battery (structural features).

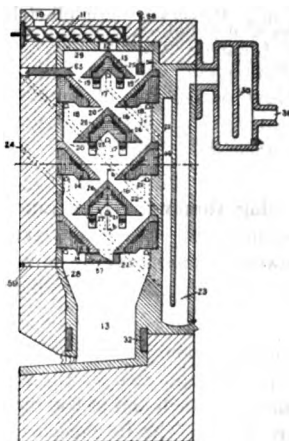
U. S., 1,151,077, Aug. 24. T. A. WILLARD. Storage battery (structural features).

U. S., 1,151,160, Aug. 24. J. L. BROWN. An alloy for spark points, lamp filaments, etc., is formed of Zr 40-90% and Fe 60-10%. It is malleable and ductile.

U. S., 1,151,453, Aug. 24. B. FORD and J. L. PHILLIPS. **Electric storage battery** (structural features).

U. S., 1,152,246-7, Aug. 31. W. L. WALKER. **Electric storage batteries** (structural features). The battery jar may be made of Pb and Sb with a lining of vulcanized rubber.

U. S., 1,152,505, Sept. 7. W. H. HAMPTON. **Electric resistance furnace for reducing zinc ores.** The ore and fuel are fed into the upper end of the furnace and follow a zig-zag downward course guided by the staggered sloping guides on the walls of the furnace shaft. The sloping surfaces of these guides are made of resistance plates composed, *e. g.*, of clay 60% and C 40%. Molten condensed Zn collects in the condenser 23 and the gases, which are rich in CO, may be led to a burner from the outlet 31.



U. S., 1,152,506, Sept. 7. H. L. HARTENSTEIN. **Recovering calcium carbide waste.** Sufficient finely divided C is added to the waste to reduce the CaO which it contains and the mixt. is heated to a fusing temp. to produce full strength carbide.

U. S., 1,152,586, Sept. 7. P. WRIGHT. **Electric furnace for smelting iron ores,** with electrodes formed of a shell of wrought Fe and a core of Cu.

U. S., 1,152,772, Sept. 7. F. G. WHEELER. **Combined diaphragm and perforated cathode for electrolytic cells** (structural features only).

U. S., 1,153,168, Sept. 7. I. H. LEVIN. **Electrolytic cell, for making oxygen and hydrogen,** with a bi-polar electrode. The anode has a Ni surface and the cathode an Fe surface.

Brit., 9,046, Apr. 9, 1914. J. VON KOWALSKI-WIERUSZ. **Ultraviolet rays for sterilizing,** effecting chem. reactions, or other purposes, are produced by a "damped" spark discharge of a large elec. current alternating with a frequency corresponding to an electro-magnetic wave length of less than 3000 meters. Damping may be effected by injecting gas into the spark-gap, or by using electrodes of particular materials. Ni, Co, W, V, Fe, Zn, Cd, Al, Mg, Mn, or alloys of these, especially with rare-earth metals, are suitable. Zr, W, and Mo may be used in an inert gas such as H or N. Materials which do not readily disintegrate, such as the Ni-steel alloy "invar," are also advantageous. The 2 electrodes may be of different materials. A silica or other partition may be placed between the spark-gap and the substance treated, when the substance must not be exposed to N oxides. Water to be sterilized may be passed through an open channel beneath a row of naked spark-gaps. The electrodes may also be immersed in the liquid to be treated. A Ni spark-gap may utilize 2 kw.

Brit., 9,846, Apr. 21, 1914. W. H. JAMES. **Electrolyzing brine or other soln. of a mineral acid salt,** with sepn. of the products at the opposite electrodes, one product being used for lixiviation of ore, Sn scrap, or other material containing base metals, while the other product is used for pptg. a compd. of the metal from the soln. obtained and thus regenerating the original electrolyte. For scrap or Cu ore, the anode liquid is used as solvent, for arsenical ores, the cathode liquid. Graphite from the ore may be removed by skimming. From the residues, other metals such as Au can be recovered.

Brit., 10,171, Apr. 24, 1914. V. SCHOLZ. In mfg. **galvanic batteries,** colloidal graphite is employed with a depolarizer such as MnO₂, particularly in dry cells, to ob-

tain a more nearly uniform e. m. f. suitable for running table lamps, etc. Colloidal graphite may be obtained by Bredig's method of elec. pulverization, or by Kuzel's process of subjection to acids or alkalis.

Brit., 10,193, Apr. 24, 1914. DEUTSCHE GOLD and SILBER-SCHNEID-ANSTALT VORM. ROSSLER. An electric furnace for obtaining alkali metals, which is described in 13,356, 1890, is modified for the electrolysis of alkali halogen compds. by coating the alkali metal collector with a mixt. of 1 or more salts with substances such as CaO , MgO , or asbestos fiber, unattacked by the anode products such as Cl . To retain the coating in a solid or pasty condition, the collector is cooled by H_2O , steam, or air, or otherwise.

Brit., 10,287, Apr. 25, 1914. E. GERBEL-STROVER. In electric furnaces for fusing alumina, etc., composed of a number of receptacles adapted to be connected column-wise, means are provided for supporting the column vertically so that the lowest section may be removed to expose a part of the solidified material, which is then broken off, the app. being worked continuously.

Brit., 10,415, Apr. 27, 1914. J. DAVIES and A. GALLINKAMP. An electric furnace comprizes end walls coupled together by pairs of tie-rods, a tube, muffle, or similar receptacle supported by the end walls and heated by a resistance, and removable lagging blocks. Each end of the resistance is connected to 1 of the tie-rods, to which terminals are fixed. The furnace may be provided with an expansion thermostat consisting of a metal rod lying close to the heater; the rod is secured to 1 end wall and passed through the other, which carries an adjustable screw engaging the end of the rod so as to make or break a circuit controlling a visible or audible alarm, or to cut off or reduce the heating current. Connection to the end of the thermostat rod is made by 1 of the tie-rods. The adjustable screw may be secured in any position by a lock nut. The furnace is enclosed in a sheet metal or like casing, preferably without end walls; the casing is mounted on supports and is provided with a removable cover. The removable lagging blocks may be of MgO -asbestos, and the end walls of urallite. The tube may be of fused silica or clay. In a modification, the furnace is arranged vertically, the tube being replaced by a crucible.

Brit., 10,616, Apr. 29, 1914. E. ACHENBACH. An alkaline electrolyte of strength say between 25 and 50° Bé. is thickened by adding 10% of CaO or MgO and heating to 100° . The product is used in dry cells, with CuO or MnO_2 , or other depolarizers. Cf. C. A. 9, 1880.

Brit., 10,980, May 4, 1914. G. A. ASHCROFT. In electrolysis, a fused mixt. of an alkali hydroxide and an alkali cyanide, with or without other salts, is used as electrolyte with an anode of an alkali metal alloy, prepared in another cell. Suitable proportions are: 60 parts of NaOH and 40 of NaCN , or 63 of NaOH , 30 of NaCN , and 7 of Na_2CO_3 or NaCl . With 100 kg. of electrolyte, a current of 10,000 amp. may be used. The Pb alloy may contain 5-10% of Na. Both the electrolyte and the alloy are kept in motion.

Ger., 283,957, Dec. 18, 1913. HENKEL & CIE. In the production of hydrogen peroxide by electrolysis under increased pressure, the interior wall of a high pressure vessel, tubular in form and made of a suitable metal, is coated with a suitable electrode material and serves as cathode, while an anode, coated with a suitable diaphragm film, is disposed approx. in the middle axis of the vessel. The construction is illustrated in detail. Cf. C. A. 9, 272, 1013.

Ital., 134,266, July 25, 1913. B. SZILARD. In an electrolytic process for recovering mercury from poor ore, the pulverized material is treated with a soln. of NaCl and CaSO_4 . After the product has been allowed to stand for two days, a current

of air is passed through it. The liquid which contains the Hg salt may be subjected to electrolysis.

Ital., 139,705, Feb. 16, 1914. G. CLÉMENT. In a process and app. for separating or concentrating the rare earths (Au, Pt, U, etc.) from powdered material containing them, the material is subjected to an elec. discharge of high tension between 2 surfaces, until a coating, containing the material, appears on 1 surface. The metallic particles are attached to the coating. The gang is discarded.

6. INORGANIC CHEMISTRY.

H. I. SCHLESINGER.

Behavior of phosphoric acid with calcium hydroxide. I. M. KOLTHOFF. Utrecht. *Chem. Weekblad* 12, 662-6(1915).— H_3PO_4 can be titrated with $\text{Ca}(\text{OH})_2$ as a unibasic acid, or vice versa, using dimethylaminoazobenzene as indicator, but titration as a dibasic acid with phenolphthalein is not practicable, because of hydrolysis of CaHPO_4 and formation of $\text{Ca}_3(\text{PO}_4)_2$. When H_3PO_4 is titrated to an end point with phenolphthalein while boiling, a quaternary compd., probably $4\text{CaO} \cdot \text{P}_2\text{O}_5 \cdot 5\text{H}_2\text{O}$, is formed.

G. W. MORRIS.

Halogen compounds of molybdenum and tungsten. X. The cyanides of tungsten and molybdenum. The valence of the central atom in their complex anions. A. ROSENHEIM AND E. DEHN. *Ber.* 48, 1167-78(1915); cf. *C. A.* 8, 1395.—In the prep. of $\text{K}_3\text{W}_2\text{Cl}_9$, from which the cyanide is easily prepared, the authors use the following improvement over Olsson's method: 50 g. of K_2WO_4 in 15-20 cc. H_2O are poured into 1 liter of concd. HCl heated to 90° and thoroughly shaken. The soln. is satd. at 60° with HCl and then reduced with granulated Zn. The soln. becomes brownish green in color after 1.5 hr. It is again satd. at 0° with HCl and left standing at that temp. for several days in a closed flask. After 2 days, 26-28 g. $\text{K}_3\text{W}_2\text{Cl}_9$ sep. out. The cyanide may be prepd. from $\text{W}(\text{OH})_2(\text{SNC})_2(\text{C}_6\text{H}_5)_2$ made by dissolving 10 g. $\text{Na}_2\text{WO}_4 \cdot 2\text{H}_2\text{O}$ and 25 g. NaSNC in 200 cc. H_2O and acidifying with 50 cc. HCl (1.12). The addition of small quantities of pyridine causes the sepn. of a dark green oil, which on standing at 0° , becomes a mass of dark green crystals. These are washed by decantation with H_2O several times, then with EtOH and Et_2O . The detn. of valence by means of ammoniacal AgNO_3 indicates that the W is pentavalent in this compd. From the soln. of this salt the Cd salt, $[\text{Cd}(\text{NH}_3)_2]_2[\text{W}(\text{CN})_8] \cdot 2\text{H}_2\text{O}$ may be pptd. From a conc. soln. of the K-salt, $\text{K}_4[\text{W}(\text{CN})_8] \cdot 2\text{H}_2\text{O}$, the corresponding acid may be prepared upon satn. with conc. HCl and rapid cooling. The ppt. formed is dissolved in a small amt. of abs. EtOH and the yellowish soln. shaken with Et_2O . The crystals which sep. when the resulting oil is cooled are dissolved in a little H_2O and HCl is passed in at 0° . Yellowish crystals which, after drying over KOH, have the comp. $\text{H}_4[\text{W}(\text{CN})_8] \cdot 6\text{H}_2\text{O}$, separate. Expts. carried out by the authors to det. the valence of W and Mo in their complex cyanides by means of the ammoniacal AgNO_3 method disclosed the facts that (1) the ppt. of metallic Ag is contaminated with small amts. of silver molybdate or tungstate from which it is difficult to free it, (2) the ppt. of metallic Ag is not sol. in the hot NH_4OH with which it is washed. As a result of valence detns. carried out with these cyanides, the authors reach the conclusion that the valence of the central W or Mo atom must lie between W^{V} and W^{VI} or Mo^{V} and Mo^{VI} .

L. T. FAIRHALL.

Dissertation on the rare earths. C. R. BÖHM. *Z. angew. Chem.* 28, I, 356(1915).—A list of 23 references to the literature, supplementing a formerly published bibliography (cf. *C. A.* 6, 1575).

E. J. C.

The preparation of sodium selenate and selenic acid. J. MEYER AND K. HEIDER. *Ber.* 48, 1154-8(1915).—The pure sublimed SeO_2 used by the authors was always prepared by the oxidation of freshly pptd. Se with fuming HNO_3 . Na_2SeO_4 was prepared by treating SeO_2 with the calcd. amt. of Na_2O_2 . A violent reaction occurred yielding a brownish fused mass which soon whitened. This mass, which consisted in the greater part of Na_2SeO_4 , was dissolved in H_2O , treated with CO_2 to remove the excess Na_2O_2 and NaOH and $\text{Al}(\text{OH})_3$ (from the porcelain crucible), filtered and recrystd. several times. During the last crystns. the temp. was maintained above 30° in order to avoid formation of salt holding much H_2O of crystn. The crystals were dried till water-free. The salt thus purified was analyzed by reducing to H_2SeO_4 with HCl , then to Se with $\text{N}_2\text{H}_4 \cdot \text{HSO}_4$ and weighed in a Gooch crucible. For the oxidation of SeO_2 with H_2O_2 0.6 g. of the oxide was treated on the steam bath with 1 g. perhydrol. The SeO_2 goes into soln. with evolution of O. The resulting H_2SeO_4 was pptd. from HNO_3 soln with BaCl_2 and weighed as BaSeO_4 . 47% of the SeO_2 had been converted into H_2SeO_4 by this means. The electrolytic oxidation of SeO_2 was carried out using for anode Pt foil having a surface of 6 sq. cm. and for cathode Pt wire. 3.2 g. of SeO_2 were dissolved in 30 cc. conc. HNO_3 (1.42). Temp. = $70-80^\circ$. P.d. = 8 v. One cc. of the soln. was analyzed from time to time by pptn. as BaSeO_4 and weighing. The H_2SeO_4 first formed appears to hasten the formation of more acid catalytically. Further expts. in which a few drops of pure H_2SeO_4 were added before electrolysis distinctly accelerated the anodic formation of H_2SeO_4 .

L. T. FAIRHALL.

Heteropoly acids containing vanadic acid. III. W. PRANDTL. Munich. *Ber.* 48, 692-8(1915); cf. *C. A.* 6, 838; 7, 1452.—A formulation of the tungstates completely analogous to that of the vanadates and molybdates is presented. The analytical data of various investigators are collated and shown to agree, on the whole, best with this formulation. There are no mol. wt. detns. available in this case but for the vanadates the analogous formulation is in entire agreement with the mol. wts. as found. This article contains no new exptl. work.

A. R. MIDDLETON.

Heteropoly acids which contain vanadium. IV. WILHELM PRANDTL. Munich. *Z. anorg. allgem. Chem.* 92, 198-212(1915).—A discussion of a number of complex vanado-tungstate compds., to which new formulas are assigned.

G. W. M.

Compounds of arsenious oxide. II. F. A. H. SCHREINEMAKERS AND W. C. DE BAAT. *Proc. Akad. Wetenschappen* 18, 126-32(1915).—Isotherms in the systems $\text{H}_2\text{O}-\text{As}_2\text{O}_3-\text{KCl}$, $\text{H}_2\text{O}-\text{As}_2\text{O}_3-\text{NH}_4\text{Cl}$ and $\text{H}_2\text{O}-\text{As}_2\text{O}_3-\text{NaCl}$ were detd. at 30° by shaking together in a thermostat H_2O , As_2O_3 , and the chloride in question. In the first case, the compd. $(\text{As}_2\text{O}_3)_2(\text{KCl})_2$, and in the 2nd case, the compd. $\text{As}_2\text{O}_3 \cdot \text{NH}_4\text{Cl}$, is found, while in the 3rd system NaCl and As_2O_3 are the only solid phases.

G. W. M.

The action of alkali sulfide on sodium ethyl thiosulfate. A. GUTMANN. *Ber.* 48, 1162-6(1915); cf. *C. A.* 1, 2556; 2, 2374.—A soln. of 5 g. Na Et thiosulfate in 60 g. EtOH treated with 65 cc. of a freshly prepared EtOH soln. of K_2S (free from polysulfides) reacts with the formation of white cryst. alkali sulfite. A mercaptan odor is noticeable. On warming gently, the sepn. of alkali sulfite is hastened and the soln. becomes intensely yellow. The soln. (a citron-colored EtOH soln. of $\text{C}_2\text{H}_5\text{SSH}$) seps. out whitish yellow S on further heating. On shaking with Na_2AsO_3 or KCN , sodium monosulfoxyarsenite and KCNS , resp., are formed. On continued heating, the above deep yellow colored soln. formed by the action of alkali sulfide, becomes colorless, mercaptan and EtOH distil over and there is left a gray-yellow residue, which gives the reaction for sulfite. Evidently there are formed $\text{SO}_2\text{NaOSC}_2\text{H}_5$, $\text{C}_2\text{H}_5\text{SSH}$, and finally



mercaptan, sulfur and sulfite. By following the reaction quant. the citron-colored soln. is shown to consist of C_2H_5SSK and not of mercaptan, K_2S and alkali sulfite.
L. T. FAIRHALL.

7. ANALYTICAL CHEMISTRY.

E. G. R. ARDAGH.

Disintegration of materials by fusion with sodium peroxide. NOAILLON. Liège. *Bull. soc. chim. belg.* 28, 212(1914).—N. discusses the general procedure for the disintegration of materials by fusion with Na_2O_2 in a Fe crucible. During the fusion of certain minerals containing antimonates the surface of the Fe crucible assumed a peculiar appearance which was ascertained to be due to the formation of an alloy of Fe and Sb; an alloy of Fe and Pb was formed in the case of Pb minerals. Inasmuch as the crucible was rather rapidly attacked, N. attempted to employ crucibles with a peroxide surface; the resistance was thereby increased, but the layer of peroxide scaled off considerably.
H. S. PAINE.

The use of red cabbage dye as indicator in chemistry. ECKERLIN. *Mitt. kgl. Landessans. Wasserhygiene* 20, 58-69(1915).—The indicator serves for the detn. of the reaction of a liquid and can be used instead of phenolphthalein, Congo red or rosolic acid. It is red in an acid medium and turns green with alkali. If neutral the color is violet. The indicator is less sensitive to CO_2 than rosolic acid or phenolphthalein, and is more sensitive to alkali than to acid. Since the indicator decomposes readily it is necessary to preserve it by the addition of $CHCl_3$ or C_6H_5OH . Even though preserved the indicator begins to show signs of decompn. after 4 weeks and must be re-adjusted by the addition of very weak KOH.
ARTHUR LEDERER.

The quantitative determination of total sulfur in vegetable substances. D. J. DEJONG. Gröningen. *Chem. Weekblad* 12, 626-34(1915).—The purpose was to select a method which was accurate for amts. of S less than 1% (in this case 0.3 to 0.8%) and which did not give a final soln. containing much inorg. salts to contaminate the $BaSO_4$ ppt. Evapg. to dryness with $KMnO_4$ and KOH was selected and test detns. made to find the optimum conditions. The method adopted is: Treat 20 g. fine material with 80 cc. 1% KOH, warm 15 min. on H_2O bath with stirring, cool and add slowly a cold satd. soln. of 12 g. $KMnO_4$ with stirring. Place in boiling H_2O -bath till the $KMnO_4$ is reduced (about 10 min.). Wash into a 12-15 cm. Ni dish and dry slowly (7 hrs.) over a spirit lamp with a mixt. of 1 pt. MeOH to 2 pts. EtOH; then ignite strongly till no more fumes come off (about 1 hr.). Heat to redness over a Barthel blast, scraping the material to the center, cool, pulverize finely with a porcelain pestle, and ignite again till all C is consumed. Cool completely, grind in H_2O in the dish, and wash into a 300 cc. Erlenmeyer. Add 20 cc. Br-HCl (100 cc. 25% HCl and 5 cc. satd. Br soln.) or enough to acidify, warm some hrs. on the H_2O -bath and filter. Wash with HCl (1 drop 25% HCl to 600 cc.), evap. to dryness, moisten with HCl and dry, repeating this 3 times; then bake at least 1 hr. on the H_2O -bath, and filter off SiO_2 . In the filtrate ppt. $BaSO_4$. The MnO_2 ppt. sometimes occludes S, especially if the soln. stands in contact with it in the cold before filtering. To recover this, treat the ppt. with HCl, warm till dissolved, dil. and filter; then evap. filtrate to dryness, moisten with HCl, dry, take up and filter, and ppt. $BaSO_4$ in the filtrate. Normally not over 2 to 3 mg. $BaSO_4$ should be obtained here, but sometimes as much as 20 mg. are found. The difference between duplicates on straw were: Max. 6, min. 0.8 mg. $BaSO_4$ on amts. ranging from 180 to 470 mg.
W. L. BADGER.

The nephelometric determination of small quantities of phosphoric acid. H. SERGER. Braunschweig. *Chem. Ztg.* 39, 613(1915).—The method has given rapid

and satisfactory results in investigations of polluted streams, but must be carried out carefully. Dissolve 225 g. NH_4 molybdate in hot H_2O and add, with stirring, to 1.5 l. HNO_3 (1:1) in which has been dissolved 600 g. $(\text{NH}_4)_2\text{SO}_4$. Dilute to 3 l. Evap. 100–300 cc. H_2O , according to probable content of P_2O_5 , to dryness in a quartz or Pt dish, treat the residue with 2.5 cc. HNO_3 , filter into a beaker about 8 cm. high and 4 cm. diam., wash the filter with 2.5 cc. HNO_3 , and then add 25 cc. of the molybdate soln. and 20 cc. concd. HNO_3 . The comparison beaker contains the same amts. of molybdate soln. and HNO_3 . Heat both to 70° in a H_2O bath, stirring with small glass rods, and taking care to avoid scratching the beakers. Set the beakers on a black ground and illuminate from one side; run a 0.002 N P_2O_5 soln. (1 cc. = 0.000372 g. P_2O_5) rapidly and carefully, with gentle stirring, into the comparison beaker till the cloudiness is the same in the 2 beakers. The beakers should then be boiled out with a 5% NaOH soln. and rinsed. 90–196 mg. P_2O_5 in 100000 pts. H_2O can be detd. easily and quickly.

J. H. MOORE.

Volumetric determination of phosphoric acid in calcium phosphate. I. M. KOLT-HOFF. *Pharm. Weekblad* 52, 1053–5 (1915).—Dissolve a weighed quantity of the phosphate in dil. HCl , render neutral to dimethylaminoazobenzene and make up to a definite vol. A soln. of Na_2HPO_4 , with the indicator, should be used for comparison. To an aliquot portion add an excess of $\text{Na}_2\text{C}_2\text{O}_4$ soln., neutral to phenolphthalein, then some of the latter indicator, and titrate the soln. with 0.1 N alkali (1 cc. alkali = 7.1 mg. P_2O_5).

P. VAN DER MEULEN.

Quantitative determination of phosphine. II. Gravimetric and titrimetric methods. H. RECKLEBEN. Leipzig. *Z. anal. Chem.* 54, 308–21 (1915); cf. C. A. 9, 2204.— PH_3 was absorbed by 0.16% Cl water or satd. Br water, NH_4OH was then added in excess and the P pptd. with magnesia mixt. 0.5 N I in KI absorbs PH_3 completely but should be allowed to act 24 hrs. and the soln. then heated 30 min. with persulfate or H_2O_2 to insure complete oxidation to phosphate. While titrimetric methods can not be applied with accuracy to the I soln. of PH_3 , the course of the reaction between the I soln. and the absorbed PH_3 can be followed by a detn. of the I used. Directly after absorption the atomic ratio of P to I used is 1:3.2, after 16 hrs. 1:5.5, and after 24 hrs. 1:5.95. This ratio nearly corresponds to the reaction $\text{PH}_3 + 6\text{I} + 3\text{H}_2\text{O} = \text{H}_3\text{PO}_3 + 6\text{HI}$. Expts. were made using solns. of NaClO , NaBrO , HBrO_3 , HIO_3 , AgNO_3 , HgCl_2 , $\text{Hg}_2(\text{NO}_3)_2$ and Cu solns. for absorption and oxidation; they failed to give satisfactory methods. KMnO_4 reacts with PH_3 according to the equation $5\text{PH}_3 + 8\text{KMnO}_4 + 12\text{H}_2\text{SO}_4 = 5\text{H}_3\text{PO}_4 + 8\text{MnSO}_4 + 4\text{K}_2\text{SO}_4 + 12\text{H}_2\text{O}$. The PH_3 is absorbed in a measured quantity of 0.5 N KMnO_4 soln., an excess of standard hot $(\text{COOH})_2$ containing H_2SO_4 is added and after rinsing the glass pipet with the hot decolorized soln. the excess of $(\text{COOH})_2$ is titrated back. The H_3PO_4 is pptd. as molybdate. A large excess of KMnO_4 over that necessary for complete absorption should be avoided. The KMnO_4 should not be acidified before the addition of $(\text{COOH})_2$ on account of the evolution of O . The Cl -water, Br -water, and KMnO_4 methods gave best results gravimetrically. The KMnO_4 method also gave good results volumetrically. Titrimetric detns. cannot be applied to the Cl - and Br -water methods.

L. W. RIGGS.

Molybdic acid recovery. C. G. ARMSTRONG. *J. Ind. Eng. Chem.* 7, 764 (1915).—Evap. the filtered soln. on the sand bath to considerable foaming and to the point where there is just enough soln. left to cover the ppt. and keep Fe in soln. Cool, dilute with $1/2$ vol. cold H_2O , settle and decant. Wash with H_2O by decantation and treat with enough 1:1 NH_4OH to fill the dish. A dark ppt. due to Fe forms. Wash the mass into a large flask, warm slightly and allow to stand with occasional shaking. After 2 hrs. filter and add 5% of the original amt. NH_4OH . The concn. of MoO_3 is detd. with a hydrometer and then sufficient fresh MoO_3 is added to make the concn.

0.2825 g. per cc. (a standard soln.) or the $(\text{NH}_4)_2\text{MoO}_4$ soln. can be evapd. to dryness and roasted at 600° to MoO_3 . Yields are over 90%. ISADOR MILLER.

The preparation of normal hydrochloric acid. L. W. WINKLER. *Z. angew. Chem.* 27, 1, 264(1915).— KHCO_3 is used as a standard. It is purified by spreading out a ground sample in a desiccator containing CaCl_2 and filling the desiccator with CO_2 . At the end of 24 hrs., the sample is mixed and exposed for another 24 hrs. Titration of solns. of such purified KHCO_3 against HCl of known strength gave an equiv. wt. for KHCO_3 of 100.19. W. recommends the use of weighing burets for the standardization. E. W. BOUGHTON.

The iodide method applied to the determination of copper in the presence of tin. R. W. COLTMAN. *J. Ind. Eng. Chem.* 7, 764-6(1915).—Weigh out a sample containing not more than 0.25 g. Cu and boil with 15 cc. HNO_3 (2:1). When the alloy is decomposed add dil. H_2SO_4 equiv. to 3 cc. concd. acid and evap. over an open flame. Drive off HNO_3 to fumes of SO_3 whereupon $\text{Sn}(\text{SO}_4)_2$ and CuSO_4 will sep. out. Remove the flame immediately to prevent spattering. Take up the mass with 25 cc. H_2O , shake and dissolve and again evap. to fuming. Cool, take up with 50 cc. cold H_2O and when all is in soln. add 25 cc. H_2O , 10 cc. KI (40%) and titrate immediately with 0.1 N $\text{Na}_2\text{S}_2\text{O}_3$. This gives Cu. Pb in small amts. does not affect the results. The time consumed is 1 hr. ISADOR MILLER.

Titration of nitrates with ferrous sulfate. F. C. BOWMAN AND W. W. SCOTT. *J. Ind. Eng. Chem.* 7, 766-9(1915).—The sample should contain 0.3-0.6 g. HNO_3 . Place 100 cc. concd. H_2SO_4 (free from nitrates) in a 250 cc. beaker set in H_2O . Run the sample in slowly from a 10 cc. pipet, stirring with the same. Run the FeSO_4 soln. in slowly in a fine stream with const. stirring until the soln. changes from yellow to a faint brown or pink. Rinse out pipet by sucking full of acid and allow to drain. Continue titration carefully to first color change. The end point is clear to 0.05 cc. and different operators should agree within 0.1 cc. Directions are also given for making up the standard solns. The method has been applied to HNO_3 in oleum, the analysis of NH_4NO_3 , NaNO_3 , KNO_3 and mixed acid. With care the error does not exceed 1/300 of the total HNO_3 . The method is unsuitable for traces. ISADOR MILLER.

Note on the determination of aluminium oxide and total aluminium in steel. F. O. KICHLINE. *J. Ind. Eng. Chem.* 7, 806-7(1915).—Because of the action of heat on Al_2O_3 all the Al in steel can be detd. in the insol. residue. Dissolve 50 g. drillings in 200 cc. concd. HCl and 300 cc. H_2O at a gentle heat, boil, allow the insol. matter to settle, filter and wash with hot (1:2) HCl and hot H_2O . Ignite the residue in a Pt crucible. Add 0.5 g. $\text{Na}_2\text{B}_2\text{O}_7$ (calcined) and heat gently to dissolve Al_2O_3 . Add 5 g. Na_2CO_3 and fuse again. Dissolve the melt in hot H_2O and det. Al_2O_3 as usual. I. M.

Qualitative separation and identification of arsenic, antimony and tin. F. L. HAHN. Frankfurt a/M. *Z. anorg. allgem. Chem.* 92, 168-70(1915).—The method is based primarily on the sepn. of cryst. $\text{Na}_2\text{H}_2\text{Sb}_2\text{O}_7$ from an alk. soln. when treated with H_2O_2 . The mixt. of As_2S_5 , Sb_2S_5 , SnS_2 and S obtained by pptn. from the yellow $(\text{NH}_4)_2\text{S}_x$ soln. in the ordinary way is extd. cold with 5% Na_2S , the undissolved S filtered off, twice as much 10% NaOH added as is necessary to dissolve the total sulfides, and H_2O_2 added in excess, heating if necessary. After a short time glittering crystals of $\text{Na}_2\text{H}_2\text{Sb}_2\text{O}_7$ form, the sepn. being made complete by diln. of the soln. with 25% of its vol. of EtOH . Filter, evap. off the EtOH , ppt. Sn with NH_4NO_3 , boil to complete pptn., filter, and ppt. As as $\text{NH}_4\text{MgAsO}_4$. The As and Sb ppts. are recognized by their form; the Sn by means of Zn and HgCl_2 . GEORGE W. MORREY.

New reaction for hydrogen peroxide. K. SPIRO. Univ. Strassburg. *Z. anal. Chem.* 54, 345-7(1915).—The addition of a few drops of 0.1 N H_2O_2 and of freshly

prepd. 0.01 *N* FeSO₄ to a dil. phenol soln. is followed by an intense green color, which upon the addition of dil. NH₄OH, (NH₄)₂CO₃ or Na₂CO₃ is changed to reddish violet. Acids change this to green and alkalis change the green back to violet. Many other monohydroxy derivs. of C₆H₅ may be used in place of phenol, *e. g.*, cresol, *p*-hydroxybenzoic acid, tyrosine, picric acid, etc. Salicylic acid cannot be used as the color which it gives with ferric salts interferes, but salicylaldehyde gives the green color. The sensitiveness of the reaction is shown by the fact that the green color is obtained in 1 cc. of a 0.001 *N* soln.

L. W. RIGGS.

Purification of alcoholic extracts obtained from a maceration of putrefying viscera and other organic substances. JORGE MAGNIN AND ENRIQUE V. ZAPPI. *Anales soc. quim. Argentina* 1, 327-36(1913).—M. and Z. propose the following modified Dragendorff procedure for the extn. of alkaloids (free from ptomaines and other possible impurities) from viscera, etc. Macerate the viscera (cut into small pieces) in H₂O slightly acidulated with several drops of H₂SO₄ (1:4), warm (in order to facilitate extn.) for 1-2 hrs. at 40° and allow to stand 18-20 hrs. Filter and add to the filtrate an equal vol. of 90-92% alc., 10 cc. of a 30% Al₂(SO₄)₃ soln. and 10 cc. of a 15% KOH soln.; filter after 2-3 hrs. and conc. *in vacuo* (at a temp. not exceeding 45-50°) to a sirupy consistency. Treat the residue with 20 times its vol. of 90-92% alc., allow to stand 18-20 hrs., filter and again conc. *in vacuo* (as above). Dissolve the residue in H₂O and apply the Dragendorff method for the extn. of alkaloids to the soln. The ptomaines and other impurities are eliminated almost completely by this procedure, while the excess of Al₂(SO₄)₃ causes no inconvenience, inasmuch as it is pptd. by the 2nd alc. treatment. Better results were obtained as the conc. of the alc. was increased, so it is advisable that this conc. be at least 90-92%. The 30% Al₂(SO₄)₃ soln. and the 15% KOH soln. should be employed in the proportions of 10 cc. of each to a vol. of liquid to be purified which is not less than 100-200 cc. Preliminary expts. had shown that no greater purification of exts. of putrefying viscera was effected by reducing agents such as SnCl₂, Na amalgam and powdered Zn in acid media than was obtained by simple filtration. The purifying action of K alum on colloidal suspensions of exts. of putrefying viscera was also negligible. Expts. with activated Al (immersed 3 min. in a 1% HgCl₂ soln. and washed with H₂O until free from HgCl₂) showed that this agent is not as effective in purifying exts. such as the above as is Al₂(OH)₃ produced in the liquid by addition of Al₂(SO₄)₃ and KOH solns. Procedure by the use of activated Al is also slower and requires continuous attention, inasmuch as the acidulated liquid constantly tends to become alk. PhOH, BzOH, picric and salicylic acids, camphor, aconitine, antipyrine, aspidospermine, atropine, berberine, brucine, caffeine, cantharidine, cocaine, colchicine, conicine, convalamarine, curarine, digitalin, digitoxin, helleborine, strychnine, emetine, hydrastine, hydroquinone, morphine, narceine, narcotine, nicotine, papaverine, pelerterine, pilocarpine, piperine, pyrocatechol, quinine, resorcinol, santonin, solanine, theobromine and veratrine were added to the viscera in these expts. All of these substances were detected by means of the purifying procedure 1st described (use of Al₂(SO₄)₃ and KOH), even in cases where the content was no greater than 0.002 g. to 100 g. of viscera, while the use of activated Al caused the complete disappearance of certain substances (picric acid, hydroquinone, resorcinol, solanine, nicotine, etc.) and rendered the reactions with strychnine, morphine, cocaine and quinine considerably less distinct. The usual Dragendorff method (modified by effecting the concs. *in vacuo* as in the Stass-Otto procedure) was compared with the activated Al method of purification, as well as with the previously described method in which Al₂(SO₄)₃ and KOH are used; putrefied beef and beef liver were employed and a number of variations in the procedures were tested. The last named method was found to be preferable in all cases.

H. S. PAINE.

Behavior of phosphoric acid with calcium hydride (KOLTHOFF) 6. Phosphoric acid as mono- and di-basic acid (KOLTHOFF) 2. Micro-gravimetric analysis (DONAU) 1. Distribution coefficient and extraction velocity of some organic acids (PINOW) 2.

Fr., 19,611, addition to 458,916, June 29, 1914. SIEMENS & HALSKE AKT.-GES. Quantitative analysis of gaseous mixtures. See Brit., 6,767, 1914 (C. A. 9, 2364).

8. MINERALOGICAL AND GEOLOGICAL CHEMISTRY.

EDGAR T. WHERRY.

Johannes Strüver. ARISTIDE ROSATI. *Centr. Min. Geol.* 1915, 321-30.—An obituary notice with portrait and bibliography. E. T. W.

An arrangement of minerals according to their occurrence. E. T. WHERRY AND S. G. GORDON. *Proc. Acad. Nat. Sci. Phila.* 1915, 426-57.—“The types of mineral occurrence are classified on the basis of chem. and geological relations, the chief criterion for subdivision being dissimilarity in mineral content.” In general the term silicic refers to rocks containing more than 45% of SiO_2 , while the terms alkalic, calcic, and magnesian denote that over 7.5% of the oxides suggested by these terms is present. Following is the synopsis of the classification: I. MAGMATIC PHENOMENA.—1. Igneous rocks: A, Silicic (comprising acidic and intermediate, but excluding alkalic, of the usual classifications); B, Alkalic (alkali-syenites and similar rocks); C, Calcic (the basic rocks); D, Magnesian (the ultra basic rocks). Each of the above divisions is subdivided as follows: a, Primary; b, Metamorphosed; c, Weathered. 2. Pegmatites (including pneumatolytic veins and many quartz veins): A, Silicic; B, Alkalic; C, Calcic. Each of the above divisions is subdivided as follows: a, Primary; b, Metamorphosed; c, Weathered. 3. Hydrothermal deposits (the majority of mineral veins, including contact deposits). (No chem. subdivision practicable): a, Primary; b, Metamorphosed (including secondarily enriched); c, Weathered. 4. Fumerolic deposits. (No chem. or historical subdivision practicable.) II. SEDIMENTARY PHENOMENA.—1. Sediments: A, Siliceous (including argillaceous); B, Calcareous (including magnesian); C, Ferruginous (including manganiferous and zinciferous); D, Saline; E, Phosphatic; F, Carbonaceous. Each of the above divisions is subdivided as follows: a, Primary; b, Metamorphosed; c, Weathered. About 800 species of minerals are arranged according to the foregoing classification, and an index given wherein each mineral is referred to its place in the synopsis. L. W. RIGGS.

A list of Canadian mineral occurrences. ROBT. A. A. JOHNSTON. Canada Dept. Mines, *Geol. Survey Mem.* 74, 275 pp. (1915).—A complete list of notable occurrences recorded in Canada up to Dec. 1, 1914. In Part I the list is arranged alphabetically according to names of the minerals; localities are given. In Part II the arrangement is alphabetical according to locality. E. J. C.

Methods of mineral synthesis. J. R. MOURKLO. *Ecole Industrielle, Madrid. Rev. gen. sci.* 26, 394-403 (1915).—Likeness in cryst. form is the most difficult thing to produce in mineral synthesis. Molten anhydrous MnCl_2 is a good solvent for the sulfates of the alk. earths and one is able to obtain, upon cooling its solns. of BaSO_4 , CaSO_4 , or SrSO_4 , crystals resembling barite, gypsum (anhydrite?) or celestite. Synthetic gahnite was obtained by heating Al_2O_3 and ZnO with B_2O_3 in a porcelain oven for 18 hrs. at a red heat. In nature zaraitite and morenosite result from the action of atmospheric gases upon the NiS. Linarite and a similar double sulfate of Cu and Fe are the products of “vitrolization” of the sulfides by atmospheric O. The synthetic re-

production of these is a very simple matter but is much faster than the natural methods and we cannot say that the laboratory methods are the same or even resemble the natural processes. Fluorophosphates or chlorophosphates (wagnerites and apatites) may be made by heating tribasic phosphates with an excess of the corresponding fluoride or chloride in a graphite crucible. We can even substitute the metallic elements and so prep. artificial wagnerites and apatites. Thus, with salts of Ba, Sr, or Pb, apatites are always obtained, while with Mn or Mg salts, wagnerites are the rule. On the other hand, Ca salts yield one or the other according to the working temp. It is also possible to replace the P by As or V or other elements and so obtain well crystd. artificial minerals which are derivatives of wagnerites or apatites. M. obtained the silicate of Ba by heating BaCO_3 and S in a crucible made of a peculiar clay. After cooling slowly, a mass resulted which appeared under the microscope to be isomorphous with wollastonite. Typical apatites, pyromorphite, mimetite, vanadinite, wagnerite, triplite, and analogous products have been produced, seeming to show that nature forms many minerals by simple addition of other chem. combinations. Thenardite is easily obtained by evap. at 33° a soln. of the hydrated sulfate; in nature, it is produced by the efflorescence of mirabilite. M. asserts that the theory of electrolytic dissociation and the electron theory and their extensions to the physical state will change the conceptions of mineral synthesis.

R. L. SIBLEY.

The symmetry of diamond. A. JOHNSEN. Kiel. *Centr. Min. Geol.* 1915, 331-6. —The structure of diamond as detd. by the use of X-rays, especially by W. H. and W. L. Bragg (*C. A.* 8, 599; 9, 1579) is discussed, and the possible space-lattices which will fit this structure considered. It can not be tetrahedral nor tetratohedral, so that the tetrahedral habit sometimes observed must be accidental; certain twins might be regarded as pyritohedral, but the most probable symmetry group is the holohedral. [The work of Fersmann and Goldschmidt (*C. A.* 5, 3789) and of Van der Veen (*C. A.* 7, 1645) is not mentioned.]

E. T. W.

Platinum in the platiniferous chromite of the urals. A. DEL CAMPO Y CERDAN AND S. PIÑA DE RUBIES. Madrid. *Anales soc. españ. fis. quim.* 13, 155-8(1915); cf. *C. A.* 9, 1266. After sepn. of the nuggets of Pt from platiniferous chromite the remaining portion of the latter was tested for Pt. No test for Pt was obtained when 3 or 5 g. chromite was treated in a combustion tube with HCl under pressure. No ppt. was obtained with H_2S after decompn. of 15 g. chromite by Na_2O_3 in a Ni crucible; spectrographic exam. of the filtrate from this liquid failed to show the presence of Pt. Neither could Pt be detected by spectrographic exam. in the material scraped from the wall of the Ni crucible. Pt, if present in platiniferous chromite aside from its localized deposits, must therefore have occurred in an amt. less than would correspond to the limit of solubility of PtS_2 . No ppt. of $(\text{NH}_4)_2\text{PtCl}_6$ could be obtained after treatment of chromite with aqua regia. The mineral itself was thereupon subjected to spectrographic analysis in the ultraviolet region. Pt was detected in appreciable amt. in each of the 4 samples of chromite which were tested. The principal characteristic rays which were observed corresponded to λ (Å. u.) 3064.82, 2998.07, 2928.90, 2830.40, 2705.99, 2702.50 and 2659.60. These results indicate that Pt occurs in minute amt. in a uniformly, finely divided condition throughout the mass of chromite, as well as in the localized deposits or nuggets.

H. S. PAINE.

Salt from Somaliland. ANON. *Bull. Imp. Inst.* 13, 190-2(1915).—The salt examd. was found to be very similar in compn. to most rock salts, except that it often contained small amts. of NaHCO_3 (0.3%). If the salt is dissolved in $2\frac{1}{2}$ times its weight of water, allowed to stand and the clear liquid decanted off and allowed to crystallize at 40° until about 80% of the total quantity is recovered, a refined salt free from

NaHCO_3 is obtained. This refined salt is of a good color and does not deliquesce upon exposure to the air.

R. L. SIBLEY.

Is lublinitite a new monoclinic modification of calcium carbonate? RICHARD LANG. *Centr. Min. Geol.* 1915, 298-305. A reply to Mügge (*C. A.* 9, 576).—L. verboosely restates the grounds on which he bases his conclusion that lublinitite is distinct from calcite. The principal proof appears to be that it gives different staining tests than the latter. It is also suggested that the material examd. by M. was not normal lublinitite, but a calcite pseudomorph after it.

E. T. W.

Chemical analysis of the mineral prehnite. BERTHAULT DE ST. JEAN VAN DER RIET. *S. African J. Sci.* 11, 300-1 (1915).—Analyses of 3 specimens of prehnite from Cape Town gave the following results: SiO_2 43.51-44.43, Al_2O_3 23.50-25.79, Fe_2O_3 none-1.91, CaO 24.12-26.03, FeO 0.25-0.89, Na_2O none-0.36, H_2O 4.27-5.05.

J. H. BOWER.

Occurrence of radioactive minerals in Ontario. S. BRUNTON. *Summary Rept. Geol. Survey, Dept. Mines Canada* 1914, 91-4.—A report of an investigation of waste dumps, concentrates from ore-dressing plants and of all minerals which seemed at all likely to show radioactivity. These were all tested with the most delicate instruments possible to be transported from place to place. In only 2 localities were traces of such minerals found; a small deposit of columbite and another resembling samarskite.

R. L. SIBLEY.

Radioactive minerals in eastern Canada. C. W. ROBINSON. *Summary Rept. Geol. Survey, Dept. Mines Canada* 1914, 109-12.—A report of the investigation of localities where radioactive minerals had been reported to occur. Specimens were examd. in the field with the scintilloscope but no deposits of radium-bearing minerals were found.

R. L. SIBLEY.

Monazite. TIPPER. *Rec. Geol. Surv. India* 44, 186; *Bull. Imp. Inst.* 13, 323-4 (1915).—The occurrence of monazite in 5 localities is reported. The monazite occurs in the pegmatite intrusions that traverse the gneisses and shows 6% thorium. No monazite was found in the gneisses although it is supposed to have been derived primarily from the disintegration of these rocks.

R. L. SIBLEY.

Composition of pyromorphites. M. AMADORI AND E. VITERBI. *Mem. Accad. Lincei* 10, 386-408 (1914); *J. Chem. Soc.* 108, II, 358-9.—Twenty specimens of pyromorphite of diverse origins have been analyzed. The sp. gr. varies only between 7.06 and 7.12, these limits being far closer than those given by Dana ("System of Mineralogy," 6th Ed., 770), namely, 6.5 and 7.1. The greater or less proportion of arsenate occurring in the pyromorphite does not alter the sp. gr. sensibly, the values for the chloroarsenate mimetite being 7.0-7.25, and the content of Ca is too small to produce appreciable variation. Most of the specimens examd. contain As and all show the presence of Ca, but the proportions of the latter element found are probably higher than those really present, owing to the protracted manipulations necessarily preceding the estn. The value of the ratio, $\text{RO}_4:\text{Cl}$, varies between 2.95 and 3.04, the small deviations from the value 3 being due, undoubtedly, to exptl. error in the estns. Thus, all the specimens examd. have the comp. $\text{MCl}_2.3\text{M}_2(\text{PO}_4)_4$, and the divergent results obtained by previous investigators appear to result from imperfect analytical methods or from faulty prepn. of the material analyzed; the low values often given for the % of Cl are probably caused by soln. of the mineral in the warm. Pyromorphites of slightly diff. comp. may occur in one and the same locality, and variations are also found between the comps. of the outer and inner layers of a single crystal. With 2 specimens from Wheal Alfred, in one case the inner, and in the other the outer portions contd. the more As.

E. J. C.

Researches on the chemical and mineralogical composition of meteorites. GEORGE P. MERRILL. U. S. National Museum. *Proc. Nat. Acad.* 1, 429-31(1915).—Upwards of 20 meteorites have been subjected to searching chem. analyses; in none of them could Sb, As, Au, Pb, Sn, W, U, Zn, Ba, Sr or Zr be detected, but the presence of traces of Pt, Pd, Ir, Ru, and V was proved. The Pt metals are present in the metallic portions as is also the V; the Ni and Co occur in both metallic and silicate minerals. The form of the P in the silicates and the presence of CaS has been previously described (*C. A.* 9, 2208). A table is given showing the av. comp. of 53 stony meteorites (some constituents detd. in only a few of the analyses) compared with the comp. of the earth's lithosphere (Clarke), and with previous averages of the comps. of meteorites by M. and Farrington. The av. comp. of the meteorites is: SiO₂ 38.68, TiO₂ 0.18, SnO₂ none, ZrO₂ none, Al₂O₃ 2.88, Cr₂O₃ 0.47, V₂O₅ trace, Fe 11.98, Ni 1.15, Co 0.07, FeO 14.58, NiO 0.48, CoO 0.06, CaO 2.42, SrO none, BaO none, MgO 22.67, MnO 0.29, Na₂O 0.87, K₂O 0.21, Li₂O trace, H₂O 0.75, P₂O₅ 0.26, S 1.80, Cu 0.014, C 0.15, Cl 0.08, F(?), CO₂(?), sum 100.044%.

E. T. W.

Gay Gulch and Skookum meteorites. R. A. A. JOHNSTON. *Canada Dept. Mines, Geol. Survey, Museum Bull.* No. 15, 8 pp.(1915).—Two meteorites discovered in the Yukon region are described. The first (sp. gr. 7.566), contained: 83.85% Fe and 15.03% Ni; the second (sp. gr. 7.561) 80.65% Fe and 18.2% Ni. When a section of each was polished, there appeared a thin zigzag streak of a silver-white substance with a metallic luster of unknown identity. Both showed crystallographic arrangement which seemed to indicate that they formed a part of the same shower.

R. L. SIBLEY.

Some recent mineral discoveries in Namaqualand. W. VERSFELD. *S. African J. Sci.* 11, 350-3(1915).—Minerals of commercial importance which have recently been discovered are tantalite, columbite, Bi ores, Li compds., Mn ores, corundum, graphite, fluorspar, molybdenite, alum, rock salt, gypsum, and Fe ores.

J. H. B.

The geology of the iron-ore deposits in and near Daiquiri, Cuba. JAMES F. KEMP. *Bull. Am. Inst. Mining Eng.* 1915, 1801-36.—The oldest rock of the region in question, which lies east of Santiago, is a dense blue limestone resembling the Appalachian Cambrian and Ordovician, cut into irregular exposures by the intrusion of a quartz-diorite or granite. This granite is itself cut by dikes of diorite which are believed to be the supply conduits for the large masses of diorite which contain the ore. The ore is mainly a fine grained cellular magnetite with quartz, garnet, and pyrite filling the interstices, whose texture is most easily explained as due to replacement of diorite. K. suggests that while the diorite mass was still hot in the depths a pronounced N. W. and S. E. fissured zone was formed up through which came fluid or gaseous emissions bringing Fe for the ore, the FeS₂ and the garnet, S for the FeS₂, and SiO₂ for the quartz and garnet. The Fe probably came up as a chloride. In ores from mines above the water-level pyrite has been oxidized but in deeper works it is unaltered. In small workings, limits of 50% Fe and 12% SiO₂ were maintained but operations have now been abandoned.

H. L. OLIN.

The formation of the oxidized ores of zinc from the sulfide. YINCHANG T. WANG. *Bull. Am. Inst. Mining Eng.* 1915, 1959-2012.—From a study of the formation of the 3 minerals calamine (Zn(OH)₂.ZnSiO₃), smithsonite (ZnCO₃) and hydrozincite (ZnCO₃.2Zn(OH)₂) from ZnS, using solns. of a group of substances capable of dissolving the blende or of converting its oxidation product into a carbonate or basic silicate, W. draws the following conclusions: sphalerite (ZnS) is first attacked by the oxidation products of FeS₂ before the formation of the secondary minerals containing Zn; rarely are the oxidized ores formed by direct replacement of ZnS. Smithsonite is formed by solns. of bicarbonates, and hydrozincite by solns. of normal carbonates. Lime-

stones may be replaced in nature by solas. of a Zn salt, usually the sulfate, as well as by smithsonite and calamine. Silicates of Zn cannot exist in the presence of free CO_2 . Calamine in nature is probably formed by steps, being pptd. from waters containing ions of a gelatinous silicate and of hydroxide but time is an important factor in the process. Minute crystals of calamine were formed by heating to 900° a mixt. of 1 part H_2SiO_4 and 30 pts. of 1 equiv. Na_2SO_4 and 0.5 equiv. ZnSO_4 .

H. L. OLIN.

Conditions of black shale deposition as illustrated by the Kupferschiefer and Lias of Germany. CHARLES SCHUCHERT. Yale Univ. *Proc. Am. Phil. Soc.* 54, 259-69(1915).—A study of the biologic, geologic, and chem. conditions accompanying the formation of the Kupferschiefer, and in the Black and other seas, show that foul bottoms are due to a lack of H_2O circulation, either because of no wide connection with oceanic areas, or because of inadequate vertical convection currents. Under these conditions the O is consumed by the organisms at or near the surface leaving the depths stale and lifeless. As the sulfur bacteria, which are always present, thrive best in the stale bottoms, they accumulate, yielding an ever increasing amt. of H_2S , provided they are furnished with dead organisms on which to feed. The sunlit, aerated upper layers of water support green plants, which after death sink. Depth of water is not essential to the formation of foul bottoms, except that large areas must have depths exceeding 300 ft., otherwise wave action would set up sufficient vertical currents to replenish O and remove the foul gases of the lesser depths.

L. W. RIGGS.

Notes on black shale in the making. W. N. TWENHOFEL. Lawrence, Kansas. *Am. J. Sci.* 40, 272-80(1915); cf. preceding abstr.—T. gives a review and criticism of the opinions of other workers, and from a study of the sulfurous littoral black muds in the Baltic Sea and other localities, as well as the black shales of Kansas and Canada, considers it absolutely certain that black hydrocarbonaceous shale may form in water so shallow that it is but a step to land conditions.

L. W. RIGGS.

Concretions in streams formed by the agency of blue-green algae and related plants. H. JUSTIN RODDY. Millersville, Pa. *Proc. Am. Phil. Soc.* 54, 246-58(1915).—The occurrence of calcareous concretions in streams and their flood plain deposits at several points is described. Their approximate comp. is: growing specimens, CaCO_3 60-75, MgCO_3 trace-1, SiO_2 12, Al trace, Fe 1, H_2O 1 and organic matter 10-15%; from flood plain deposits: CaCO_3 70-80, MgCO_3 trace-1, SiO_2 12, Al trace, Fe 2, H_2O 1, and organic matter 1-12%. Microscopic exam. shows the presence of several types of algae, and the concentric laminated structure is evidently due to growth during the summer seasons, and its cessation during the winters. The occurrence of such algal deposits in other regions and in past geological periods is discussed. It is shown by a table of the salinity of several streams that the concretions only form when the salinity exceeds 200 parts of $\text{CaH}_2(\text{CO}_3)_2$ per million.

E. T. W.

A discrepancy in geochemical data. H. S. SHELTON. *Chem. News* 112, 85-8 (1915); cf. *C. A.* 5, 850; 9, 677.—S. again asserts his belief that there must be an error in S detn. in H_2O because of the discrepancy between the amts. of S found in rivers and in the ocean. He replies to the discussion of the subject by Dole (*C. A.* 9, 1209) but without adding any new data. He fails to find the activities of man in opening mines, etc., and thereby bringing S compds. into the range of erosion sufficient explanation of the high S content of rivers.

E. T. W.

Vanadium 9. The structure of the spinel group of crystals (BRAGG) 2. Manganiferous iron ores of the Cuyuna range (McCARTY) 9.

9. METALLURGY AND METALLOGRAPHY.

WILLIAM BRADY, WILLIAM T. HALL.

Symposium on ore dressing. ROBERT H. RICHARDS. *Trans. Intern. Eng. Congress 1915* (advance copy), 9 pp.—A historical sketch of the advancement in this field, dealing especially with the latest results. E. J. C.

The economics of the world's supply of copper. T. T. READ. *Trans. Intern. Eng. Congress 1915* (advance copy), 7 pp. E. J. C.

Advances in copper smelting. F. LAIST. *Trans. Intern. Eng. Congress 1915* (advance copy), 14 pp.—A review with bibliography. E. J. C.

Progress in copper metallurgy. T. T. READ. *Trans. Intern. Eng. Congress 1915* (advance copy), 4 pp.—A brief review. E. J. C.

Leaching copper ores. W. L. AUSTIN. *Trans. Intern. Eng. Congress 1915* (advance copy), 62 pp.—A detailed review and discussion of modern hydrometallurgical practice under captions: (1) Ore suitable for leaching. (2) Choice of lixiviants. (3) Lixiviation compared with other methods of ore reduction. (4) Crushing the ore. (5) Roasting. (6) Percolation and agitation compared. (7) Strength of lixiviant. (8) Fouling of solns. (9) The slime problem. (10) Time required for bringing Cu into soln. (11) Percentage of extn. (12) Wash H_2O . (13) Removal of tailing. (14) Dissolving the Ag. (15) Removing Cu from solns. (16) Pptn. with Fe. (17) Chemical pptn. (18) Electrodeposition of Cu. (19) Comp. of the electrolyte. (20) Electrodes. (21) Electrolysis of $CuSO_4$ solns. (22) Current conditions. (23) Ore leaching vats. (24) Miscellaneous app. F. W. SMITHER.

Copper metallurgy of the Southwest. J. DOUGLAS. *Trans. Intern. Eng. Congress 1915* (advance copy), 8 pp.—A review tracing the development of Cu metallurgy in the Southwest. A flow sheet is given of the new plant of the Internatl. Smelting and Refining Co., in course of construction near Globe, Ariz., to handle the concentrates from the Inspiration and Miami properties. A list is also given of the furnace equipment of the works either completed or in course of erection in the Southwest. F. W. SMITHER.

Improvements in design and construction of modern copper plants. C. H. REPATH. *Trans. Intern. Eng. Congress 1915* (advance copy), 19 pp.—A review. Bibliography. F. W. SMITHER.

The outlook for iron. J. F. KEMP. *Trans. Intern. Eng. Congress 1915* (advance copy), 25 pp.—A review including statistics and a bibliography. F. W. S.

Coarse crushing plant; 1,000 tons capacity. G. O. BRADLEY. *Trans. Intern. Eng. Congress 1915* (advance copy), 8 pp.—B. describes with plates a proposed arrangement of coarse crushing equipment for 1,000 ton plant. A table is given showing type of crusher recommended for a given ore. F. W. SMITHER.

Advances made in the metallurgy of copper, Globe District, Arizona. L. O. HOWARD. *Trans. Intern. Eng. Congress 1915* (advance copy), 3 pp.—A brief review. The greatest advance has been in the successful attempt to work the low-grade porphyry deposits of the Miami and Inspiration properties. F. W. SMITHER.

The place of copper in the present engineering field. H. D. HAWKS AND T. T. READ. *Trans. Intern. Eng. Congress 1915* (advance copy), 27 pp.—A discussion of the uses of Cu. The elec. industry at the present time consumes between 60 and 70% of all the new Cu produced. E. J. C.

The development of zinc smelting in the United States. GHO. C. STONE. *Trans. Intern. Eng. Congress 1915* (advance copy), 29 pp.—A discussion and review with production statistics included.
E. J. C.

Some main points in the economics of the metallurgy of zinc. W. R. INGALLS. *Trans. Intern. Eng. Congress 1915* (advance copy), 11 pp.
E. J. C.

Vanadium. ANON. *Engineering* 100, 170(1915).—A brief review of the occurrence, properties, uses, etc., of V.
F. W. SMITHER.

Wet method of mercury extraction. C. A. MULHOLLAND. *Mining Sci. Press* 111, 346(1915).—Discussion of a paper by Thornhill (cf. *C. A.* 9, 1891), especially of the chem. reactions involved.
F. W. SMITHER.

Manganiferous iron ores of the Cuyuna range. EDWARD P. McCARTY. *Univ. Minn. Eng. Mining J.* 100, 400-2(1915).—Av. analyses of various types of these ores are given. There is in general too much P present for the ores to be of wide application and it is in such a form that it cannot be satisfactorily sepd. magnetically, or by any other single mechanical process.
E. T. WHERRY.

Rotary kilns for desulfurization and agglomeration. S. E. DOAK. *Bull. Am. Inst. Mining Eng.* 1915, 2061-6.—A discussion of the utilization of rotary kilns, of the cement type, for the desulfurization and agglomeration of pyrites cinder to be used as a large part of the blast-furnace burden. The one great obstacle now in the way of continuous operation is the formation of "rings," caused by the cinder becoming hot enough to stick to the lining. It is in localities where the native ore is lean that the kiln is valuable, affording an opportunity of enriching the burden with a high grade ore at a much lower cost than could be done by direct purchase of lake or other rich ores, and where the SiO_2 in the native ore averages well over 20%.
F. W. SMITHER.

Surface-flow phenomena. J. E. HURST. *Engineering* 100, 130-1(1915), illus.—Engineers know that the best running properties of internal-combustion engine cylinders, slide-valve guides, bearings, etc., may be expected after the parts have been in use for a certain time and a hard glazed surface has resulted. This is probably a result of surface flow of the vitreous or amorphous phase of the metal. The original microscopic structure of the metal is noticeably changed as a result of such flow and tool marks are obliterated to some extent. A number of practical examples are cited.
WILLIAM T. HALL.

A modified iron-carbon diagram. EDWIN A. SPERRY. *Pei Yang Univ., Tientsin. Met. Chem. Eng.* 13, 469-71(1915).—To reconcile somewhat conflicting statements in text books a compromise diagram is drawn for the use of Chinese students. Such a diagram has no exptl. justification.
W. T. HALL.

The diffusion of carbon in iron. F. W. ADAMS. *Engineering* 100, 95-7(1915), illus.—Royston has shown that when a hard steel in close contact with a mild steel is heated in a vacuum at 900° diffusion of C takes place from the former into the latter but some doubt exists as to whether C diffuses as such or as Fe_3C . The confirmatory results now obtained show that such diffusion takes place but only when the surfaces of the two metals are in very close contact. When in sufficiently close contact, welding and intercrystallization takes place between the specimens and the extent of the welding is not influenced by the C content of either sample; after such welding has taken place the transference of the C is much more rapid than is ordinarily accomplished by cementation by means of CO. When a white Fe was heated with a mild steel considerable migration of the C took place but as there was no evidence of graphitization the results would apparently indicate that the migration was of Fe_3C rather than of free C. Samples of iron and steel are likely to lose wt. when heated in a vacuum; apparently some Fe and some C is volatilized.
WILLIAM T. HALL.

Can the dissociation theory be applied to solid solutions in steels? E. D. CAMPBELL. *J. Am. Chem. Soc.* 37, 2039-46(1915).—Specimens were heated to 892°, quenched and reheated to various temps. from 20° to 800°. Samples were analyzed after each treatment. As the temp. of reheating increased, the amt. of dinitro compds. derived from carbides sol. in cold HNO₃ decreased somewhat regularly; the amt. derived from carbides insol. in cold acid but sol. at boiling temp. increased from 12.8 at 20° to 39.0 (arbitrary units) at 800°. The sp. elec. resistance closely paralleled the decrease in color from carbides sol. in cold HNO₃, i. e., the concn. of carbide. The "molar concn." of C, P, Si, and S in the steel has been calcd., assuming steel to weigh 7800 g. per l. If the products of dissociation of a solute (called "ionoids") in a solvent of high sp. cond. be assumed to resemble the ions of electrolytic dissociation in its usual form, the theory would be just as applicable to solid solns. in metals as to aq. solns., although the phenomena, when the 2 solns. were subjected to a difference of potential at 2 points, would manifest themselves in opposite directions. The differences are due mainly to the differences in elec. properties of the solvents. E. B. MILLARD.

Radiography of metals. WHEELER P. DAVY. *Bull. Am. Inst. Mining Eng.* 1915, 1515-26; *Gen. Elec. Rev.* 18, 795-800(1915), illus.—The presence of blow-holes, slag inclusions, porous spots and the general gross structure (not the grain) can be detd. by taking an X-ray picture, provided the metal is not too thick. Thus holes purposely drilled could be detected in boiler plate and air inclusions 0.52 mm. thick were noticeable in steel which was 31.3 mm. thick. There is no other method of obtaining such information which does not involve cutting the sample. The method of carrying out the tests is described and the proper voltages to use are given. WILLIAM T. HALL.

The commercial production of sound, homogeneous steel ingots and blooms, EMIL GATHMANN. *Bull. Am. Inst. Mining Eng.* 1915, 1485-92, illus.—To produce a sound *piping* steel free from blow-holes, a mold has been devised which has thinner walls at the top than in the middle and bottom sections and is provided with a sink head which is made of poor heat-conducting material. Good ingots can be prepared with such a mold even although, to save expense, the big end is down; the discard can be reduced to about 10%. Early stripping and rolling will reduce the pipe. In blooming the ingots, the rolling should begin while the interior is still hotter and more plastic than the exterior but the ingot must remain in the soaking pit until the steel is entirely set. The best method of reducing the ingot is in *but-to-end* passes. W. T. HALL.

Some suggestions regarding the determination of the properties of steel. A. N. MITINSKY. *Bull. Am. Inst. Mining Eng.* 1915, 1697-706.—The *proportional limit*, i. e., the point at which the extensions cease to be proportional to the loads in tensile strength tests, is recommended as the proper basis of all engineering calculations. This limit is independent of the yield point and of the ultimate strength. It should be as high as possible for metals which are to be subjected to repeated loads, shocks, wear by crushing, etc. Such wear of metals is practically independent of the ultimate strength, yield point and Brinell number. Wear by flow of metal or by crushing depends only on the proportional limit. Factors affecting wear by abrasion were not detd. completely but the deleterious influence of S was noted. It is impossible to destroy a metal by any number of repeated stresses if the proportional limit is not exceeded by the individual stresses, and fatigue is found only when this limit has been exceeded. WILLIAM T. HALL.

The properties of cold-worked metals. I. The density of metallic filings. THOMAS M. LOWRY AND REGINALD G. PARKER. *J. Chem. Soc.* 107, 1005-18(1915).—The changes in d. produced by filing and then by annealing at different temps. were studied with Mg, Al, Sb, Zn, Sn, Fe, Cd, Co, Ni, Cu, Bi, Ag, Pb, Pd, Au and Pt. In

general, the d. of the worked metal was found less than that of the metal as purchased and, conversely, complete annealing is always accompanied by a contraction. This contraction, in the light of Beilby's theory, is due to the recrystn. of the amorphous material which is produced by work on the metal. The contraction, however, is preceded by an expansion. In the case of Au, Ag, Cu, Co, Ni and Sb the intermediate expansion is preceded by a preliminary contraction which is apparently a specific property of a limited number of metals. In the case of Au, the preliminary contraction and the intermediate expansion can be observed to take place consecutively when the metal is heated at 100°. The process of annealing, therefore, may involve 3 distinct changes, of which only the last has been explained satisfactorily. Probably an allotropic change is the cause of the preliminary contraction and the release of mechanical strain of the intermediate expansion.

WILLIAM T. HALL.

Corrosion of iron and steel pipe. W. A. DUNKLEY AND J. E. NOBLE. *Power* 41, 584-5 (1915).—Comparative phys. and chem. tests of steel and wrought Fe pipes apparently show the former to be superior. Cf. C. O. Standstrom, *Ibid* 41, 416.

W. H. BOYNTON.

Corrosion of metal flume sheets. I. C. HARRIS. *J. Elec. Power & Gas* 34, 542 (1915).—An investigation of rustless, "pure" and "Cu-bearing" irons and corrosion-protecting coatings has been made by the Reclamation Service with the result that "it appears that there is no justification for the payment of a higher price for one material than for another on the basis of non-corrodibility when used under the usual conditions encountered on the projects of the Reclamation Service."

W. E. R.

External corrosion of cast iron pipe. MARSHALL R. PUGH. *Chem. Eng.* 22, 47-54 (1915); *Am. Gas Light J.* 103, 65-70 (1915).—Ordinarily, cast Fe pipe embedded in soil will last for from 1 to 3 centuries but in salt marshes or in other saline soils its life may be only 7 yrs. Slag and cinder fills are deleterious and acid mine waters are destructive. Substituting wrought-Fe or steel pipe is ineffectual. To prevent corrosion, (1) the skin resistance may be increased, (2) the pipe may be embedded in lime or cement, (3) acids, salt and air may be excluded, or (4) the pipe may be galvanized.

WILLIAM T. HALL.

Researches on the iron, silicon and carbon alloys. GEORGES CHARPY AND ANDRÉ CORNU-THENARD. *Engineering* 100, 173-7 (1915), illus.; cf. C. A. 8, 484, 2999.—When the % Si rises, the A₂ point rapidly becomes less pronounced and rises slightly on the temp. scale. The H point rises with % Si, passes A₂ and gradually becomes fainter in character and finally disappears when all the C exists as graphite. The A₂ point falls gradually when % Si rises, becomes less and less intense, but can be detected up to 7% Si and is then the only one of these 3 points that remains. Every increase in Si lessens the soln. of C in Fe. The influence of Si on the rate of graphite pptn. is so great that in certain irons the graphite pptn. gives rise to a thermal point.

WILLIAM T. HALL.

A bearing metal of high elastic limit. ANON. *Iron Age* 95, 1016 (1915).—Alloy "Noheet" contains 97% Pb hardened with an alkaline substance. It is much stronger than Babbitt metal.

H. V. MAIN.

One of the causes that may give rise to internal lacerations in steel ingots of large dimensions. F. GIOLITTI. *L'industria* 29, 243, 263 (1915); through *Ann. chim. applicata* 3, 376-7 (1915).—Solus. of continuity that often appear in large steel ingots may be attributed either to chem., physical or unknown causes. G. studied a laceration in a large Ni-steel ingot, the contiguous surfaces differing in macro- and micro-structure and in chem. comp. In 1 of the 2 parts the concn. of C, P and Mn was greater than in the other. This might indicate the formation of abnormal or parasitic germs

of crystn., producing liquation phenomena and inducing the non-homogeneity of the ingot and soln. of continuity. G. suggests considerations looking to the avoidance of inconveniences of this kind. S. LEVY.

Metallographic grinding and polishing machine. ANON. *Iron Age* 95, 1164 (1915).—This combined machine, designed by Wysor, of Lafayette College, is sold by Eimer & Amend. H. V. MAIN.

Vanadium from oxide to steel. W. F. BLEECKER AND W. L. MORRISON. *Met. Chem. Eng.* 13, 492-4 (1915).—The manuf. of Fe-V and its uses are discussed in detail. It may be prepared from oxide by the thermit process, by reduction in the elec. furnace with Al or in the same way with Si as reducing agent. The efficiency of these different methods is discussed. Instead of using Fe-V in the preparation of V-steel, $\text{Ca}_2(\text{VO}_4)_2$ mixed with a little Fe scale and an excess of Si or of Al may be added to molten steel directly. To get the best results with such a mixt. it should be added to the charge in an elec. furnace just before pouring into the ladle. The resulting steel usually contains 0.08 to 0.38% V and it is produced more economically than when Fe-V is used. F. W. SMITHER.

The engineering uses of aluminium. JOS. W. RICHARDS. *Trans. Intern. Eng. Congress 1915* (advance copy), 17 pp.—A discussion of the phys. and chem. properties of Al and the uses based thereon. Light but strong Al alloys are also discussed. E. J. C.

99.84 percent. pure iron for electrical purposes. ANON. *Elec. World* 66, 213 (1915).—"Armco" iron is made in the basic open-hearth furnace by a special process which eliminates as far as possible all solid and gaseous impurities. A guaranteed analysis of Si 0.002, S 0.02, P 0.005, C 0.1, Mn 0.02, and Cu 0.03% is given. Oxidation tests made on charcoal iron, steel and "Armco" by immersing in alk. H_2O for 3 yrs. showed the steel to be badly pitted, with a loss of 9 oz. per sq. ft. surface. The charcoal iron and "Armco" were both uniformly corroded and lost 14 oz. and 7 oz. per sq. ft., resp. Armco Fe rusts, but the oxide formed is finer and more adherent and protects the metal against deep corrosion. A high permeability and low residual magnetism make the product useful for solenoids, etc., while its corrosion-resisting properties makes it desirable for transmission towers, anchor rods, outlet boxes, etc. Photomicrographs of puddled iron, mold steel and "Armco" are given. W. E. RUDER.

Allotropy and metastability of metals (HOLT) 2.

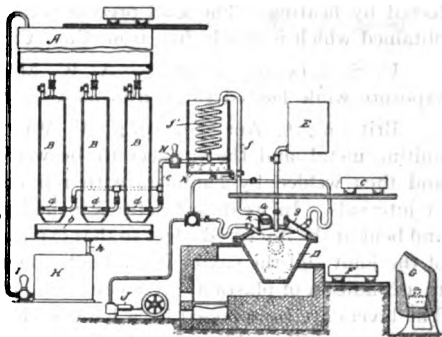
U. S., 1,150,897, Aug. 24. A. C. SPENCER. Recovering residual zinc minerals from calcareous final tailings from ores such as franklinite or willemite. The tailings are passed through a calcining zone against a current of oxidizing flame and gases at a temp. sufficiently high to over-burn the CaO produced. The lime is then sepd. from the heavy mineral constituents of the calcined mixt. by gravity sepn. on a concentrating table.

U. S., 1,151,049, Aug. 24. C. H. A. F. L. ROSS. Steel bars, etc., are toughened by immersing in a bath of molten metal at a temp. of about 780° while supplying to the bath for a period under 10 min. over 125 B. t. u. per min. for each lb. of steel, then quenching the steel at 65° or below in a bath of NH_4Cl , alum and NaCl , reheating to about 540° and quenching again at 50° or below after heating for 8 min.

U. S., 1,151,117, Aug. 24. A. J. MOXHAM. Wet method of classifying constituents of ores by gravity separation.

U. S., 1,151,192, Aug. 24. L. L. KNOX. Blast-furnace.

U. S., 1,151,234, Aug. 24. R. F. BACON. Obtaining cuprous sulfide from ores. The ore is leached as usual, CuS is pptd. with H_2S (thus regenerating the solvent for further use), then S equal in amt. to half that contained in the CuS is added and the CuS is reduced to Cu_2S by heating with hydrocarbon oil and the H_2S which is simultaneously formed is used for further pptn. of soln. leached from the ore. Leaching is carried out in the tank A from which the soln. flows to pptg. towers B, discharging the ppt. on a perforated grid b. It is filter-pressed and conveyed by a car C to the reduction retort D. A car F may convey the product to a converter G. Hydrocarbon is supplied from a tank E to the retort and H_2S from the latter is pumped through a condensing worm f' and used in the pptg. towers B. A pump J supplies air for maintaining sufficient pressure in D to keep down the foam produced. Acid liquor from the sump H is returned to the leach vat A.



U. S., 1,151,235, Aug. 24. R. F. BACON. Reducing cupric sulfide to cuprous sulfide. The CuS is reacted on with mineral oil at its boiling point. The same app. is used as in the preceding pat.

U. S., 1,151,236, Aug. 24. R. F. BACON. Obtaining copper from solutions leached from ores. H_2S is made by reaction of S on a hydrocarbon residue. A portion of the H_2S formed is reacted on with SO_2 forming free S. The remaining H_2S is used for pptg. CuS from the soln. leached from ore and regenerating the solvent as in 1,151,234 (*supra*). The CuS is roasted and the SO_2 thus formed as well as the free S previously produced in the process are used in continuing the process, using fresh charges of other materials.

U. S., 1,151,574, Aug. 31. G. F. DOWNS. Rotating kiln for sintering ores, etc.

U. S., 1,151,629, Aug. 31. N.-K. TURNBULL. Apparatus for galvanizing sheet metal, wire, etc.

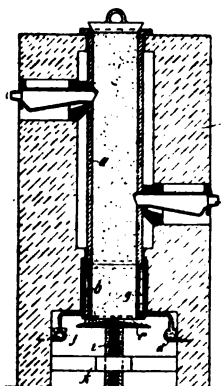
U. S., 1,151,675, Aug. 31. J. A. DYBLIE. Apparatus for tempering metals in oil.

U. S., 1,151,744, Aug. 31. C. VICKERS. An alloy for use in making dense castings resembling bronze is formed of Cu 93, Ti 5 and Mg 2 parts.

U. S., 1,151,831, Aug. 31. C. SEMMLER. Apparatus for absorbing waste heat from blast furnaces, etc., and utilizing it for generating steam for producing power.

U. S., 1,152,050, Aug. 31. A. RORTZHEIM. Zinc-retort furnace arranged to prevent formation of smoke. A vertical retort *a* is supported on a cooling metal jacket *b*, which forms an extension of the retort outside the heating zone. This extension serves to cool the residues after they have passed through the retort. The cooling is regulated by adjusting the plate *c* with the screw *i* to control the rate of discharge. *h* is an observation window.

U. S., 1,152,157, Aug. 31. F. H. FARMER. Hardening steel gears. Rough-machined gear blanks are carbonized, heated, quenched in oil, annealed, machine-finished and then oil-hardened.



U. S., 1,152,699, Sept. 7. W. BORCHERS and E. THLOSS. Separating iron and nickel from copper in sulfide ores, mat, etc. The material is smelted with an excess of lime flux and just sufficient C to reduce the Ni and Fe and gradual reduction is effected by heating. The CaS present retards the sepn. of Cu and an Fe-Ni alloy is obtained which is nearly free from Cu. Cf. C. A. 8, 2337.

U. S., 1,152,959, Sept. 7. A. W. MACHLEY. Case-hardening iron or steel by exposure while heated to an atm. of CO and NH₃ charged with naphtha vapor.

Brit., 9,776, Apr. 20, 1914. F. WERNER. In welding steel or cast-iron, the uniting metal and the surfaces to be welded are heated to a condition of plasticity and then welded by hammers with rounded faces, the uniting metal being inserted at intervals. In welding fractures in boiler plates, etc., *in situ*, the plate is bevelled and bent at the fractured edges so that expansion of the plates does not affect the strength of the joint and the cavity is gradually filled in layers with metal by heating an Fe rod to a condition of plasticity by means of an oxy-acetylene, oxy-hydrogen, or like burner. The layers are compressed by a hammer having a spherical end to avoid the presence of cavities in the weld or stretching of the metal at the weld. Further layers are then applied, and similar hammers of gradually increasing size utilized for completing the joint. The joint is heated after welding, and a magnet used to test whether it is demagnetized. A profiled joint may be made by forging during the welding operation.

Brit., 9,939, July 4, 1914. R. WRIGHT and J. CALDERWOOD. In a blast furnace in which the fuel is introduced by sep. shafts arranged around the central ore and flux shaft, the fuel is admitted above the combustion zone undecomposed and relatively cool.

Brit., 10,312, Apr. 25, 1914. L. A. WOOD and MINERALS SEPARATION, LTD. Concentrating ores, such as sulfide ores, by subjecting a pulp free from oil or frothing agent to the admission of a gas, the bubbles of which raise certain particles of the ore towards the surface and discharge them within the pulp, below the surface of which they are caught and removed. The pulp may be acidified.

Brit., 10,500, Apr. 28, 1914. E. R. WEIDLEIN. A process of extracting copper. See U. S., 1,089,096 (C. A. 8, 1409).

Brit., 10,582, Apr. 29, 1914. B. TALBOT. An anti-corrosive alloy is made by piling rolled sheets of Fe or steel containing 0.3 to 3% Cu, and then heating and hammering or rolling the pile. The sheets at 1 or both surfaces may contain more Cu than the others; or the % may be graduated, decreasing from the surface to the center of the pile.

Brit., 10,598, Apr. 29, 1914. N. E. MACCALLUM. In an open-hearth furnace for the manuf. of steel, the roof, hearth, side and end walls or linings, the walls or arches sepg. the air and gas ports, the doors, and any other wall or portion thereof exposed to the chem. reactions and high temp. of the furnace, are built up of tubular metal containers filled with basic material, such as dolomite, magnesite, and lime, or with neutral material, such as chromite, bauxite, and C, or with a mixt. of such basic and neutral materials.

Brit., 10,630, Apr. 30, 1914. N. S. BRAYSHAW and E. R. BRAYSHAW. In a gas-fired annealing furnace of the kind provided with burner openings arranged beneath the hearth, swivelling gas burners are provided adapted to be withdrawn from the openings in the furnace bottom, the openings being then closed by dampers; also longitudinal scale, slag, or dirt collecting passages may be arranged at the sides of the hearth.

Brit., 10,872, May 2, 1914. GEN. ELEC. CO. Bearings or wearing surfaces of ferrous metal are coated with Zn or other metal by sherardizing. A cast-Fe bearing

is first annealed at a bright red heat to prevent subsequent distortion, and is then heated at a dull red heat for 3-4 hrs. or more in a closed revolving box or cylinder containing Zn dust. After cooling, the bearing may be reamed out to the correct size. The invention is applicable also to shafts, journal boxes, cylinders, pistons, piston-rings, and other wearing surfaces of relatively moving parts.

Ger., 283,035, Feb. 6, 1913. H. BROSCHE. A coating for metal cores, for use in casting tubes and the like from metals such as cast Fe, brass, bronze, and the like, consisting, besides a suitable binder, of a substance such as $MgSiO_3$, which does not fuse or burn at the pouring temp., and which acts as a lubricant after pouring, permitting the easy withdrawal of the solidified casting. Cf. C. A. 9, 3551.

Ger., 283,060, Apr. 9, 1913. A. WASMUS. A system for dry grinding ores, or the like.

Ger., 283,473, Sept. 19, 1913. H. ALDEHOFF. Constructional details of a cylinder mill for ores and other hard substances.

Ger., 283,664, Dec. 14, 1912. Addition to 262,902. GEBR. PFEIFFER. Grinding machine for ores, and the like.

Ger., 283,818, Nov. 16, 1913. Addition to 283,473 (*supra*). H. ALDEHOFF. Cylinder mill for ores and other hard substances, with a scraper arranged behind the first grinding cylinder.

Ital., 134,380, July 11, 1913. O. MASTROLORENZI. A new alloy, which is especially lustrous, ductile, light and tough, is composed of Al 95%, Sn 3%, and Ni 2%.

Ital., 138,648, Mar. 5, 1914. A. P. STROHNIENGER. The manuf. of alloys. See U. S., 1,085,951 (C. A. 8, 1064).

Ital., 142,476, June 1, 1914. E. PLÜGEL. An anti-friction metal containing, with brass or bronze, other metals in such proportions that the resulting alloy may have the following compn: Zn 34, Al 3, Sn 5, Pb 3, Cu 55%.

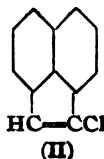
Ital., 142,665, June 5, 1914. CHEM. FABRIK VON DER LINDE and G. VON DER LINDE. Recovering tin from tin plate with the aid of a mixt. of Cl and air. This mixt. is effected in a chamber anterior to the reaction chamber and filled with an inert material (such as Guttman spheres) for the purpose of insuring a homogeneous mixt.

10. ORGANIC CHEMISTRY.

C. A. ROUILLER.

Guido Goldschmiedt. RUD. WEGSCHNEIDER. *Chem. Ztg.* 39, 649-50(1915).—An obituary. J. H. MOORE.

Acenaphthylene and its derivatives. BERTRAM CAMPBELL. Imperial Coll. Sci. Tech., London. *J. Chem. Soc.* 107, 918-21(1915).—Acenaphthylene (A), yellow plates, m. 93°, prepd. by Dziewonski and Rapalski's method (C. A. 7, 89), was freed from acenaphthene by fractional crystn. of the picrates. (A) in CCl_4 when treated with an equimol. amt. of Cl yielded 1,2-dichloroacenaphthene (I), glistening plates

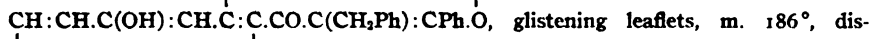


from petroleum, needles from alc., m. 115° , which on oxidation with KMnO_4 yielded naphthalic acid. When heated in EtOH with EtONa (I) formed 1-chloroacenaaphthylene (II), yellow oil. I in Et_2O acting upon an equimol. amt. of (A) in Et_2O yielded a pale yellow powder containing no I and having properties similar to those of "polyacenaaphthylene" described by D. and Leyko (cf. C. A. 8, 2729). LOUIS E. WISE.

Alcoholysis. I. Dilatometric determinations of the velocity of alcoholysis in the presence of a large amount of alcohol. GOPAL B. KOLHATKAR. Indian Inst. Sci., Bangalore. *J. Chem. Soc.* 107, 921-33(1915).—K. has detd. the velocity of alcoholysis in alc.-ester mixts., in the presence of HCl, by the dilatometric method. In a series of preliminary expts., K. showed that in the absence of a catalyst, the ester-alc. mixts. showed no appreciable changes in vol. after long standing; that the variation in concn. of the reacting substances is a linear function of the change in density of the reacting substances; that the catalyst had a negligible effect on the vol. of esters alone, but a slight though appreciable effect on the vols. of the alcs. alone, for which suitable correction was made in the later expts. A set of expts. further indicated that the alcoholysis velocity const. increased in proportion to the increase in HCl concn. Measurements were carried out as follows: The ester was mixed with 20 molar proportions of the requisite alc. previously treated with sufficient HCl gas to form an approx. 0.02 *N* HCl soln. The dilatometer, 50-70 cc. capacity with only 1 capillary (internal diameter about 0.8 mm. and length between the bulb and the tap of the dilatometer 30-40 cm.), was almost completely filled with the above mixt. at about 20° and then transferred to an electrically heated bath kept constantly at 30° ($\pm 0.01^{\circ}$), smaller temp. variations being recorded by a Beckmann thermometer and vol. corrections applied. The level of the liquid in the dilatometer capillary was then adjusted to a convenient height, and readings of the level of the meniscus taken at convenient intervals by means of a reading microscope, until the vol. remained nearly const. In general the system reached equil. when 96% of the ester had been transformed. In all cases the const., k , was computed by the use of the equation $k = 2.3026(1/t \cdot \log a/(a - x))$ where a is proportional to the initial concn. of ester and x to the amt. of ester changed in t mins. The mean values of k were invariably corrected for 0.02 *N* HCl. The following list gives the mixts. and the corr. values for k in parentheses: $\text{AcOEt} + \text{MeOH}$ (0.00608); $\text{AcOPr} + \text{MeOH}$ (0.00546); $\text{iso-PrOAc} + \text{MeOH}$ (0.00214); $\text{iso-BuOAc} + \text{MeOH}$ (0.00488); $\text{iso-AmOAc} + \text{MeOH}$ (0.00495); $\text{iso-BuO}_2\text{CH} + \text{MeOH}$ (0.218); $\text{EtCO}_2\text{Et} + \text{MeOH}$ (0.00375); $\text{PrCO}_2\text{Et} + \text{MeOH}$ (0.00204); $\text{CCl}_3\text{CO}_2\text{Et} + \text{MeOH}$ (0.000229); $\text{CH}_2\text{ClCO}_2\text{Et} + \text{MeOH}$ (0.00249); $\text{BzOEt} + \text{MeOH}$ (0.0000371); $\text{AcOMe} + \text{EtOH}$ (0.00172); $\text{AcOMe} + \text{PrOH}$ (0.00105); $\text{AcOMe} + \text{iso-PrOH}$ (0.000723); $\text{AcOMe} + \text{iso-BuOH}$ (0.000776); $\text{AcOMe} + \text{iso-AmOH}$ (0.000861); $\text{EtCO}_2\text{Me} + \text{EtOH}$ (0.000979); $\text{PrCO}_2\text{Me} + \text{EtOH}$ (0.000546); $\text{CH}_2\text{ClCO}_2\text{Me} + \text{EtOH}$ (0.000953). The rates of esterification of acids by the catalytic method (cf. Sudborough and Gittins, *J. Chem. Soc.* 93, 211(1908)) and of the alcoholysis of the corresponding esters by HCl follow the same order: $\text{HCO}_2\text{H} > \text{AcOH} > \text{EtCO}_2\text{H} > \text{PrCO}_2\text{H} > \text{CCl}_3\text{CO}_2\text{H} > \text{BzOH}$ (the sole exception being $\text{CH}_2\text{ClCO}_2\text{H}$). The relative activities of alkyl groups calcd. from the acetate alcoholysis expts. and taking Me as 100 are $\text{Et} = 28$; $\text{Pr} = 19$; $\text{iso-Pr} = 3.4$; $\text{iso-Bu} = 16$; $\text{iso-Am} = 17$. The ratios $(\text{Et ester} + \text{MeOH})/(\text{Me ester} + \text{EtOH})$ are very nearly identical for acetates, propionates and butyrates, being 3.5, 3.8, and 3.7, resp. This indicates that the relative affinities of Me and Et groups towards an acyl group are to some extent independent of the nature of that group. LOUIS E. WISE.

Synthesis of benzo- γ -pyrones and flavones. II, III. SERGE JACOBSON AND BROJENDRANATH GHOSH. Univ. Coll., London. *J. Chem. Soc.* 107, 959-66, 1051-8 (1915).—(Throughout this article J. and G. use the term "Et β -benzoyl- α -

phenylpropionate," to which they assign the enolic formula: $\text{HOCPh:C}(\text{C}_6\text{H}_5)\text{-CO}_2\text{Et}$. Judging from the method of synthesis of the compd. and from the structure of its condensation products, it is evident that J. and G. mean Et α -benzoyl- β -phenylpropionate.—ABSTR.) $\text{BzCH}(\text{CH}_2\text{Ph})\text{CO}_2\text{Et}$ (A), b_p 218–20°, prep'd. by the interaction of PhCH_2Cl and $\text{BzCHNaCO}_2\text{Et}$ in EtOH, when condensed with phenols in the presence of suitable condensing agents gave rise to benzo- γ -pyrones. $m\text{-C}_6\text{H}_4(\text{OH})_2$ in glacial AcOH reacting with (A) in the presence of dry HCl formed 7-hydroxy-2-phenyl-3-benzylbenzo- γ -pyrone (7-hydroxy-3-benzylflavone) (B),

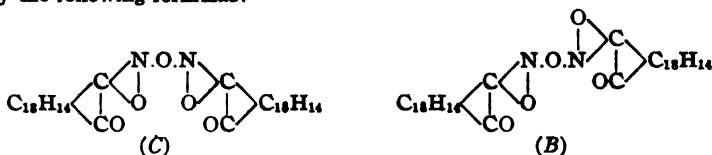


solving in H_2SO_4 with a yellow color and developing an intense, bluish violet fluorescence. Its acetate, colorless needles, m. 134° , develops a similar fluorescence in H_2SO_4 . When heated with KOH for several hrs., (B) is decomp'd. into $\text{BzCH}_2\text{CH}_2\text{Ph}$, m. 72° , and 2,4-(HO) $_2$ $\text{C}_6\text{H}_3\text{CO}_2\text{H}$, m. 203° . The condensation of pyrogallol and (A) yielded 7,8-dihydroxy-2-phenyl-3-benzylbenzo- γ -pyrone (7,8-dihydroxy-3-benzylflavone), leaflets, m. $136\text{--}7^\circ$, developing a green fluorescence in H_2SO_4 , and forming a reddish brown sodium salt; an acetate (0.5 H_2O), needles, m. 175° ; and a benzoate, needles, m. $170\text{--}1^\circ$. Similarly α -naphthol and (A) in the presence of H_2SO_4 or SnCl_4 gave rise to 2-phenyl-3-benzyl-1,4- α -naphthapyrone (3-benzyl-1,4- α -naphthylflavone), leaflets, m. 71.5° , dissolving in H_2SO_4 with a yellow color and greenish fluorescence. $\text{sym-C}_6\text{H}_3(\text{OH})_3$ in AcOH and (A) react in the presence of ZnCl_2 to form 5,7-dihydroxy-2-phenyl-3-benzylbenzo- γ -pyrone (5,7-dihydroxy-3-benzylflavone), pale brown prisms, m. 119° (decomp. 126°). Its acetate, prisms, m. 56° . Similarly 3,5-(HO) $_2$ $\text{C}_6\text{H}_3\text{Me}$ and (A) gave rise to 7-hydroxy-2-phenyl-3-benzyl-5-methylbenzo- γ -pyrone (7-hydroxy-3-benzyl-5-methylflavone), lemon-yellow needles, m. 108° , developing a green fluorescence in H_2SO_4 . $m\text{-C}_6\text{H}_4(\text{OH})_2$ or 1,2,3-(HO) $_3$ C_6H_3 reacting with $\text{PhCH}_2\text{COCHPhCO}_2\text{Et}$ in the presence of concd. H_2SO_4 yielded 1,3-dihydroxy-2-phenylnaphthalene (cf. Volhard, *Ann.* 296, 16(1897)). Very similarly, substituted benzo- γ -pyrones were obtained by condensing $\text{AcCHPhCO}_2\text{Et}$ (C) or $\text{HCOCHPhCO}_2\text{Et}$ (D) with phenols in the presence of suitable condensing agents. (C) reacting with $m\text{-C}_6\text{H}_4(\text{OH})_2$ yielded (in the presence of concd. H_2SO_4) 7-hydroxy-3-phenyl-2-methylbenzo- γ -pyrone (E), needles, m. 226° ; acetate, needles, m. 185° ; benzoate, needles, m. $187\text{--}8^\circ$; ethyl ether, prisms, m. $89\text{--}90^\circ$; methyl ether, needles, m. 87° . On decompn. with 33% alkali (E) yielded 2,4-(HO) $_2$ $\text{C}_6\text{H}_3\text{CO}_2\text{H}$ and AcCH_2Ph . By a similar condensation, 1,2,3-(HO) $_3$ C_6H_3 and (C) yielded 7,8-dihydroxy-3-phenyl-2-methylbenzo- γ -pyrone, pale yellow prisms, m. 268° ; acetate, needles, m. 211° ; benzoate, yellow prisms, m. 204° ; ethyl ether, needles, m. 132° . (C) and α -naphthol reacted to form 3-phenyl-2-methyl-1,4- α -naphthapyrone, $\text{C}_{18}\text{H}_{16}\text{O.CMe:CPh.CO}$, lemon-yellow needles, m. 209° , yielding AcCH_2Ph and 1,2-

$\text{C}_6\text{H}_3(\text{OH})\text{CO}_2\text{H}$ on hydrolysis with KOH. (C) and $\text{sym-C}_6\text{H}_3(\text{OH})_3$ in the presence of ZnCl_2 formed 5,7-dihydroxy-3-phenyl-2-methylbenzo- γ -pyrone, lemon-colored needles, m. 178° ; acetate, needles, m. 146° . (D) and $m\text{-C}_6\text{H}_4(\text{OH})_2$ in the presence of ZnCl_2 gave rise to 7-hydroxy-3-phenylbenzo- γ -pyrone, pale yellow needles, m. 131° . Resorcinol when condensed with $\text{AcOCH}(\text{CO}_2\text{Et})_2$ (F) in the presence of H_2SO_4 formed β -methylumbelliferone. Similarly $\text{AcCHBzCO}_2\text{Et}$ (G) and resorcinol gave rise to β -phenylumbelliferone. Apparently the direction of the condensation with phenols depends on the reactivity of the α -H atom in the acetoacetate. When the H atom is very reactive (as in the case of (F) and (G) where it is situated between 3 C:O groups) coumarins are formed. If its reactivity is sufficiently limited, benzo- γ -pyrones are the result. No definite reaction product could be isolated from a mixt. of m -cresol and $\text{AcCHPhCO}_2\text{Et}$ kept in the presence of H_2SO_4 .

LOUIS E. WISE.

Nitrocamphor and its derivatives. VIII. Action of formamide on nitrocamphor. THOMAS M. LOWRY AND VICTOR STREELE. Guy's Hosp., London. *J. Chem. Soc.* 107, 1038-43(1915).—The following is an improved method for the prepn. of pure nitrocamphor (*A*) m. 102° (cf. *Ibid* 73, 995(1898)). 276 g. of crude bromonitrocamphor were dissolved in 100 cc. of hot EtOH (distd. from KOH) and gradually added to a soln. of 46 g. Na in 400 cc. alc. in a flask provided with a reflux condenser. At the close of the reaction a Na salt sepd. which after washing with EtOH-acetone mixt. (1:1) and acidification yielded pure (*A*). The action of KMnO_4 on isonitrosocamphor also gives rise to (*A*) in theoretical amt. The stable ammonium salt of (*A*), m. 178° , $[\alpha]_{\text{D}}^{25}$ 384° ; $[\alpha]_{\text{D}}^{1780}$ 324° , was formed either by adding HCONH_2 to (*A*) in AcOEt or more conveniently by adding concd. NH_4OH to (*A*) in acetone. When a mixt. of 20 g. (*A*) and 5 g. HCONH_2 in 50 cc. of AcOEt is heated for 12 hours under reflux, and 0.5 of the AcOEt is allowed to evaporate, the residue yields only a small amt. of the NH_4 salt and a new anhydride of (*A*), $\text{C}_{20}\text{H}_{32}\text{O}_5\text{N}_2$ (*B*), slender needles with a slight greenish yellow tint, m. 184° , $[\alpha]_{\text{D}}^{25}$ in C_6H_6 -6° , $[\alpha]_{\text{D}}^{1780}$ -4° . (*B*) is apparently closely related to but not identical with an isomeric anhydride of (*A*); (*C*) previously prepd., m. 193° , $[\alpha]_{\text{D}}^{25}$ in C_6H_6 242° , $[\alpha]_{\text{D}}^{1780}$ 204° . In view of the fact that the reactions of (*B*) and (*C*) are sensibly the same, L. and S. suggest that the compds. are stereoisomers and owing to the low $[\alpha]$ of (*B*) and the high $[\alpha]$ of (*C*) represent their structures by the following formulas:



LOUIS E. WISE.

Reactivity of the halogens in organic compounds. VIII. Interaction of alkalis and alkali bromoacetates in methyl-alcoholic solution. GEORGE SENTER AND HENRY WOOD. Birkbeck Coll., London. *J. Chem. Soc.* 107, 1070-80(1915).—Owing to the comparatively meager data given by Madsen (*C. A.* 7, 3120), S. and W. have repeated M.'s expts. and extended his work, and have shown that M.'s conclusions are not accurate. The reaction between $\text{CH}_2\text{BrCO}_2\text{Na}$ (*A*) and MeONa in MeOH is pseudo-bimol. in character. The course of any one reaction may be satisfactorily represented by the equation for a bimol. reaction, although the speed of reaction is not proportional to the mol. concn. of each of the reacting substances when the initial concns. are varied. MeOK when substituted for MeONa in the above reaction was shown to be considerably more reactive. In the corresponding reaction between $\text{CH}_2\text{BrCH}_2\text{CO}_2\text{Na}$ (*B*) and MeONa , which is much slower than in the case of (*A*), the reaction velocity is not independent of the MeONa concn. (as M. states) but increases with growing concn. of MeONa although not in the same proportion. The actions of MeONa and of MeOH on (*B*) proceed at comparable rates (whereas the action of MeOH on (*A*) is negligible when compared with that of MeONa). Measurements of the halogen displacement in (*A*) and (*B*) in mixts. of MeOH and H_2O have been made with the result that a max. velocity is observed in mixts. containing about 60% H_2O , the velocity coeff. in this case being nearly double that in H_2O and more than twice that in pure MeOH . The relative proportions of Me-acid to HO-acid formed were shown always to be much greater than corresponds with the concn. of MeOH in the mixt. These facts are analogous to those reported by Lobry de Bruyn and Steger (*Rec. trav. chim.* 18, 41, etc.(1899)) on the displacement of a NO_2 group in $p\text{-C}_6\text{H}_4(\text{NO}_2)_2$, and of I in alkyl iodides, in $\text{MeOH-H}_2\text{O}$ mixts. de B. and S.'s results are critically discussed. The methods for detg.

velocities have been previously described. The results of measurements are given in tabular form.

LOUIS E. WISE.

Preparation of dichlorodinitromethane by the simultaneous nitration and chlorination of acetone. JIRENDRA N. RAKSHIT. Presidency Coll., Calcutta. *J. Chem. Soc.* 107, 1115-7(1915).— $\text{Cl}_2\text{C}(\text{NO}_2)_2$ (A), pale yellow liquid, b. $121-2.5^\circ$, possessing an extremely pungent odor (cf. Losanitsch, *Ber.* 17, 849(1884), and Marignac, *Ann.* 38, 16(1841)), was readily prepd. by the following method: To a mixt. of 60 g. granular CaCl_2 and 40 cc. of acetone in a H_2O -cooled flask were very gradually added through a tap funnel 10 cc. of 70% HNO_3 . After 5 min., 5 cc. more of HNO_3 were slowly added and the addition of acid continued until the beginning of a violent reaction (after about 20 min.), during which NO_2 , Cl and NOCl were evolved. When fuming had ceased, more HNO_3 was gradually added until all of the CaCl_2 had dissolved. The upper layer in the flask was then sepd. and transferred to another well-cooled flask containing 40 g. of CaCl_2 and treated as before with HNO_3 . At the conclusion of this second reaction, the upper layer in the flask was subjected to a third similar treatment. The entire expt. was completed during 1 day, the time of reaction being about 6 hrs. The final upper layer when poured into H_2O yielded about 12 cc. of an insol. heavy oil, which consisted largely of (A), and which after drying was purified by fractional distn. The synthesis should be carried out exactly as described, with the quantities indicated, since a violent explosion followed the use of larger proportional amts. If the reaction mixt. was allowed to stand overnight in contact with HNO_3 , a colorless liquid (not (A)) containing 8.38% C, 9.97% N, and 48.86% Cl was formed.

LOUIS E. WISE.

Hydrazides and azides of organic acids. XXXI. The hydrazides and azides of oxalic acid. THEODOR CURTIUS with KARL HOCHSCHWENDER. *J. prakt. Chem.* 91, 415-41(1915); cf. *C. A.* 9, 1605.—The following members of this series have been previously prepd.: $(\text{CONHNH}_2)_2$ (a) (Schöfer and Schwan, *J. prakt. Chem.* 51, 194), oxazide (b), $(\text{N}_3\text{CO})_2$ (Burkhardt, *J. prakt. Chem.* 58, 216, 232), $\text{HO}_2\text{CCONHNH}_2$ (c) (Curtius, Darapsky and Müller, *C. A.* 1, 1573) and $\text{NH}_2\text{OCCONHNH}_2$ (d) (Kerp and Unger, *Ber.* 30, 586). $\text{HO}_2\text{CCO}_2\text{N}_3\text{H}_5$ (e) is formed when $(\text{CO}_2\text{H})_2$ and 1 mol. $\text{N}_3\text{H}_4\cdot\text{H}_2\text{O}$ are dissolved in H_2O and cooled; short, stout needles from H_2O , shrivels 180° without m.; 1 part H_2O dissolves 0.006 part of salt. $(\text{CO}_2\text{N}_3\text{H}_5)_2$ (f), formed when 2 mols. $\text{N}_3\text{H}_4\cdot\text{H}_2\text{O}$ are used, seps. on evapn. *in vacuo* in fine needles, which soften 140° and m. 148° . (e) and (f) have both been described since the completion of this work, by Turrentine, *C. A.* 4, 2266. 10 g. (d), heated at 100° for 2 hrs. with 50 g. Ac_2O gives in 66% yield the *diacetyl derivative*, $\text{H}_2\text{NOCCONHNHAc}$, lustrous needles from alc. or H_2O , m. $184-5^\circ$; *benzoyl derivative*, by shaking 5 g. (d) in H_2O with 10 g. Na_2CO_3 and 15 g. BzCl , fine needles in clusters from H_2O , m. $231-2^\circ$; yield 75%. *Oxamyl azide* (g), $\text{H}_2\text{NOCCON}_3$, is obtained in 22.8% yield when 30 g. HCl (d) in 50 cc. H_2O is treated at -5° with 15 g. NaNO_2 in H_2O drop by drop with shaking; the slimy mass is quickly filtered, sepd. from *hydrazidioxamide* (h), $(\text{H}_2\text{NOCCONH})_2$, by soln. in 1.6 kg. acetone, filtered and pptd. by 2 vols. cold petr. ether; microscopic needles and leaves, which explode violently 115° ; boiled with alc., $\text{NH}_2\text{CONHCO}_2\text{Et}$ is formed (the corresponding diazide (b) is not attacked by alc.); warmed with H_2O , the formation of $\text{CO}(\text{NHCONH}_2)_2$ was to be expected, but $\text{NH}_2\text{COCO}_2\text{H}$ was the only product isolated; warmed at $30-40^\circ$ with moist AcMe , $\text{CO}(\text{NH}_2)_2$ is formed, probably as follows:

$$\text{NH}_2\text{COCON}_3 \xrightarrow{+\text{H}_2\text{O}} \text{NH}_2\text{CONHCO}_2\text{H} \xrightarrow{-\text{CO}_2} \text{CO}(\text{NH}_2)_2$$

With PhNH_2 and $p\text{-NH}_2\text{C}_6\text{H}_4\text{Me}$ in acetone, (g) gives $\text{NH}_2\text{CONHCONHPh}$ (Schiff, *C. A.* 1, 1700) and asym. *p*-tolylbiuret (Pickard and Carter, *J. Chem. Soc.* 79, 844), resp., while PhNHNH_2 in Et_2O gives $\text{NH}_2\text{COCONHNHPh}$, without rearrangement. (h) is formed exclusively

in 55% yield when HCl (*d*) is treated at room temp. with 0.5 mol. NaNO_2 ; sparkling flakes from H_2O , sol. in Na_2CO_3 and alkalis, m. $302-3^\circ$ (decompn.); *silver salt*, yellow. HNO_2

The reaction probably proceeds as follows: $\text{NH}_2\text{NHCOCOCONH}_2 \xrightarrow{\text{HNO}_2} \text{N}_2\text{COCONH}_2$
 $\text{NH}_2\text{NHCOCOCONH}_2$

$\longrightarrow [\text{NH}_2\text{COCONH}]_2 + \text{HN}_2$ (cf. Curtius, *J. prakt. Chem.* 52, 468). (*k*) is also formed, but in smaller yield, by heating (*d*) in alc. with I at 100° . While the neutral esters of dibasic acids in general react with $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$ to form dihydrazides, even though the ester is present in excess, $(\text{CO}_2\text{Et})_2$ gives chiefly the monohydrazide, *ethyl hydrazino-oxalate* (*i*), $\text{NH}_2\text{NHCOCO}_2\text{Et}$. To 90 g. $(\text{CO}_2\text{Et})_2$ in 50 cc. alc., 20 g. $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$ is added slowly, keeping the temp. below -13° , the soln. then filtered from about 2 g. of the dihydrazide, evapd. *in vacuo* at 30° and Et_2O added in large excess, when (*i*) seps. as an oil which crysts. on cooling in short, stout needles, m. $52-3^\circ$, effervescing and then solidifying at 152° and not again m. below 300° ; it is unstable, decomp. to a high melting substance on standing; with NH_3 , it gives (*d*) and with BzH the benzal derivative of Stollé, *C. A.* 5, 1914; acetone does not give a cryst. condensation product; the *hydrochloride* (*j*), formed in 89-94% yield from a cold Et_2O soln. with dry HCl, hygroscopic leaves or powder, m. $107-8^\circ$. *Ethyl asido-oxalate* (*k*), $\text{N}_2\text{COCO}_2\text{Et}$, is formed when 10 g. (*j*) in a little H_2O is covered with 100 cc. Et_2O , treated cold with 4.1 g. NaNO_2 in 20 cc. H_2O , the Et_2O layer sepd. and evapd.; an oil, which explodes violently on heating. The H_2O layer from the above expt., satd. with $(\text{NH}_4)_2\text{SO}_4$, extd. with CHCl_3 , the CHCl_3 soln. dried and dild. with ligroin, seps. *diethyl hydrazidioxalate* (*l*), $(\text{EtO}_2\text{CCONH})_2$, in fine needles, m. $125-6^\circ$. To prep. (*l*) alone by the action of NaNO_2 on (*j*), the reaction is carried on in H_2O at room temp., using only 0.5 mol. NaNO_2 ; yield, 6 g. from 20 g. (*j*). It cannot be prepd. like (*k*) by the action of I on (*i*), but is formed when (*i*) in alc. is oxidized with 2 mols. HgO or (*i*) is heated with 4 mols. $(\text{CO}_2\text{Et})_2$ at $130-40^\circ$; the yields in both cases are poor. (*l*) is converted by NH_3 into (*h*). When (*k*) is warmed with alc., $\text{NH}(\text{CO}_2\text{Et})_2$ is formed. When 4 g. (*l*) are treated with 3 mols. NaOH in 20 cc. H_2O , a cryst. *sodium salt* seps., which is probably $\text{NaO}_2\text{CCONHNNaCOCO}_2\text{Na}$; on acidifying the H_2O soln., *hydrazidioxalic acid* (*m*), $(\text{HO}_2\text{CCONH})_2$, is pptd., which m. $174-5^\circ$. If (*m*) is crystd. from hot H_2O , the *hydrate*, (*m*) $\cdot 3\text{H}_2\text{O}$, seps. in short needles or leaves, which m. 126° , solidify 170° and do not again m. below 280° . From H_2O solns. of (*m*), AgNO_3 and $\text{Pb}(\text{OAc})_2$ give white ppts., CuSO_4 a green ppt. sol. in NH_3 , and $\text{CaCl}_2 + \text{NH}_3$ a white gelatinous ppt. When $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$ in abs. alc. is added to (*l*) in abs. alc., *hydrazidioxalyl dihydrazide* (*n*), $(\text{NH}_2\text{NHCOCOCONH})_2$, is pptd. as a white gelatinous mass, which becomes granular on heating; fine, long needles from H_2O , which do not m. below 300° ; *dihydrochloride*, pptd. from dil. HCl by concd. HCl; *nitrate*; *dibenzal derivative*, microscopic cryst. powder, m. above 300° . *Hydrazidioxalyl diaside*, $(\text{N}_2\text{COCONH})_2$, is formed in the usual manner by the action of HNO_2 on (*n*); cryst. powder, which explodes violently on heating; heated with abs. alc. at 100° , N_2 is evolved, leaving a white cryst. powder on evapn., small, rhombic tables from alc., m. $200-5^\circ$, which were identified as the *déurethos derivative*, $[\text{EtO}_2\text{CNHCONH}]_2$, by the products of hydrolysis, alc., CO_2 , NH_3 , N_2H_4 and no $(\text{CO}_2\text{H})_2$.

NORMAN A. SHEPARD.

Isolation of a new phenol, baptisol (CLARK) 11D. Dynamics of the keto-enol transformation of cyanoacetic acid (DAWSON) 2. Absorption spectra of mono-substituted benzene compounds and the benzene substitution law (BALY) 2. Action of alkali sulfide on sodium ethyl thiosulfate (GUTMANN) 6.

11. BIOLOGICAL CHEMISTRY.

WILLIAM J. GIES, EDGAR G. MILLER, JR., PAUL E. HOWE.

A. GENERAL.

FRANK P. UNDERHILL.

Paul Ehrlich. ANON. *J. Soc. Chem. Ind.* 34, 893(1915); *Science* 42, 332-3(1915).
—Biographical. E. J. C.

The biochemistry of respiration. H. M. VERNON. *Sci. Prog. Twentieth Century* 9, 251-69(1914); *Expt. Sta. Record* 32, 664.—A summary and digest of data regarding this subject, from which V. draws the general conclusion that the biochemistry of respiration is in the main dependent upon intracellular enzymes. While in some instances this is entirely a hydrolytic process without oxidation, in a majority of organisms the processes are both hydrolytic and oxidative. E. J. C.

Cause of the activation exerted by beer yeast on the gastric juice. II. GIOVANNI PICCOLI. Univ. Bologna. *Arch. farm. sper.* 19, 488-504(1915).—The favorable action of yeast on peptic digestion is probably due to the presence of erepsin. Since this enzyme increases in amt. as the cells multiply, and is therefore a product of the activity and not of the destruction of yeast cells, the amt. of protein digested should be greatest under conditions that promote the growth of yeast. A. W. DOX.

Influence of the bromine-ion on uricolysis. ANTONIO JAPPELLI. Univ. Naples. *Arch. farm. sper.* 19, 329-34(1915).—NaBr inhibits the enzymic oxidation of uric acid by liver exts. *in vitro*, as compared with similar concns. of NaCl. This furnishes further verification of J.'s previous findings that the Br-ion has an inhibitory effect upon enzymes in general. A. W. DOX.

Researches on the permeability to glucose of the red corpuscles of splenectomized dogs. A. DONATI. Univ. Torino. *Arch. farm. sper.* 19, 565-71(1915).—Splenectomy increases the permeability of the erythrocytes to glucose. This effect cannot be due to the formation of new cells, since these are known to be less permeable to glucose than the mature cells. A. W. DOX.

Certain aspects of biological oxidation. A. S. LOEVENHART. Univ. Wisc. *Arch. Intern. Med.* 15, 1058-71(1915); cf. *C. A.* 7, 2062; 8, 175, 752, 1468, 1994.—The effect of the administration of CO or of NaCN is explained as due to their effect in diminishing oxidations. The primary effect is stimulation of the medullary centers. The administration of Na iodo- and iodosobenzoate, which contain active O and which accelerate oxidations, depresses these centers. These substances also produce effects on the formation of hemolysins and reaction to foreign substances which are in marked contrast to the inactivity of Na iodobenzoate. Expts. on rabbits kept at normal atmospheric pressures but with varying concns. of O and of CO₂ showed that when the concn. of O is reduced to 0.5 of the usual amt. there is an increase in the number of erythrocytes, or amt. of hemoglobin in the blood, or both. Blood-smears showed that the effect was not due to concn. of the blood but to stimulation of the bone-marrow. Increased concn. of CO₂ stimulated the respiratory center but had little effect on the bone-marrow. When the concn. of O in the atm. is reduced to 3 or 3.5%, rabbits soon die, but at concns. slightly above this they behave normally. Various chem. combustions are completely inhibited long before the O concn. has sunk to any such level: EtOH at 15%, illuminating gas at 13%, H₂ at 6.6%. I. GREENWALD.

The role of oxidases in respiration. G. B. REED. Harvard Univ. *J. Biol. Chem.* 22, 99-111(1915); cf. *C. A.* 7, 3602.—The formation of indophenol from *p*-phenylenediamine and α -naphthol frequently proceeds most rapidly in the region of semipermeable membranes, yet many surfaces show no such activity. The semi-

permeable character of the membrane may be destroyed by suitable means (CHCl_3 , toluene, etc.) without interfering with the formation of indophenol within the cells. Such treatment does not affect the activity of oxidases. If, however, the cell be killed by such means as are known to destroy oxidases, no formation of indophenol occurs. It is concluded that the oxidases are the essential agents in the formation of indophenol.

I. GREENWALD.

Studies of autolysis. II. The acceleration of liver autolysis. H. C. BRADLEY. Univ. Wisc. *J. Biol. Chem.* 22, 113-23(1915); cf. *C. A.* 9, 1920.—Casein, peptone and coagulated liver proteins are digested by the autolytic enzymes of the liver. The presence of MnCl_2 does not lead to an increase in the rate or the extent of digestion of casein or of peptone. Edestin is not digested by the liver enzyme under normal conditions, but is digested when MnCl_2 is added. Ovalbumin is not digested by the liver enzymes, even if MnCl_2 be added. In the presence of HCl , it is digested. All the sol. salts of Mn investigated accelerate and increase liver autolysis. The phosphate (insol.) does not and the carbonate, which inhibits the formation of the normal acidity of the liver pulp, does inhibit autolysis. A lower concn. of HCl acts as does MnCl_2 in accelerating and increasing autolysis. Although in H_2O soln. the MnCl_2 used would not have as high a H^+ concn. as the HCl that produces the same effect upon autolysis, in the liver pulp, fixation of ions by protein permits further hydrolysis of MnCl_2 . It is therefore probable that the effect of the MnCl_2 (and of other Mn salts) is entirely due to the acid liberated from them.

I. GREENWALD.

The role of halogens as accelerators of tissue enzyme action. MAX MORSE. Univ. Wisc. *J. Biol. Chem.* 22, 125-32(1915).—I and iodides may slightly accelerate the rate of autolysis of liver tissue. This may be due to the formation of small amts. of HI . Thyroid protein and iodized blood-protein cause an apparent acceleration of autolysis, probably due to the increase in available substrate. The addition of small amts. of Br accelerates autolysis, probably because of the increased acidity. Feeding of the dog with thyroid for 2 weeks previous does not increase the rate of autolysis of the liver.

I. GREENWALD.

The formation of yeast protein from inorganic nitrogen compounds. ED. DONATH. *Oesterr. Chem. Ztg.* 18, 74(1915).—D. demonstrates that from a purely scientific standpoint the credit for this discovery belongs to Ad. Meyer.

ARTHUR LEDERER.

Some new constituents of milk. I. The phosphatides of milk. THOMAS B. OSBORNE AND ALFRED J. WAKEMAN. Conn. Agr. Expt. Sta. *J. Biol. Chem.* 21, 539-50(1915).—The phosphatides were obtained by repeated hot alc. extn. of the coagulum resulting from boiling milk serum after the pptn. of the caseinogen from 3000 l. of milk with 1% HCl . The ext. was concd. at a low temp. *in vacuo*, the residue dissolved in Et_2O , shaken out with H_2O and the Et_2O distd. off. The residue was extd. repeatedly with Me_2CO ; an amt. failed to dissolve equal to 0.31% of the coagulum. The material insol. in Me_2CO had all the physical properties of lecithin. It was only partly sol. in Et_2O . The portion insol. in Et_2O , after repeated crystn. from warm alc., sepd. in the form of semi-cryst. microscopic balls; turns brown and softens above 169° , begins to melt at 184° , m. 190° (decompn.) to a clear brown liquid; absorbs 29.8% of I; ratio of P:N equal to 1:2.09. The substance was apparently a diamino-phosphatide but lack of material made it impossible to det. its nature. The phosphatide, sol. in Et_2O , was purified by twice dissolving in Et_2O and pptg. with excess of Me_2CO . It was a monoaminophosphatide, yielding choline containing at least $\frac{1}{2}$ of the N, fatty acids and glycerophosphoric acid in proportions corresponding to a stearyl-oleyl-lecithin of the structure commonly assumed for this substance. About 36% of the N of the phosphatide is present in the form of amino-N and it is probable that the Et_2O -sol. milk phosphatide is a mixt. of 2 substances, one yielding choline and the other

a base containing amino-N. "What relation these substances have to the protein is difficult to det. That some form of combination exists must be assumed, for they become sol. in Et_2O only after the protein is treated with alc., and, furthermore, before coagulating by heat, they are freely sol. in H_2O . It is probable that these phosphatides are not combined with the lactalbumin which is the chief constituent of the coagulum, but with another protein, for we found that when the filtrate from the casein is neutralized with milk of lime the acidified filtrate from the ppt. yields a coagulum which is free from P. Since the ppt. produced by thus neutralizing contains protein, it is probable that the phosphatides are also contained therein as a lecithalbumin containing a relatively large proportion of phosphatide similar to ovovitellin of the egg-yolk."

A. P. LOTHROP.

Action of serum on the lipase of pancreatic juice. J. A. SHAW-MACKENZIE. *J. Physiol.* 49, 216-21(1915).—The author confirms his previous expts. and contradicts the statements of Mellanby and Woolley. (1) Pancreatic lipase can be sepd. into enzyme and coenzyme. (2) Blood serum contains a coenzyme to which is due its accelerating effect on lipase. (3) Lipase can exist in the presence of free trypsin although its activity is somewhat reduced. (4) Glycerol exts. of pancreas contain active trypsin. (5) Fresh pancreatic juice contains little active lipase, the enzyme being present as pro-lipase.

J. F. LYMAN.

Enzymes of the pancreas. V. Carbohydrate enzymes of pancreatic juice. J. MELLANBY AND V. J. WOOLLEY. *J. Physiol.* 49, 246-64(1915).—Fresh pancreatic juice contains amylase but no maltase. The amylase breaks down starch into a stable dextrin (25%) and maltose (75%). After adding acid to pancreatic juice maltase and an enzyme capable of hydrolyzing the stable dextrin are produced. The greater the H^+ concn. the greater the amt. of dextrose formed until a concn. of acid is present which stops all action owing to the destruction of the enzyme. Maltose is 54% hydrolyzed under optimal conditions of acidity. Hydrolysis of starch is facilitated by neutral salts as CaCl_2 , or NaCl , but the final position of equil. is the same as when pancreatic juice only is present. It is suggested that pancreatic juice contains 1 carbohydrate enzyme. In a neutral medium, or in the presence of neut. salts, this enzyme hydrolyzed starch to dextrin and maltose only. When acid is added the enzyme associates itself with some of the acid and the activity of the enzyme is detd. by the H^+ concn. of the enzyme complex. Pancreatic juice alone, or in the presence of neutral salts, acids or alkalies, has no action on lactose or sucrose.

J. F. LYMAN.

The rate of evaporation of ether from oils and its application in oil-ether colonic anaesthesia. CHAS. BASKERVILLE. College of City of N. Y. *J. Ind. Eng. Chem.* 7, 868-70(1915); *Proc. Am. Phil. Soc.* 54, 270-8(1915).—Report of an experimental study covering: (1) A comparison of the rate of evapn. of ether from different mixts. of ether and the same oil, (2) a comparison of the rate of evapn. of ether from the same per cent. mixts. of different oils and ether, and (3) the influence of surface on the rate of evapn. The oils were of 3 types, vegetable, animal and mineral. The method of procedure involved heating in a thermostat to 37° . The observations demonstrated that: (1) While ether boils at 34.6° , it does not escape violently from an oil-ether mixt., as from an aqueous mixt., when the mixt. is heated higher, namely to the body temp. (37°). (2) The rate of sepn. of ether from the oil quickly acquires a definite and fairly fixed speed. This conduct, it is thought, may be utilized to maintain in the blood any desired physiological effect of ether that has a quantitative relation thereto, for example, the third or surgical stage of anaesthesia. The latter effect has been demonstrated clinically, with records to date of about 1000 human cases. **Discussion.** J. T. GWATHMEY. *J. Ind. Eng. Chem.* 7, 870.

M. I. W.

Amino-acid content of certain feeding stuffs (NOLLAU) 12.

B. METHODS AND APPARATUS.

STANLEY R. BENEDICT.

Gerhardt's reaction for acetoacetic acid. L. LICHTWITZ. Göttingen. *Berl. klin. Wochschr.* 52, 399-400(1915).—The strength of the FeCl_3 test for acetoacetic acid in urine has no relation to the strength of the sodium nitroprusside test for the same substance. The reason for this is found to be that the ketone and the enol forms of acetoacetic acid do not occur in the same proportion in urine and Gerhardt's test detects only the enol form while the sodium nitroprusside test is for the ketone form.

JULIAN H. LEWIS.

Chemical analysis of shot-marks. T. LOCHTE AND E. DANZIGER. *Vierteljahreschr. ger. Med.* 49, 7-14(1915).—Flobert shots made with a Flobert pistol at short range (10 cm.), showed 8 mg. of Pb in the wound. At a range of 4 m. the Pb content was 0.07-8 mg. With revolver shots and similar range, 0.4 mg. Pb at most were shown. Gunshots with Pb bullets at a distance of 1 m. show traces of Pb (0.04-7 mg.). Traces disappear at a distance of 2 m. L. and D. state that a conclusion as to the distance cannot be drawn with mathematical safety from traces of Pb, but only with a certain probability.

EDWARD J. KELLEY.

The value of the clinical, pathological-anatomical, chemical and legal examinations into phosphorus poisoning. J. P. L. HULST. *Vierteljahreschr. ger. Med.* 49, 206-20(1915).—A discussion. The author finds considerable value in the above examinations.

EDWARD J. KELLEY.

An accurate clinical study of blood-sugar. SOLOMON STROUSE, IRVING F. STEIN AND ALAN WISELY. Chicago. *Bull. Johns Hopkins Hosp.* 26, 211-5(1915).—Calibrate several ordinary centrifuge tubes, marking them at the 0.5, 1, 5 and 10 cc. points. Fill a tube to the 0.5 cc. mark with 0.2% NaF soln. Allow blood from a pricked finger or ear to fall into the tube up to the 1 cc. mark. Add H_2O to the 5 cc. mark and a pinch of powdered Rochelle salt and shake until soln. is complete. Add Merck's dialyzed Fe (5%) soln. up to the 10 cc. mark, stopper and shake vigorously until the mixt. is homogeneous. Centrifuge 3-5 min. Proceed with the detn. according to the method of Kowarsky (*C. A.* 7, 3768). A table is given from which the amt. of sugar can be read directly from the Cu content of the ppt. The amt. of sugar in the Cu soln. must be subtracted from the amt. found. If the supernatant liquid after centrifuging is not water-clear more of the dialyzed Fe soln. should be used. The detn. can be made in 15 min. and is especially useful for clinical purposes. In a series of 61 detns., the normal blood-sugar varied from 0.04 to 0.12% with an av. of 0.084%. "Carbohydrates in the diet raise the blood-sugar. The blood-sugar of a normal man describes a curve reaching its lowest limits before breakfast and before dinner, and invariably showing a rise 1 hr. after meals. Detns. to be of any value must be performed before and after an ordinary meal containing carbohydrate."

A. P. LOTHROP.

Renal functional tests. JOHN T. GERAGHTY. Baltimore. *Bull. Johns Hopkins Hosp.* 26, 155-8(1915).—A discussion of the value of the various renal functional tests.

A. P. LOTHROP.

A rapid method for determining calcium in urine and feces. HENRY LYMAN. Harvard Med. School. *J. Biol. Chem.* 21, 551-6(1915).—A method has been devised in which the Ca is pptd. as a soap and the cloud formed is compared with a cloud of a standard soln. in the Duboscq colorimeter. From 5 to 10 cc. of urine (8 cc. will usually give the best results with normal adults on a mixed diet) are measured into a small Erlenmeyer flask and the Ca pptd. as oxalate according to the method of McCrudden. On account of the small vol. of urine used for the detn., 1 cc. of 2% $(\text{CO}_2\text{H})_2$ and 1 cc. of 10% Na acetate are used in the pptn. After shaking for 10 min., pour into a centrifuge tube, rinsing the flask with 2 cc. of 0.5% $(\text{NH}_4)_2\text{C}_2\text{O}_4$ soln. Centrifuge until

the supernatant liquid is perfectly clear (2-3 min.). Decant, being careful not to disturb the ppt., wash with 10 cc. of 0.5% $(\text{NH}_4)_2\text{C}_2\text{O}_4$, centrifuge and decant. Dissolve the ppt. in 5 cc. of 5% HCl, warming in hot H_2O , if necessary. Pour the soln. into the flask in which the original pptn. was made and wash out the tube with 5 cc. of H_2O . Dissolve any ppt. clinging to the walls of the flask by agitating the liquid. In another flask measure 10 cc. of a standard soln. of CaC_2O_4 in 2.5% HCl, containing 1.5 mg. of Ca per 10 cc. (0.5475 of $\text{Ca}_2\text{C}_2\text{O}_4 \cdot \text{H}_2\text{O}$ in 1 l. of 2.5% HCl). From a pipet, from which the tip has been broken, run into each flask 20 cc. of K ricinate soln., shaking during the addition. Mix, allow to stand for 2 min. and read the clouds in the Duboscq colorimeter. If the amt. of urine taken is found to contain less than 0.75 mg. or more than 2.5 mg. of Ca, the readings are not quant. and another detn. must be made with a vol. of urine which will give results between these amts. Diln. after pptn. will not give accurate results. If 10 cc. of urine are used and the *unknown* is set at 15 mm., the reading of the standard equals the mg. of Ca in 100 cc. of urine. Formula: (reading of the standard $\times 1.5$) / (height at which the unknown is set $\times$ number of cc. of urine taken) = mg. of Ca in 1 cc. The shade of the colorimeter must always be used; daylight from a clear sky is the best (artificial light containing much yellow or red cannot be used); the colorimeter must be kept perfectly clean and should always be tested with the standard in both cups. The K ricinate is prepared as follows: dissolve 15 g. of KOH in 25 cc. of H_2O and 100 cc. of alc., warm and add 100 cc. of castor oil. Shake well and heat under a reflux condenser until sapon. is complete (about 7 hrs.). Of this stock soln., pipet 35 cc. into a flask and add 965 cc. of distd. H_2O in which have been dissolved 9 g. of NaOH (KOH does not give good results). The reagent should be perfectly clear and must be made fresh from the stock soln. once a week. In the analysis of feces, weigh out 5-6 g., after thorough mixing, into a silica dish, moisten with concd. H_2SO_4 and burn to a white powder, heating gently at first. Wash the residue into a 100 cc. volumetric flask with 50 cc. of 10% HCl, make up to vol., shake and filter. Take 50 cc. of the filtrate and make up to 100 cc. with distd. H_2O . Det. the Ca in this soln. by the method described except that 2 cc. of Na acetate soln. must be added instead of 1 cc.

A. P. LOTHROP.

The quantitative determination of creatine in muscle and other organs. N. W. JANNEY AND N. R. BLATHERWICK. Montefiore Home, N. Y. *J. Biol. Chem.* 21, 567-82 (1915).—The method of Myers and Fine (*C. A.* 8, 1132) has been modified in such a way as to permit the use of very much smaller amts. of material. Free fresh muscle quickly from visible connective tissue, grind in a meat chopper and mix thoroughly. Weigh out into a beaker by difference about 5 g. from a sample in a weighing bottle with ground-glass stopper. Stir up in 50 cc. of H_2O and heat to boiling. Remove the flame and stir through the contents of the beaker 10 cc. of a 15% suspension of powdered $\text{Al}(\text{OH})_3$. Filter hot through a small Buchner funnel into a warmed flask. Ext. the ppt. with 150 cc. of hot H_2O in 6 portions, filling the funnel completely and sucking nearly dry each time. Transfer the filtrate to a flat bottom Jena flask graduated to 300 cc., washing the filter flask with 55 cc. of 25% H_2SO_4 , followed by H_2O until the volumetric flask contains about 280 cc. The acid concn. is approx. *N*. Convert the creatine into creatinine by immersing the flask in a boiling H_2O bath for 3 hrs. Cool, dil. to the mark and mix. Det. the creatinine by the Folin method after neutralizing the acidity to phenolphthalein of 10 cc. of the soln. with 10% NaOH. If the weighing of the material is carefully done, smaller amts. of muscle, $\text{Al}(\text{OH})_3$, vol. of ext. and H_2SO_4 may be safely employed. In analyzing organs other than muscle the same technic is used up to and including the extn. of the creatine, except that at least 5 g. of material should be taken. To the creatine ext. add 8 cc. of 25% H_2SO_4 , transfer to a porcelain dish, washing the filter flask twice with H_2O . Evap.

on a H_2O bath to 75 cc., cover the dish with a large watch glass to retard further evapn. and continue heating for 2 hrs. Transfer the cooled soln. quant. to a 100 cc. flask, dil. to the mark and mix. Det. the creatinine in the usual manner. In working with organs which contain only traces of creatine, measure 10 cc. of the unknown into a small glass, add 20 cc. of satd. picric acid and 1.5 cc. of 10% NaOH in addition to the amt. necessary to neutralize 10 cc. of the unknown. To 10 cc. of the standard add 20 cc. of the picric acid and 1.5 cc. of the NaOH soln. and sufficient distd. H_2O from a buret to make the vol. equal to that of the unknown. In all cases the standard may be set at 20 mm. The method has been compared with that of Folin (*C. A.* 8, 2736) and it was found that "the action of heat and acid on dog muscle leads to the production of products other than creatine, which are the sources of the higher results obtained by the use of the Folin method. Folin's procedure for the estn. of creatine in muscle is of limited applicability. For organs other than muscle it cannot be recommended." Glucose and urea in concns. up to 1% do not interfere provided the colorimetric readings are made promptly. "Creatine and creatinine are probably not to be regarded as existing in firm combination in liver and muscle, as acid hydrolysis of such organs, previously freed of these substances by extn., fails to yield additional creatine or its anhydride." The following amts. of creatine in mg. per 100 g. were found in various organs: dog brain 124, pancreas 18, kidney 27, spleen 30, testes 181, liver 20 (av. of 12 detns.); calf liver 45.

A. P. LOTHEROP.

Determination of total nitrogen in urine, particularly in presence of sugar. ED. JUSTIN-MUELLER. *J. pharm. chim.* 11, 171-4(1915).—Into a 200-250 cc. flask put 10 cc. of urine, 5 cc. of a 30% soln. of $K_2C_2O_4$ and 9 cc. of concd. H_2SO_4 ; then add slowly 20 cc. of H_2O_2 of 12 vols. and heat over a flame. Steady effervescence marks decompn. of the sugar, which, without the use of H_2O_2 , would cause a troublesome black scum to form. Further heating destroys organic matter, and N is detd. as usual. For 10 cc. of urine containing n g. of sugar per l., use $n/2$ cc. of H_2O_2 of 12 vols., and $5 + n/10$ cc. H_2SO_4 .

S. WALDBOTT.

Determination of total sulfur in vegetable substances (DE JONG) 7.

C. BACTERIOLOGY.

ERNEST D. CLARK.

Influence of organic acids on yeast. I: BUIROMSKII. Moskau. *Centr. Bakt. Parasitenk.*, II Abt. 42, 530-57(1915).—The action of a number of different organic acids on yeast grown in different media was investigated. The changes produced in the substrate and the effect produced on the individual enzymes of the yeast were detd.

J. H. LEWIS.

Transformation of atmospheric nitrogen to protein. A. BAUDREXEL. *Z. Spiritusind.* 38, 256(1915).—A historical review of both the processes of atmospheric N fixation and the transformation of inorganic to organic N compds. in the form of yeast protein.

L. W. HAAS.

D. BOTANY.

CARL L. ALSBERG.

The action of radium and its emanations on the germination of the higher plants. HENRI AGULHON AND THÉRÈSE ROBERT. *Ann. inst. Pasteur* 29, 261-73(1915).—The expts. here reported concern only the germination of seeds or the period during which the plants live at the expense of their reserves. They are classed in 3 series: (1) Expts. with the Ra in a sealed tube; here the germinating plants are submitted to the emanations which traverse the glass. (2) Expts. with a very dil. soln. of $RaBr_3$, in which the seeds germinate directly. (3) Expts. with the Ra in an unsealed vial, permitting the emanations to diffuse in a closed space in which the cultures are disposed. In the first series, there was clearly a retarding influence exerted by the radia-

tions capable of traversing the glass. In the second series, no action, favorable or unfavorable, was observed. In soln., very small doses of Ra are inactive. The third series of expts. seems to prove a positive activation of the growth of plants by the emanations of Ra. If this activation was due to the presence of ozone, the conc. of the ozone was in each case too slight to be recognized by the most sensitive indicators available.

GEO. T. CALDWELL.

Physiological investigations on the germination of the pollen of *Vitis vinifera*. E. GARINO-CANINA. *Stas. sper. agrar. ital.* 47, 481-92(1914); through *Chem. Zentr.* 1915, I, 322-3.—The pollen of the grape is decidedly acidophile. The best germinative soln. is 15% cane sugar plus 2% neutral gelatin and 1:4000 tartaric acid. A long-continued rain acts on natural germination in the same way as distd. water in expts. Temps. below 14 and above 35° inhibit germination. All the bactericides used in the vineyard are poisons for germination.

L. J. GILLESPIE.

Ectoprotease of grapes. F. M. MARRAS. Univ. Sassari. *Centr. Bakt. Parasitenk., II Abt.* 43, 641-4(1915).—Using the gelatin plate method which is the most delicate test for proteolysis, protease could not be detected in the juice expressed from ripe and unripe grapes.

JULIAN H. LEWIS.

The distribution of cyanogen in grasses, especially in the genera, *Panicularia* or *Glyceria* and *Tridens* or *Sieglingia*. C. L. ALSBERG AND O. F. BLACK. U. S. Dept. Agr., Bur. of Plant Ind. *J. Biol. Chem.* 21, 601-9(1915).—Twenty-two species of American grasses were tested for HCN. Of these, this acid was found in *Tridens flavus* and *Panicularia nervata*, *P. grandis* and *P. canadensis*. It was not present under the conditions of examn. in *Panicularia pauciflora*, *P. fluitans* and *P. septentrionalis*. Sleepy grass of the Southwest, *Stipa vaseyi*, which is generally regarded as poisonous, contained no HCN.

A. P. LOTHROP.

The blackening of the leaves of the wild indigo (*Baptisia tinctoria*) and the isolation of a new phenol, baptisol. E. D. CLARK. Cornell Univ. Med. College. *J. Biol. Chem.* 21, 645-60(1915).—Leaves of *Baptisia tinctoria*, subjected to the action of various volatile organic substances, are turned jet black by the vapors. There is a rise in temp. which often reaches 55-60° in an hour in the center of the mass. Substances of the ester type are more effective in causing the blackening of the leaves than the ordinary volatile antiseptics such as CHCl_3 , C_2H_5 , and Et_2O . Me_2CO is the most active agent. "The phenomena of blackening seem to be produced by any agency, physical, chem. or mechanical, that disturbs the normal relationships of the cells containing certain enzymes and those containing the substrate; i. e., altered permeability and active diffusion of the cell constituents. Apparently, first a hydrolytic enzyme decomposes a glucoside, and then an oxidase acts to produce the dark pigment." When the leaves are subjected to the action of CHCl_3 vapors for 24 hrs., they turn jet black and are covered with a white cryst. efflorescence. This substance can be extd. from the leaves by 0.5% NaOH, neutralization by dil. AcOH and extn. of the ppt. with hot 95% alc. After boiling the alc. ext. with bone-black, the compd. is pptd. by diln. of the alc. to 30% with hot H_2O . Fresh leaves which have not been blackened, do not yield the compd. when treated with 0.5% NaOH. The blackened dried leaves contain about 0.2% of the substance. The new phenol has been named baptisol, $\text{C}_{15}\text{H}_{13}\text{O}_5$; m. 212-3° (cor.); insol. in H_2O , sol. in glacial AcOH, concd. HCl, alc., CHCl_3 , etc.; pptd. from soln. in fixed alkalies by dil. acids or CO_2 ; reacts positively with Millon's reagent. *Triacetyl*baptisol, m. 189° (cor.). *Tribenzoyl*baptisol, m. 183° (cor.). The phenol contains 3 hydroxyl groups and 1 methoxy group, but lack of material made it impossible to identify any other groups. "It apparently has no unsatd. bonds, no groups reacting with NH_4OH or PhNHNH_2 , no groups capable of oxidation or re-

duction to form colored products, and none of the properties of flavones as a class." From present knowledge the formula may be indicated as $C_{16}H_{14}O(OCH_3)(OH)_2$.

A. P. LOTHROP.

The presence of choline in the shoots of *Aralia cordata*. K. MIYAKE. Tohoku Imperial Univ., Japan. *J. Biol. Chem.* 21, 661-2(1915); cf. *C. A.* 9, 2395.—The presence of choline in the juice of the shoots of *Aralia cordata* has been established by the isolation of the characteristic crystals of choline chloroplatinate.

A. P. LOTHROP.

E. NUTRITION.

PHILIP B. HAWK.

NORMAL.

Phosphorus metabolism of lambs fed a ration of alfalfa hay, corn, and linseed meal. E. L. ROSS, M. H. KEITH AND H. S. GRINDLEY. Univ. Ill. *J. Agr. Res.* 4, 459-73(1915).—This is part of an investigation to det. the influence of different quantities of protein on nutrition of young lambs. Differences of protein were obtained by varying the proportions of corn and linseed meal. The feces were collected daily at 2 P.M. from oilcloth-lined canvas bags strapped to the lambs. The urine was collected under the animal cages in galvanized iron trays. A large part of the P of alfalfa hay is acid-sol. inorg.; the P of corn is $\frac{1}{2}$ acid-sol., largely org.; that of linseed meal is mostly acid-insol., the sol. part equally org. and inorg. With a ration of alfalfa hay, corn and linseed meal, lambs secrete in urine 0.2-0.5% of total ingested P. A large part of the acid-insol. P in feeds is changed to acid-sol. and the acid-sol. org. P to acid-sol. inorg. in the feces. The feces contain a large proportion of the acid-sol. inorg. P and little insol. P. The normal P requirement of lambs does not exceed 3 g. per day per 100 lbs. live wt. No relation is shown between P retained by the body, the P ingested, the protein ingested or the body wt. of lambs. On varying the digestible protein in feed from 1.56 to 3.19 lbs. per 1000 lbs. live wt. per day there was no appreciable influence on the forms of P in the feces, the total P in the urine, or the total P stored in the animal body.

R. O. E. DAVIS.

The value of dry yeast, potato vinasse, malt sprouts and palm seed cake under various conditions as feedstuffs for milk production. Specific actions of said feedstuffs on the fat content of milk. W. VÖLTZ, A. BAUDREXEL AND W. DIETRICH. *Landw. Jahrb.* 47, 573-638(1914).—The results of expts. carried out on four cows for two successive years are summed up as follows: Malt sprouts increased the milk yield but not its fat content and therefore they should be fed (as a component of mixed feed) when the milk is to be valued according to measure rather than fat content. Palm seed cake increased the fat content considerably, as G. Kühn, v. Knieriem, v. Lochow, Hansen, and others, have found. Yeast also increased the fat content of the milk but not to as great an extent as the palm cake. The potato vinasse had a slight negative influence on % of fat.

C. F. MILLER.

A contribution to the study of the amine-acid content of the blood. PAUL GYÖRGY AND EDGARD ZUNZ. Univ. Brussels. *J. Biol. Chem.* 21, 511-37(1915).—Dogs weighing from 7 to 10 kg. were bled from the carotid artery after fasting 24 hrs., during which time they were allowed to drink water freely. Part of the blood was centrifuged and alc. exts. were made of the whole blood and of the plasma according to the method of Van Slyke and Meyer. The urea was removed by the action of urease and the soln. freed from NH_3 by Folin's method. The amino-N content was then detd. by the micro-method of Van Slyke. The relative vol. of corpuscles and plasma was detd. by means of the hematocrite of Kottmann. The blood during fasting and in normal conditions contains from 4 to 5 mg. of amino-N per 100 cc. and the amt. is remarkably const. for both corpuscles and plasma. There is an increase in amino-N content of

about 38% about 4 hrs. after copious bleeding. This increase is prevented if Ringer soln. is injected intravenously during the bleeding. During the digestion of a meal poor in protein, such as purée of potatoes, there is no appreciable change in the amino-N content of the blood. An increase of 2-3 times the normal amt. follows the ingestion of meat, the increase being greater in the corpuscles than in the plasma. If the dogs are bled before the meat is eaten, the increase is greater than in animals not bled before feeding. The amino-N content of the blood taken 4 hrs. after the ingestion of meat has a const. value of from 10 to 12 mg. per 100 cc., an increase of 148%. During the digestion of a meal rich in protein, the amino-N content of venous blood is lower than that of arterial blood, indicating a retention of aminoacids by the tissues during digestion.

A. P. LOTHROP.

The significance of glycogen and starch as intermediate products in the metabolism of certain organisms. H. I. WATERMAN. Dordrecht. *Chem. Weekblad* 12, 552-6 (1915).—When *Aspergillus niger* is cultivated under favorable conditions on a sugar soln. there are formed a new mold material, CO₂, water, and other products. There does not appear to be a proportionality between the amt. of mold material and CO₂ formed and the amt. of sugar taken up. Euler has observed in the case of alc. fermentation that the amt. of sugar taken up by the yeast is not proportional to the CO₂ evolved. This is explained by noting that two main reactions take place: (1) The formation of intermediate products from sugars, and (2) the decompn. of these into sugars, and then into CO₂, alc., etc. Of these intermediate products starch is important in plants and glycogen in animal organisms. W. has studied the decompn. reaction of the starch in bananas. When dried at a low temp. (35-60°) a certain % of the starch is converted first to sugar, and then to further decompn. products. The bananas including the skin were sliced and 3 portions dried at different temps., powdered and analyzed. Invert and cane sugar were estd. by extn. with water and measurement of the opt. rotation and reducing action of Fehling soln., before and after inversion. The starch was detd. in the residue after extn. of the sugar by alc. Drying at 60° brings about considerable conversion of the starch into sugar. The starch content of the powder dried at 105° was 7.3%, of that dried at 60° 1 % lower, while the total sugar content of the latter was 1.4% higher. The sugar content of the material dried at 45° was abnormally low (3.8%), much lower than of the product dried at 105°, due probably to a further decompn. of the saccharose or invert sugar with the loss of CO₂.

P. v. d. MEULEN.

ABNORMAL.

Albumin milk in infant feeding. V. POULSEN. *Ugeskrift for Læger* 77, No. 21(1915); *J. Am. Med. Assoc.* 40, 372.—Observations with 85 infants under 1 year failed to show advantages of feeding albumin milk in cases of acute gastro-enteritis. In chronic dyspepsia albumin milk proved to be more beneficial than any other measure. The change to other food should be made very gradually. With 29 children, from 1 to 5 years old, suffering from chronic dyspepsia, albumin milk as a supplement to other food gave strikingly good results in every case.

L. W. RIGGS.

F. PHYSIOLOGY.

ANDREW HUNTER.

Hydrogen ion concentration in blood under various abnormal conditions. M. L. MENTEN AND G. W. CRILE. *Am. J. Physiol.* 38, 225-32(1915).—H⁺ conc. may be markedly increased in the blood in some abnormal conditions, e. g., during fright or anger (due probably to increased CO₂ tension), in anesthesia by Et₂O, CHCl₃, or N₂O, and in shock. Blood flowing from the adrenal glands is always more alkaline than venous blood of the general circulation, due probably to the base epinephrine in the blood of the adrenal vein.

J. F. LYMAN.

Effect of various mechanical conditions on the gaseous metabolism and efficiency of the mammalian heart. C. L. EVANS AND Y. MATSUOKA. *J. Physiol.* 49, 378-405 (1915).—Work of the heart, using the heart-lung prep., was calcd. assuming 1 cc. O = 3.4 cal. or 2.07 kg.-m. In calcg. work of the heart the velocity factor must be considered, as with high outputs it may account for 5% of the total work. With increased pressure gaseous metabolism is increased and mechanical efficiency raised up to a certain limit, beyond which it is diminished. With increased output metabolism is increased to a max., falling off again with further increase of output. Increase of output is more economically accomplished than a comparable increase of pressure. A parallel is usually demonstrable between O usage and heart vol. J. F. LYMAN.

G. PATHOLOGY.

H. GIDEON WELLS.

The diagnosis and significance of gastric hyperacidity. F. W. ROLPH. Univ. Toronto. *Quart. J. Med.* 8, 309-16(1915).—The symptoms of hyperacidity depend on the H-ion content. Therefore small amts. of ionized combinations are more harmful than larger amts. of less ionized combinations. The hydrolysis of protein liberates groupings whose combinations with HCl are more ionized than the combination of the protein itself with the acid. Whatever the true explanation of the hyperacidity in disturbances of gastric function may be, the symptoms of hyperacidity go with a conc. of H ions in the gastric contents after a test meal which is indicated by a reaction with tropaeolinoo, and the reaction is never given when the symptoms are absent. The presence or absence of this degree of acidity cannot be detd. by titrating the amt. of acid that gives the reaction to Töpfer's reagent. JOHN T. MYERS.

The properties of urine of patients with frozen feet. L. TIXIER. *Union pharm.*, June, 1915; *Repert. pharm.* 27, 173-4(1915).—The ratio of NH₃ to urea which is normally 1:40 varied according to density between 1:8 and 1:30. The reaction to litmus was alk. The urine contained neither albumin nor sugar but appreciable amts. of indole and skatole were detected. Millon's reagent gave a ppt. of protein compds. varying in color from pale pink to red. A microscopic exam. showed the presence of crystals of MgNH₄PO₄ and of tyrosine and cystine. These symptoms indicate the presence of acid amides and point to a diminution in intraorganic oxidation. H. L. OLIN.

Multi-pollen vaccines in the treatment of hay fever. HENRI ISKOWITZ. *Med. Record* 88, 270-2(1915). A. H. RAHE.

Protein absorption as a factor in the causation of cancer. J. WALLACE BEVERIDGE. *N. Y. Med. J.* 102, 387-90(1915).—End products of protein digestion may reach the general circulation through intestinal lesions and if they are present in quantities greater than the liver can deal with, toxic effects may ensue. A. H. RAHE.

Pathologic liquids of chylous appearance. I. Pleural chyiform discharges. G. PATEIN. *J. pharm. chim.* 11, 265-71(1915).—Two examples of such liquids are cited (M. Khouri, 1898, and C. A. 9, 1200). P. gives analyses of 3 similar liquids removed from the chest of a tuberculous patient at different periods. The first, amounting to 1 liter, was milky, slightly yellowish, free from pus, of alk. reaction, d. 1.025, in g. per l., total solids 85.8, mineral matter 9.5, fatty matter 2.0. The second, 500 cc., was greenish gray, thick, milky, very alk., d. 1.021, in g. per l., total solids 64.5, mineral matter 9.6, fatty matter 8.4, and showed pus and fatty granules. In both liquids were traces of reducing and biliary matters, no fibrin, no fibrinogen. The 3rd liquid was also purulent, greenish yellow, alk., d. 1.022, total solids 69.5, mineral matters 8.2, albuminoids 42.5, fatty matter 14.8, consisting of free fatty acids 11.2, fatty acids combined as soap 3.6 g. per liter. Reducing and biliary matters, fibrin and fibrinogen were absent. The fatty matter also contained a small amt. of cholesterol and notable

amts. of lecithin. The m. p. of the fatty substance is much higher than that of the fatty matters from ascitic liquids or chyliform urine, and may exceed 80°. The albuminous matter in the 3rd liquid is nearly all pptd. by adding 10 vols. of H₂O and rendering faintly acid with AcOH. The ppt. contains no much, but nucleoproteins abundantly.

S. WALDBOTT.

The significance of the distribution of urea in the body. D. M. DAVIS. Johns Hopkins Univ. *Bull. Johns Hopkins Hosp.* 26, 154-5 (1915).—The urea content of all organs and tissues is approx. uniform and equal to that of the blood, with the exception of fat which has a low content and the urinary tract which has a high urea content. The retention of urea commonly observed in nephritis may be a mechanism whereby the injured kidneys are stimulated by the diuretic action of the urea until they are able to eliminate an amt. equal to the daily production. It is difficult to interpret the significance of the urea content of the blood in any case on account of the innumerable kinds of nephritis, in each of which the excretion of different substances is affected differently. "The quantity of urea in the blood of a patient at any moment can naturally give much less information than a study extending over some time, and including as many factors as possible, i. e., blood detns., urine detns., diet and other methods of estg. renal function."

A. P. LOTHROP.

An abnormal yellow pigment in urine. ED. JUSTIN-MUELLER. *J. pharm. chim.* 12, 57-9 (1915).—The urine in a case of pneumonia followed by purulent pleurisy was feebly acid, contained 1.03 g. dextrose and 0.35 g. albumin per l., and urobilin in notable amt. The color was reddish yellow, but did not stain filter paper nor did it give a colored foam. Alkalies, especially NH₄OH, turned it an intense yellow which stained filter paper and gave color to foam. Upon defecating the original (acid) urine with Pb subacetate and filtering, the ppt. is chamois-yellow but the filtrate is decidedly yellow and stains filter paper yellow. It proved to be free from urobilin. The chromogen could not be extd. by org. solvents. It disappears upon acidulating. The urine does not resemble icteric urine nor does it give Grimbart's test for bile pigments. The defecated urine (removing Pb by Na₂SO₄) shows special absorption bands between 135 and 160, urobilin in CHCl₃ soln. between 120 and 140. The bands were not shown by non-defecated urine whether alk. or not. The pigment is probably due to an alteration in the liver.

S. WALDBOTT.

H. PHARMACOLOGY.

ALFRED N. RICHARDS.

Behavior of the isolated heart of the frog under the action of nicotine and heat. GIOVANNI B. ZANDA. Univ. Genoa. *Arch. farm. sper.* 19, 505-10 (1915).—Heat and nicotine produce opposite effects when applied separately, the former accelerating and the latter retarding the heart beat. However, neither one counteracts the effect of the other. Heat tends to exaggerate the effect of the nicotine, no matter whether the heat or the nicotine is applied first.

A. W. DOX.

Observations on plasmapheresis. B. B. TURNER, E. K. MARSHALL, JR. and PAUL D. LAMSON. Baltimore. *J. Pharmacol.* 7, 129-35 (1915).—Plasmapheresis may be carried on to a greater extent than was indicated by earlier work; in dogs 4 to 5 times the vol. of blood has been withdrawn in 4 to 5 days successfully, death resulting from intercurrent infection in some cases, in others from toxic effects of a particular variety of hirudin. The blood pressure falls with the repeated bleedings, but this can be remedied. The number of red corpuscles rises, that of white cells falls in plasmapheresis during a day's work, with a reverse change at night. No destruction of corpuscles has been demonstrated. There is also a decrease of protein in the plasma to about 1/3 of its original value, caused by 3 days plasmapheresis; this is followed by a slight increase. Urea and total non-protein-N increased from the beginning.

A rise in temp. by 1° was observed during each day of plasmapheresis with a return to normal during the night.

P. J. HANZLIK.

The role of the liver in acute polycythemia. A mechanism for the regulation of the red corpuscle content of the blood. PAUL D. LAMSON. Baltimore. *J. Pharmacol.* 7, 169-224(1915).—The author's own condensed summary brings out the important points of his lengthy paper: (1) The red corpuscle content of the blood is a constantly varying quantity under physiological conditions. (2) Certain new means have been found by which the red (corpuscle) count may be rapidly and greatly increased: (a) lung emboli produced by the injection of corpuscles hardened with HCHO, of an inert powder, as lycopodium, or of oil; (b) emotional stimuli, as fright or rage. (3) The polycythemia produced by injection of epinephrine is due to the action of the liver alone. (4) Ligation of the arterial blood supply to the liver excludes the production of polycythemia after the injection of epinephrine. (5) Later release of this ligation allows the customary increase in number of red cells to take place, without the further injection of epinephrine. (6) The liver effects this increase in number of red cells by (a) a decrease in plasma vol. (not sufficient to account for the entire increase in the number of red cells, however); (b) by bringing into the circulation red cells which were not present before the production of polycythemia as shown by (a) their reduced size, (b) their reduced % hemoglobin content. (7) These cells give none of the usual reactions of young cells. There is an absence of nucleated red cells, no change in the fragility of the corpuscles, and no increased metabolism of the red cells themselves, as shown by an increased rate of reduction. (8) It is concluded that there is a mechanism for the regulation of the red corpuscle content of the blood; (9) that the regulatory mechanism is under nervous control, reacting to lack of O as a stimulus; (10) that the adrenal glands play a part in this mechanism; (10) that the liver is the organ which supplies the body with red cells to meet its acute demands.

P. J. HANZLIK.

The action of oxycholine derivatives on purine metabolism and their therapeutic application. T. BURGSCHE AND R. WOLFFENSTEIN. Berlin. *Berl. klin. Wochschr.* 52, 157-9(1915).—On the basis of the work of Nicolaier and Dohrn who suggested the use of atophan (2-phenylquinoline-4-carboxylic acid) in the therapy of gout, B. and W. make a study of certain synthetic substances using the quinoline ring as a nucleus. 1-Hydroxyquinoline (a) is found to increase the excretion of allantoin in dogs and uric acid in man. This only happens if the liver has a high content of purine compds. When the liver has been exhausted there is a decrease in the excretion of these substances. The toxicity of (a) prevents its therapeutic application. Its salicylate increases the excretion of uric acid and also inhibits the formation of uric acid. Because of these properties and of its non-toxicity, it is recommended in the treatment of gout.

JULIAN H. LEWIS.

The biological action of condensed radium emanations. E. PARTOS. Stuttgart. *Berl. klin. Wochschr.* 52, 181-3(1915).—The first decompn. product of Ra is an inactive gas called "emanation" which can be condensed at -155° . The authors detd. the effect of this substance on mice. If exposed long enough to the condensed gas mice are killed. In smaller doses the chief effect is on the spleen. The leucocytes in this organ are destroyed and the connective tissue takes on a hyaline appearance. Besides these changes there was also produced acute parenchymatous nephritis and severe burns of the skin.

JULIAN H. LEWIS.

Spinal anesthesia in the cat. G. G. SMITH AND W. T. PORTER. *Am. J. Physiol.* 38, 108-27(1915).—Expts. are reported which show the effects under various conditions of novocaine and tropacocaine on blood pressure and respiration.

J. F. LYMAN,

Perfusion of the mammalian medulla. Effect of calcium and potassium on the respiratory and cardiac centers. D. R. HOOKER. *Am. J. Physiol.* 38, 200-8(1915).—When the medulla of the dog is isolated and perfused with solutions containing washed blood corpuscles the respiratory center is stimulated and heart rate increased by a preponderance of Ca^{++} over K^+ . Conversely when K^+ predominates over Ca^{++} the respiratory center is inhibited and the heart rate decreased. After cutting the accelerator nerves, K^+ increase causes pronounced cardiac slowing, while Ca^{++} increase causes slight cardiac acceleration. When the vagi are cut, Ca^{++} causes a definite cardiac acceleration and augmentation while K^+ causes a slight cardiac slowing.

J. F. LYMAN.

Mode of action of carbon dioxide on blood pressure. E. P. CATHCART AND G. H. CLARK. *J. Physiol.* 49, 301-9(1915).—The rise of blood pressure following administration of small amounts of CO_2 to the intact animal is not obtained (1) after decapitation, (2) after injection of nicotine. It is concluded that the action of CO_2 upon the adrenals and blood pressure is exerted through the agency of some central mechanism.

J. F. LYMAN.

Absorption of drugs from the nasal submucosa of dogs. J. D. PILCHER. *Omaha J. Am. Med. Assoc.* 40, 232-4(1915).—In a previous paper (*J. Am. Med. Assoc.* 38, 209(1915)) P. showed that epinephrine injected into the submucosa of the nasal turbinates of dogs, was absorbed with a rapidity approx. that of an intravenous injection. In this article the results are given of similar expts. with histamine, tyramine, *Veratrum viride*, nitrites, KI, CHCl_3 , strophanthus and methylene blue. All but the last three were quite rapidly absorbed when administered by this method as compared to controls injected intravenously.

L. W. RIGGS.

Recent advances in the relation between chemical structure and pharmacological action. J. M. FORTESCUE-BRICKDALE. *Bristol Royal Infirmary. Brit. Med. J.* 1915, I, 106-7.

M. RINGER.

Coagulation time of blood. VII. Influence of certain anesthetics. W. L. MENDENHALL. *Am. J. Physiol.* 38, 31-51(1915).—If CHCl_3 and chloral hydrate affect the coagulation time at all they prolong it. The mechanism of action is not apparent; the production of a retarding agent is not proved. Et_2O hastens coagulation. This is due wholly to its action on the adrenals with the subsequent pouring out of epinephrine and its accelerating effect on coagulation.

J. F. LYMAN.

Saline diuresis. S. YAGI AND K. KURODA. *J. Physiol.* 49, 162-70(1915).—When mixts. of NaCl and Na_2SO_4 are introduced intravenously and diuresis limited by compression of the renal artery on one side the vol. of urine and amts. of NaCl and Na_2SO_4 are reduced, while the % of NaCl is lower and of Na_2SO_4 higher on the compressed side. With NaCl and urea results are similar except that % of both NaCl and urea are higher on the compressed side. Lowering of blood pressure by stimulation of the vagus affects the excretion of Cl, SO_4 and urea in the same way as does compression of the renal artery.

J. F. LYMAN.

The deposition of arsenic in hair. A. HEFFNER. *Verhandl. Jahresschr. ger. Med.* 49, 194-205(1915).—As and organic As compds. are capable of being absorbed by the hair of a living but not of a dead person. The As content of the hair varies in man from 1 to 5 in 100,000. The deposition in the hair takes place later than in the organs of the abdominal cavity (liver, kidney). In the case of quick, acute poisoning, these organs contain As, but not the hair. For legal medicine the exam. of the hair for As poisoning is important. If the hair contains As and all other organs do not it may be concluded that there have been As absorptions, but not recently. Exam. of the hair for As on a living person can either prove or disprove the suspicion of chronic As poisoning.

E. J. KELLEY.

Demonstration of salvarsan in forensic cases. G. MÜLLER. *Vierteljahreschr. ger. Med.* 49, 48-74(1915).—These expts. were conducted in connection with a case of suicide by strychnine poisoning in which the action of salvarsan came into question. Salvarsan was found in the urine 37 hrs. after injection. It was also shown to be present after injection, for a period of 9 days in the liver, and 12 days in the muscles. An insignificant sublethal dose of strychnine is sufficient to cause a reaction in salvarsan-treated animals.

EDWARD J. KELLEY.

Therapeutics and chemistry of the oxypimenes (BLOMÉN) 17.

I. ZOÖLOGY.

R. A. GORTNER.

Preservation of life of the frog egg and the initiation of development by increase in permeability. J. F. McCLENDON. *Am. J. Physiol.* 38, 163-72(1915).—Fertilization or elec. stimulation of frog eggs increases their permeability so that Na, K, Li, Mg, Ca, Cl, SO₄, and CO₂ diffuse out at a faster rate. The unfertilized eggs swell rapidly in distd. H₂O and are probably destroyed by an excessive imbibition of H₂O.

J. F. LYMAN.

Action of anesthetics in preventing increase of cell permeability. J. F. McCLENDON. *Am. J. Physiol.* 38, 173-9(1915).—Anesthetics (2 to 3% EtOH or 0.5% Et₂O) tend to inhibit the diffusion of Cl⁻ from the eggs or embryos of the pike (*Esox*) in 0.1 N NaNO₃ soln. This is further evidence that anesthetics prevent stimulation by decreasing cell permeability.

J. F. LYMAN.

Concretions in streams formed by algae (RODDY) 8.

12. FOODS.

W. D. BIGELOW AND F. F. FITZGERALD.

The amino-acid content of certain commercial feeding stuffs and other sources of protein. E. H. NOLLAU. Kentucky Agr. Expt. Sta. *J. Biol. Chem.* 21, 611-4 (1915).—N distribution in 22 com. feeding stuffs and other protein substances was detd. by the Van Slyke method. Histidine was absent from distillers' dried grains and cowpea; non-amino-N from wheat bran and maize kernel; lysine from rice, oat grain, rolled oats and barley. Soy bean, distillers' dried grains, wheat bran, dried blood, maize kernel, hemp seed and sunflower seed contain relatively large amts. of lysine. Monoamino acids constitute, in most cases, one-half of the amino acids present. The peanut, black walnut and hickory nut contain much arginine, the pecan little. The reverse is true of the histidine content. Gluten and gluten flour have a high NH₂ and a low lysine content.

A. P. LOTHROP.

Modification of the constituents of flour which occurs during baking. Chemical composition of bread. H. KALNING AND A. SCHLEIMER. Berlin. *Z. ges. Getreidew.* 6, 137-43(1914).—The differences in compn. of crust and crumb are principally due to differences in temp. (95-100° in the center of the loaf and 180-200° at the surface) during baking. K. and S. have investigated these differences, as well as the differences in compn. of flour and bread. The baked products were of the usual rounded form and weighed approx. 1500 g. each; 2 types were compared, 1 with light and the other with dark crust. Three kinds of wheat bread (sour dough bread from 30-70 wheat flour and bread from 0-30 and 30-70 wheat flour with yeast) and 2 kinds of rye bread (sour dough bread from 0-65 rye flour and bread with yeast from 0-65 rye flour) were prepd. The ash, protein, fat, crude fiber and N-free ext. contents of the crumb and crust (both light and dark) of these types of bread, as well as the flour from which the bread was made, were detd. No appreciable differences were observed in the contents of these substances in crumb and light and dark crust; differences

(except in the case of crude fiber) were observed, however, when the compn. of the crumb and crust of the bread was compared with that of the corresponding flour. The carbohydrate content of the bread was diminished because of losses during fermentation, while the greater ash content of the bread was due to addition of NaCl. The increase in the fat and protein contents of the baked products is due to the fat and protein content of the yeast. The glucose, maltose, invert sugar, dextrin and ext. (residue after evapn.) contents of the H₂O exts. of flour, crumb and crust (light and dark) were next compared. No definite conclusions were derived in so far as the sugars were concerned; a slight decrease in the sugar content of the wheat bread as compared with the flour was observed, while for rye bread, the sugar content either increased considerably or remained unchanged (especially in the crumb) as compared with the flour. With the exception of the yeast rye bread a considerable increase in dextrin and ext. contents was observed in the crust as compared with the crumb; this increase is due to dextrinization of the starch in the crust by the action of H₂O vapor at the high temp. of the exterior of the loaf. The 8% excess of dextrin in the crumb, as compared with the crust, of the yeast rye bread was probably due to formation (by enzymes of the yeast) from the starch of compds. which were transformed by further increase in temp. into H₂O-insol. substances; such action would be in accord with the observed smaller H₂O-ext. content of the dark crust as compared with that of the crumb. The rye flour showed considerably smaller contents of dextrin and H₂O-ext. than did the bread; this difference was due to the influence of temp. in baking. The soln. obtained by H₂O-extn. of the crumb gave (after filtration) a reddish brown coloration (maltodextrins) with I in KI soln., while the soln. from the crust gave a blue coloration (corresponding solns. from the dough and flour gave no coloration with I). The reaction of the ext. of the crust was due to sol. starch which was formed by the action of H₂O at the high temp. of the exterior of the loaf, while the temp. at the interior of the loaf was not high enough to produce this result. The analytical data indicate considerable dextrinization of starch in the crust (the dark crust of the wheat breads contained 2-3 times as much dextrin as the crumb). These results are not in accord, however, with the results of the starch detns. (by the Ewers method) which indicate practically the same starch content in crumb and light and dark crust; this discrepancy is doubtless due to the fact that dextrins are hydrolyzed by the Ewers method and are hence calcd. as starch. The fact that the flour had a higher starch content than the bread is due to the action of the diastase of the flour on the starch; a corresponding increase in the total sugar content of the bread was not observed, inasmuch as a portion of the sugar was destroyed by enzymic action. The H₂O-sol. and alc.-sol. (55% alc. by wt.) proteins of flour, crumb and crust (light and dark) were detd. after 2 hrs. extn. In almost all cases the sol. protein content of the crust was less than that of the crumb. This decrease is attributed to greater coagulation at higher temps.; for the same reason the bread as a whole showed a smaller content of sol. protein than did the corresponding flour. No appreciable differences in content of total or H₂O-sol. P₂O₅ were observed when flour and bread (crumb and light and dark crust) were compared; this indicates that no change in the mode of combination of P₂O₅ occurred during baking. It is also probable that the P₂O₅ is not combined to any great extent with proteins, since in this case the solubility of P₂O₅ in combination would be expected to vary with the temp. The above results show that the principal difference in the compn. of crumb and crust is due to the influence of increased temp. on carbohydrates.

H. S. PAINE.

Sucrose and invert sugar as partial substitutes for flour in bread making. JOHANN JELINEK. Prague. *Z. Zuckerind. Böhmen* 39, 281-3(1915).—The regulations governing bread making in Austria permit the substitution of sugar for rye and wheat flour in an amt. not exceeding 5%; in view of the tax on sucrose, J. proposes to employ the

less expensive invert sugar for this purpose. In a 1st series of expts. bread was made from flour containing 5% sucrose and 6.25% invert sugar sirup, resp.; yields of 137% and 149% bread were obtained. The loaves made by use of invert sugar were more rounded than those made with sucrose; the difference in porosity and tenacity of crumb was slight. The dough was salted normally in the prep. of the bread, but the salt taste was partly concealed by the presence of sugar, so that the bread tasted as though it had not been salted sufficiently. The bread made by use of sucrose appeared to be somewhat sweeter than that made with invert sugar, although the difference was very slight; the latter bread had, on the whole, a more agreeable taste. In a 2nd series of expts. (performed on a larger scale in a bakery) bread was made in the following manner: (1) without addition of saccharine material; (2) with addition of 5% sucrose; (3) with addition of 6.25% of 80% invert sugar syrup (prepd. by heating for $\frac{1}{4}$ hr. at 95° a soln. of 1 kg. sucrose in 240 cc. H_2O with addition of 0.5 cc. 36% HCl and 9.5 cc. H_2O); (4) with addition of 6.25% of 80% invert sugar syrup (prepd. as in case of (3) except that the period of heating was $1\frac{1}{2}$ hr.). The yields of dough were 155, 150, 160 and 156%, resp.; the increased yield in the case of the light colored invert sugar syrup (No. 3 above) was probably due to the fact that this sugar is most readily assimilated by the microorganisms during fermentation of the dough. The tenacity of the crumb was practically the same in all 4 cases. The bread made by use of sucrose had the smallest pores and was solid and compact, while that made by use of light colored invert sugar syrup (No. 3) had the most pores. A greater amt. of NaCl was added to the dough in these expts. so that the taste of sugar was not so pronounced as in the 1st expts. The bread made by use of light colored invert sugar syrup had the most agreeable flavor in both series of expts. The increase in tenacity of the crumb on becoming stale was most pronounced in the case of bread made without addition of saccharine material. It is concluded from these observations that the addition of invert sugar to the dough in bread making is more advantageous than addition of sucrose. Inasmuch as 0.5-1.0% NaCl must be added to the dough, the required amt. (10-20% in the case of the addition of 6.25% syrup) may be added to the invert sugar syrup so that the latter is thereby denatured and rendered unfit for almost all other purposes.

H. S. PAINE.

Concealing the use of blood in bread. R. DROST. Hanover. *Chem. Ztg.* 39, 634(1915).—The use of blood in bread may be concealed by keeping the blood in a refrigerator for 24-35 hrs., then filtering off the serum and using it to make the dough to which H_2O_2 is added instead of yeast or baking powder. The liberated O raises and bleaches the bread. Cf. Kobert, C. A. 9, 1951.

J. H. MOORE.

Studies on the expansion of milk and cream. H. W. BEARCE. *J. Agr. Res.* 3, 251-68(1914).—In order to det. the change in vol. of milk and cream which occurs with variations in the temp., so that accurate allowance can be made in making measurements by vol. at high temps., sp. gr. detns. were made over a range of from 0° to 50° and with samples in which the fat content varied from 0.025 to 40%. Having detd. the d. of each sample and the rate of change of d. with change of temp., 20° was adopted as the standard temp. and a table was prepd. giving the vol. of all samples at all temps. calcd. in terms of the vol. at 20° . The results, though sufficiently accurate for the purpose for which the investigation was undertaken, revealed certain anomalies which made it appear that the rate of expansion of any given sample depends on something more than the d. or the % of fat present, viz., on the chem. and phys. condition of the sample, which are largely controlled by the time that has elapsed since the prepn. of the sample, and upon the temp. at which it has been kept.

E. J. C.

Adulteration of butter by addition of coconut oil. RENÉ LEDENT. Liège. *Bull. soc. chim. belg.* 27, 325-30(1913).—In the exam. of pure butter obtained from the

milk of cows receiving a daily ration which included coconut press-cake certain investigators have observed values for physical and chem. indexes which justify the conclusion that the butter had been adulterated with coconut oil; certain crystallographic characteristics described by Césaro as sp. for coconut oil were also observed. In view of the doubt attached to the validity of the accepted physical and chem. indexes in these instances L. has analyzed (detn. of d., n , the indexes of Crismer, Meissl, Polenske, Wauters and Hehner, the index of sapon. and the I no., as well as exam. by the Césaro method) the pure butter of cows which were fed beet leaves, as well as beet leaves and coconut press-cake. The analytical data clearly indicate the presence of coconut oil in the butter of the cows which were fed coconut press-cake: The Polenske index showed a deviation in content of insol. volatile acids from the accepted values for pure butter; an increase was observed in this respect, while the content of sol., volatile acids decreased (with a corresponding increase for the butter of the cows which only received a ration of beet leaves). An increase in the index of sapon. and a decrease in the I no. were also observed for the butter of the cows which were fed coconut press-cake. A number of the samples examd. were somewhat rancid; the values of the Crismer index are given without correction so as to show the degree of rancidity. After alc. extn. according to the Césaro method not one of the samples yielded an ext. which presented the characteristics of coconut oil when examd. microscopically by means of polarized light. Two extns. were made for each sample, one with 80% and the other with 90% alc. (both extns. continued 1 hr. at 35-37°). In filtering the alc. soln. care was taken to leave in the extn. flask the felt-like mass (almost exclusively butter) which adhered to the wall of the latter. In order to detect with certainty the presence of coconut oil, when the latter is added to butter in the proportion of 5%, L. suggests that the conc. of the alc. be reduced to 60%; the amt. of dissolved butter glycerides would be thereby decreased, while the content of coconut oil glycerides in the alc. ext. would be increased.

H. S. PAINE.

Is it hygienic to use apricot and peach kernels in the preparation of marchpane? K. B. LEHMANN. Würzburg. *Chem. Ztg.* 39, 573-5(1915).—L. compares the amt. of bitter principle in these kernels with several varieties of almond and concludes that if they are properly treated for several hrs. with H_2O at 50° to reduce the benzaldehyde below 40 mg. in 100 parts they may safely be substituted for almond. J. H. MOORE.

The international movement of feeding stuffs. ANON. *Bull. Agr. Intelligence* 6, 481-516(1915).—This is the first of the annual reviews on this subject that are to be published by the Intern. Inst. of Agriculture. A large amt. of data on production, trade, consumption, etc., of the various feeding stuffs is given, the data for each country being treated separately. A 6-page bibliography is appended.

E. J. C.

Determination of total sulfur in vegetable substances (DEJONG) 7. Deodorization of olive oil (BARRION) 27. Composition of the coffee berry (ANSTEAD) 15. Copra drying (HINES) 27.

U. S., 1,149,839, Aug. 10. H. A. KOHMAN. Bread-leavening mixture containing a dried bacterial ferment which liberates CO_2 and H and in which the spores have been developed, is prepared by mixing milk, $NaHCO_3$, and corn meal, fermenting with bacterial ferment from salt-rising bread, adding $CaCO_3$, more corn meal and $NaHCO_3$. Cf. C. A. 9, 2556.

U. S., 1,150,691, Aug. 17. H. MARTIN. A food containing lecithin. See Brit., 8,589, 1914 (C. A. 9, 2567).

U. S., 1,150,901, Aug. 24. E. H. STRICKLER. An effervescent composition for

use in baking powder is prepd. by mixing NaHCO_3 with about 3% its wt. of Na_2HPO_4 . This renders the NaHCO_3 less likely to decompose prematurely.

U. S., 1,151,373, Aug. 24. J. MORLEY. Coffee-clearing mixture; formed of beaten egg, sugar, burnt sugar and a small amt. of Na benzoate as a preservative.

U. S., 1,151,526, Aug. 24. H. A. KORMAN, C. HOFFMAN and T. M. GODFREY. Yeast-saving composition for use in bread-making; composed of NH_4Cl 0.64, CaSO_4 1.76 and KBrO_3 0.0176 parts. A portion of the NaCl to be used in the dough as well as a small amt. of flour may be included in the mixt. before adding to the main dough batch.

U. S., 1,152,132, Aug. 31. A. VARTANIAN. A food (for man) is made of pumpkin seeds, squash seeds and sunflower seeds, washed, salted and cooked separately, and then mixed.

Brit., 10,295, Apr. 25, 1914. H. LÖFQUIST. Rotary chamber app. for drying cereals, roasting coffee, etc., is provided with a series of elec. heating elements arranged in hollow webs at the periphery of the drum. A cut-out device for the heating elements is provided, acting as soon as the drum stops, to prevent overheating.

Brit., 10,328, Apr. 27, 1914. T. H. GOODWIN. Preparing food for animals by mixing ground cocoa shells with cocoa waste, dried and ground spent hops, rice meal, and fenugreek.

Brit., 10,774, May 1, 1914. P. A. DOCHERTY. Yeast for baking purposes is treated to remove bitterness by washing with H_2O to remove sol. and heavy impurities, treating with a weakly alk. soln. such as $(\text{NH}_4)_2\text{CO}_3$ soln., and allowing it to stand for some time in contact with wood charcoal.

14. WATER, SEWAGE AND SANITATION.

EDWARD BARTOW.

Stripping water works reservoirs. F. P. STEARNS. *Eng. News* 74, 302-4(1915).—The object of stripping is to diminish the food supply of microorganisms which cause taste or odors. Water reservoirs should improve with age. A clean bottom prevents unloading of decomposing material by vertical circulation. LANGDON PEARSE.

Water softening by the permutite system. C. P. HOOVER AND R. D. SCOTT. *Ohio Pub. Health J.* 6, 143-50(1915).—At Columbus a comparison of the $\text{CaO-Na}_2\text{CO}_3$ method with the permutite method was undertaken with the following results: (1) cost of operation with permutite was higher than with $\text{CaO-Na}_2\text{CO}_3$, the $\text{CaO-Na}_2\text{CO}_3$ costing \$4.75 per mil. gal. for removal of 100 pts. of hardness as compared with \$8.61 for permutite. (2) Permutite-softened H_2O contains residual NaHCO_3 which may cause trouble in boilers. (3) Permutite is the only substance which gives a zero-hard H_2O , the variations in the hardness of raw H_2O being automatically taken care of. (4) There is no sludge to be removed in the permutite process, but the water should be clear, for a turbid H_2O clogs and thereby impairs the process. J. GAUB.

The disinfection of water. W. H. DITTOE. *Ohio Pub. Health J.* 6, 133-42(1915).—D. discusses the effect and methods of use of the following agents: (1) Heat, (2) Cu salts, (3) permanganates, (4) O_3 , (5) Cl_2 and $\text{Ca}(\text{OCl})_2$, (6) CaO , (7) ultraviolet light. J. GAUB.

Bureaus of water supplies. E. BARTOW. *Am. J. Pub. Health* 5, 871-4(1915).—B. points out the importance of state bureaus together with a national bureau which should coöperate with the state bureaus, especially in interstate questions. J. GAUB.

Six years of softened and purified water at McKeesport, Pa. E. C. TRAX. *Eng. Contrg.* 44, 137-8(1915); cf. C. A. 8, 3831.—The water from the Youghiogheny River has an acidity of over 3 grains per gal. at times, varying from an alkalinity of 40 pts. per mil. to an acidity of 390 pts. per mil. and a hardness of 200 pts. per mil. Softening with lime and soda has made a water palatable and safe, the typhoid being markedly reduced.

LANGDON PEARSE.

Stream gaging stations and publications relating to water resources 1885-1913. B. D. WOOD. U. S. Geol. Survey, *Water Supply Paper* 340-H, Part VIII(1915). Western Gulf of Mexico drainage basins. *Ibid* 340-I, Part IX. Colorado River basin. *Ibid* 340-J, Part X. The Great Basin. *Ibid* 340-K, Part XI. Pacific coast basins in California. Catalog and bibliography.

W. D. C.

Gazetteer of surface waters of Iowa. W. G. HOYT AND H. J. RYAN. U. S. Geol. Survey, *Water Supply Paper* 345-I, 169-221(1915).

W. D. C.

Ground water for irrigation in the Sacramento Valley, California. KIRK BRYAN. U. S. Geol. Survey, *Water Supply Paper* 375-A(1915).—The water-bearing formations and the origin, movements, and development of the ground water are discussed, special attention being given to pumping problems.

W. D. C.

London's water. Eleventh report on research work. A. C. HOUSTON. *Surveyor* 48, 31(1915); cf. C. A. 9, 496.—Lime expts. at Sunbury lead to the conclusion that river water no matter how impure, may be brought into a condition of absolute safety bacteriologically, and of great relative purity chemically, by means of lime. It is shown that in the absence of cholera infection, London waters normally contain no bacteria which respond to all the tests used for cholera vibrios.

W. D. C.

Chemical composition of the ferro-manganous-arsenical mineral water of Tartavalle in Valsassina. GIACOMO BERTONI. Livorno. *Boll. chim. farm.* 52, 783-91(1913).—B. presents a tabulated statement of the analysis of this H₂O reported in ions and in hypothetical combinations; the therapeutic action is attributed to the presence of Fe, Mn and As.

H. S. PAINE.

Clarifying sewage by fine screens. *Munic. J.* 39, 220-2(1915).—Various types of screens are compared. Fine screening is compared with sedimentation in effectiveness, with varied opinions. The difficulty of handling screenings is commented on.

LANGDON PEARSE.

Aeration method of purifying sludge. J. P. WAKEFORD. *Inst. Mun. and County Engs.* June, 1915; *Can. Eng.* 29, 249-51(1915).—Expts. on activated sludge are described. Barrel and bottle tests showed complete oxidation of the NH₃ by aeration for 2 hrs. A porous tile diffuser was used. In a large tank holding 11,000 gals. exclusive of 25% sludge, operated on the fill and draw plan, a cycle of 1/2 hr. fill, 2 hrs. blow, 2 hrs. settlement and 1/2 hr. empty worked well. Ninety cu. ft. air per min. was used under 5 lb. per sq. in. pressure. The sludge contained 4.59% N. Analyses of sludge and sewage are given.

LANGDON PEARSE.

Destructors and their by-products. J. A. PRIESTLY. *Surveyor* 48, 46-7(1915).—Fish and animal offal make fertilizer. Paper and glass may be sold for use in manufacturing. Tins and tinware give solder and Sn, while the detinned scrap may be sold. Half the steam produced will run the plant, and the other half may be sold as such or converted into elec. power. No satisfactory commercial use has yet been found for ashes, clinker and flue dust.

W. D. C.

The treatment of waste liquors from bleach, print and dye works. G. B. KER-SHAW. *Surveyor* 47, 497-8(1915).—A brief review.

W. D. C.

Relative stabilities in polluted waters carrying colloids. A. LEDERER. *Am. J. Pub. Health* 5, 740-3(1915); cf. C. A. 8, 3337.—L. thinks it useless to det. relative

stabilities in turbid H_2O by the methylene blue test. To obtain correct O_2 demand the following method should be followed: Det. free O_2 on the spot and add $CHCl_3$ to a sample for NO_2 and NO_3 detn. Then take 3 other samples; to 1 of these add a definite amt. of saltpeter or H_2O free from NO_2 and NO_3 but of known O_2 content. The other two remain as collected. All of these samples are incubated in closed bottles for 10 days at 20° . At the end of this incubation the residual available O_2 is detd. in samples devoid of additional H_2O or saltpeter. The other sample is examd. for NO_2 and NO_3 . If free O_2 remains after incubation the residual saltpeter O_2 need not be detd. The initial available O_2 minus the residual gives the biochem. demand. In badly polluted waters, free O_2 need not be detd. because it will be absent after incubation. Generally, NO_2 and NO_3 are attacked when free O_2 is reduced about 50%. J. GAUB.

A study of methods of sewage disposal in industrial and rural communities and suggestions for their improvement. J. F. SILER, P. E. GARRISON AND W. J. MACNEAL. *Am. J. Pub. Health* 5, 820-32 (1915).—The methods of disposal of excreta as practised in the South are reviewed. The authors think that benefit to a community is possible by the installation of complete water systems and sewage disposal plants. The expense would vary from \$210 to \$265 per house. J. GAUB.

Notes on the practical application of the saltpeter method for determining the strength of sewages. A. LEDGER. *Am. J. Pub. Health* 5, 354-61 (1915).—For sewages: Use a soln. contg. 26.56 g. $NaNO_3$ per l.; 1 cc. of this equals 50 pts. per mil. when in 250 cc. of sewage. Incubate the sewage containing the saltpeter for 10 days at 20° . The appearance of a black sediment and the development of a putrid odor during incubation show that too little saltpeter has been added. Methylene blue may be used as an indicator. Decolorization indicates presence of too little saltpeter. At the end of the incubation, det. NO_2 and NO_3 . Change the N_2 to O_2 equivalents by multiplying NO_2 by 1.7 and the NO_3 by 2.9. The initial available O_2 minus the residual O_2 gives the biochem. O_2 demand. For trade wastes the same procedure is used with larger amts. of saltpeter. Neutralize an acid waste with $NaHCO_3$ or a too alk. one with dil. HCl . Also inoculate a sterile one with sewage after adjusting the reaction. In the case of filter effluents this method may be supplanted by Phelps relative stabilities, provided no colloidal matter is present, and the initial available O_2 is detd. When clay and other colloidal matter is present, 2 samples must be incubated, one for residual free O_2 and the other for residual NO_2 and NO_3 . J. GAUB.

Seven years' experience with a large sludge pressing plant. JOHN T. THOMPSON. *Surveyor* 48, 100-3 (1915).—Sewage is pptd. with 10-100 p.p.m. CaO . Milk of lime is added to the sludge to about 1%. Oiling the press cloths for 8 in. all around the outside, around the center hole, and where the bosses meet lengthened the av. life from 156 pressings to 200 pressings. About one-third of the press cake is given to farmers for manure; the rest is dumped. Cost data are given. W. D. C.

Refuse disposal in southern cities with particular reference to Savannah, Ga., and its new incinerator. E. R. CONANT. *Am. J. Pub. Health* 5, 904-17 (1915).—Southern refuse differs from northern in that it has less grease, more vegetable matter, less ashes and more rubbish; hence the incinerator is used freely. The plant at Savannah is of the Heenan-Froude type and has a daily capacity of 130 tons of mixed refuse. It cost \$126,271 complete and if the refuse delivered to the plant equals the capacity, enough steam will be furnished to operate the pumping station with an annual saving of \$12,000. The clinker varies from 20 to 30% of the total refuse burned. The av. compn. of the refuse is: garbage 45, rubbish 40, ash or cinder 10, manure 5% by wt. The total labor charge per day of 24 hrs. is \$52.50. J. GAUB.

Activated sludge experiments at Baltimore. LESLIE C. FRANK AND CALVIN W. HENDRICK. *Surveyor* 47, 693 (1915).—Proposed schedule of expts. W. D. C.

Toronto sewage disposal plant. C. J. HASTINGS AND R. C. HARRIS. *Can. Eng.* 29, 290(1915).—A report on the sewage disposal situation showed complaints of odor due to poor sludge disposal. Shavings and CaO or $\text{Ca}(\text{OCl})_2$ are used on top of sludge. Expts. showed electrolytic processes and slate beds to be of little value. A brush filter handles 5.5 mil. imp. gal. per acre per day. LANGDON PEARSE.

The value of mechanical filters in the purification of water. THOMAS ORR. *Surveyor* 47, 698-700(1915).—Discussion with instances of English practice.

W. D. C.

Activated sludge experiments in Canada. R. O. WYNE-ROBERTS. *Mun. Eng.* 49, 68-9(1915); cf. *C. A.* 9, 1210, 2278. LANGDON PEARSE.

A method for drawing off liquid in a thin layer in connection with sterilization by ultraviolet rays. BILLON-DAGUERRE. *Compt. rend.* 161, 18-20(1915).—After passing through a filter, the water to be sterilized enters a tank from which it passes out through a cylinder provided with opening slots on opposite sides. The quartz lamps are placed close to these slots, thereby forming a narrow opening between the lamps and the cylinder through which the water must pass in order to emerge. The app. may be mounted on an auto truck for use in military sanitation. H. P. CORSON.

Studies in air cleanliness. G. C. AND M. C. WHIFFLE. *Heat. Vent. Mag.* July, 1915, p. 23-8.—Jars containing 1 l. of distd. H_2O were suspended 20 ft. above ground from elec. light poles for 2 wks. The evapn. was replaced and the soln. analyzed. Total solids were detd. by evapn. Exam. revealed more molds in summer than spring and more dirt in industrial than in residence districts. Streets with car lines always showed more than other places of same character. H. V. MAIN.

Sulfur found in rivers (SHELTON) 8. Red cabbage dye as an indicator (ECKERLIN) 7.

U. S., 1,151,267, Aug. 24. V. HENRI, A. HELBRONNER and M. VON RECKLINGHAUSEN. Apparatus for sterilizing liquids by the action of ultraviolet light. Cf. *C. A.* 9, 945.

Brit., 10,997, May 4, 1914. P. DE BRÜNN. Base-exchanging bodies are pptd. by wet reactions upon inert and preferably porous matter, as hard coke, porous stones, and comminuted glass. The inert substance is maintained in suspension, as by stirring during the pptn.

15. SOILS AND FERTILIZERS.

R. O. E. DAVIS.

Effect of grinding the soil on its reaction as determined by the Veitch method. P. E. BROWN AND H. W. JOHNSON. *J. Ind. Eng. Chem.* 7, 776-7(1915).—If acid soils are ground before being tested by the Veitch method the acidity is reduced and the reaction frequently becomes basic. This development of basicity increases directly with the grinding of the soil and depends upon the amt. of sand present, being greater in coarse sandy soils than in fine soils. B. and J. believe that soils should not be ground previous to testing by the V. method. ISADOR MILLER.

Electrolytic determination of biological soil solution. E. PANTANELLI. *Centr. Bakt. Parasitenk.* 42, 439-43(1914); *Bull. Agr. Intelligence* 6, 663.—In detg. the part played by microbiological action in rendering the soil constituents available, some investigators have measured directly the electrolytic cond. of water-satd. soil; P. modified this method by estg. the cond. of the percolating solns. of the soil. He

used in his expts. different soil samples from the neighborhoods of Tripoli and Naples. Through these he allowed: (a) sterilized water, (b) sterilized water satd. either with CHCl_3 , or 0.5% glucose, or (c) water mixed with glucose and CHCl_3 to percolate 3 times. He found that the detn. of the electrolytic cond. was a good method of estg. the microbiological solubility of the soil particles, especially if the expt. was carried out comparatively with and without the addition of CHCl_3 and glucose. CHCl_3 increases, while glucose decreases, but not always, the leaching out of the salts from the soils. The solubility of the soil usually varies with the number of microorganisms it contains. E. J. C.

Bacteriological investigations of soils. A. VORTKIEVICZ. Moskau. *Centr. Bakt. Parasitenk.*, II Abt. 42, 254-61(1914).—The number of bacteria in the soil varies during the year but not extremely. The max. number occurs in the spring and the minimum number in the winter. The N-assimilation capacity of the soil varies extremely. The minimum comes in the winter and the max. in the fall. In general, there is a parallelism between the number of bacteria and the amt. of N assimilation. The opt. temp. for N-fixation by bacteria changes with the time of year, but somewhat more slowly. The variations of temp. during the day have no influence. Studies on nitrification, putrefaction, ammoniacal decompn. and CO_2 production by soil bacteria gave no certain and satisfactory results. JULIAN H. LEWIS.

Technical application of microorganisms to agriculture. C. E. MARSHALL. Mass. Agr. Coll. *Science* 42, 267-74(1915).—The historical development of the discovery and application of microorganisms in agriculture is traced. R. O. E. D.

New methods in soil protozoology. N. KOPELOFF, H. C. LINT AND D. A. COLEMAN. *Science* 42, 284-6(1915).—The method for counting protozoa is adapted from the well known blood-counting apparatus. A drop of standard size is examd. microscopically. Picrosulfuric acid is recommended for killing and staining the organisms simultaneously. A standard stage micrometer and a soln. of const. depth (1 mm.) are used, so there is no mechanical variation. The method is direct, accurate and rapid. To separate fungi from protozoa a method based on the principle of dilution was devised. From agar plates a cube 2 cm. sq. was cut and in the cavity was placed 1 cc. soil ext. A Pt loop-full of 3-day-old culture of bacteria, protozoa and fungi in soil ext. was rinsed off in the soln. in the cavity. Bacteria and protozoa developed in large quantities but fungi were absent even after 30 days. Comparison of different media for soil protozoa showed that 10% hay infusion is best for small flagellates and 0.5% egg albumen best for ciliates. R. O. E. D.

The scouring lands of Somerset and Warwickshire. C. T. GIMMINGHAM. *J. Agr. Sci.* 6, 328-36(1914).—*Chem. exam.* of the soil of these regions has failed to reveal any substance to which the scouring properties could be attributed. E. J. C.

The biochemical decomposition of nitrogenous substances in soils. W. P. KELLEY. Hawaii Agr. Expt. Sta., *Bull.* 39, 25 pp.(1915).—Studies were conducted on the rate of decompn. of casein, dried blood, soy bean cake meal, cottonseed meal and linseed meal under varying conditions. Ammonification studies were made: In silica sand, in soil, with equal amts. of N supplied, in soil under anaerobic conditions, with equal amts. of nitrogenous and non-nitrogenous materials, with varying amts. of casein, of casein during different lengths of time, of casein in silica sand, and, finally, ammonification and hydrolysis of casein. Casein was decomposed more rapidly than the other substances in silica sand, in soil and when equal amts. of N were provided. As a rule dried blood came next. Casein, with the other substances, was decomposed very slowly, under anaerobic conditions, during the first two days. It then was decomposed almost the same as under aerobic conditions. Other substances decomposed very slowly. In the study of the effects of bacterial action on different groups of N

comps. it was found that in six out of the eight substances used the basic diamino acid N was more readily converted into NH_3 than was the N of other groups. B. E. B.

The international movement of fertilizers. ANON. *Bull. Agr. Intelligence* 6, 323-70(1915); cf. *C. A.* 9, 501.—A thorough compilation of statistics on production, international trade, prices and consumption of P, K and N fertilizers throughout the world. A 6-page bibliography is appended. E. J. C.

Will the loss of lime in the soil be increased by kainite fertilization? GERLACH AND VECKENSTEDT. *Mitt. Kaiser Wilhelm Inst. Landw. Bromberg* 6, 382-93(1915); *Chem. Zentr.* 1915, I, 1137.—Expts. on a loam soil containing 0.38% CaO show that a greater quantity of lime is lost by seepage through a soil fertilized with kainite than through one unfertilized. W. H. FRY.

Is kainite fertilization economic as to water? GERLACH AND SCHIKORRA. *Bromberg. Mitt. Kaiser Wilhelm Inst. Landw. Bromberg* 6, 368-81(1915); *Chem. Zentr.* 1915, I, 1137.—Water evapn. was influenced not at all and absorption of water vapor from the air only slightly by the application of kainite. Water evapn. by the soil and plant jointly is not influenced by kainite so long as the kainite causes no considerable increase of produce. Barley yield was increased in some cases by kainite. In this case the absolute water consumption remained the same, but the relative consumption decreased; kainite is therefore sparing of water. W. H. FRY.

The composition of the coffee berry and its relation to the manuring of a coffee estate. R. D. ANSTEAD. *Annals of Applied Biology* 1, 299-302(1915); *Bull. Agr. Intelligence* 6, 583-4.—Analyses of the berries in different stages of development show preponderance of potash, which remains const. throughout, while the proportion of P_2O_5 attains a max. in the 4th month (October), then steadily declines. Expts. are now in progress to ascertain the precise mineral requirements of this crop and the most suitable stage in which to supply them. Detn. of the H_2O content of the berries shows a steady decrease from July (87.13%) to December (65.77%), but during the final ripening stage in January there is a rise of nearly 1%. This rise in the moisture content would appear to indicate a critical stage in the history of the berry. It may account for the premature falling and failure to ripen of the crop on certain soils and in years of low rainfall. At any rate it suggests changes in the methods of cultivation and manuring so as to develop the root area and conserve the soil moisture. E. J. C.

Absorption of fertilizing substances in different growth phases of the sugar beet. F. CALZOLARI AND G. MASSORRIO. *Boll. assoc. ital. ind.* 7, 201-14(1915); *Bull. Agr. Intelligence* 6, 709.—Analyses of sugar beets were made periodically throughout the growing season from the time when the plants were singled till the crop was mature. It was found that the absorption of fertilizing substances increased continuously throughout growth; N proved the most important constituent at the beginning, and potash at the end of the growing period, while P_2O_5 was almost equally necessary throughout the whole vegetative period. E. J. C.

Results of fertilizer experiments conducted at Summerville, S. Carolina. T. E. KEITT. *South Carolina Sta., Bull.* 178, 20 pp.(1914); *Exp. Sta. Rec.* 32, 423.—The most important fact established is that P is the limiting element in fertilizers for corn and cotton on the soils of this substation. The relative value of different phosphates for supplying this deficiency is discussed; acid phosphate is recommended as most profitable. Org. sources of N were more effective than inorg. E. J. C.

Quassia as a contact insecticide. W. B. PARKER. U. S. Dept. Agr., *Bull.* 165, 8 pp.(1914).—A soln. of quassia (0.4 g. in 2000 cc. H_2O) was successfully used in exterminating the hop aphid (*Phorodon Humuli*, Schrank) and the prune aphid (*Hyalop-*

terus pruni, Fab.) in a moist district in California. 100 gals. of spray cost 24 cents.
E. J. C.

The action of free sulfur on plants. G. BOSINELLI. *Staz. sper. agr. ital.* 48, 175-84(1915). — Expts. were conducted to demonstrate whether S produces a beneficial action on plant growth and whether plants grown in plots treated with S contain a larger amount of protein than plants without S. These expts. were carried on in pots and in the field with wheat, buckwheat and legume. Each series consisted of four pots, one the control and the other three containing different amounts of S. Part of the crop was harvested in the spring and part in the fall. These were weighed and analyzed. In every case the plots treated with S gave a greater yield than the control. The % of protein on the dry basis was sometimes higher in the control and sometimes lower. Field expts. were carried on in plots 2 m. square, 10 g. S being added per sq. m. The results in the field likewise showed an increase in yield due to S in 5 of the 6 plots. Expts. to test the ammonizing effect of S on dried blood showed that any such effect was practically nil after 40 days.
J. A. LECHE.

The conversion of cotton sticks into charcoal for the destruction of the pink bollworm. A. T. MCKILLOP. *Agr. J. Egypt* 3, 127-9(1914); *Expt. Sta. Rec.* 32, 449-50. — By the baladi method (described) the bollworm may be destroyed and from 9 to 55% of the original weight of the stalks be retained as charcoal. A retort which will convert small lots of cotton stalks into charcoal in a few hrs. has been patented; it is capable of making from $\frac{1}{4}$ to $\frac{1}{2}$ a ton per day. Attention is called to the fact that the calorific value of the charcoal is 7,420, as compared with that of 2,744 for cotton wood.
E. J. C.

Determination of phosphoric acid in calcium phosphate (KOLTHOFF) 7. Potash from Queensland "prickly pear" 18.

U. S., 1,151,633, Aug. 31. F. S. WASHBURN. A fertilizer containing $\text{NH}_4\text{H}_2\text{PO}_4$ in the form of a dry, porous granular mass, is made by heating a soln. of $\text{NH}_4\text{H}_2\text{PO}_4$, e. g., obtained by treating crude H_3PO_4 (from phosphate rock and H_2SO_4) with NH_3 , to 112° to evap. part of the H_2O , further evapg. *in vacuo* sufficiently to cause the mass to puff up and assume a granular form, and finally completing the drying in a vacuum drier or any ordinary type of drier to obtain a product somewhat resembling pumice stone in appearance, containing only 3-4% H_2O or less. Cf. C. A. 9, 1978.

Brit., 10,202, Apr. 24, 1914. C. E. DE WOLF and H. E. FRY. After treating grain by electrolysis in a soln. of a fertilizer, HNO_3 , etc., as described in 22,151, 1913 (C. A. 9, 839), the grain, instead of being dried, is sprayed with petroleum or benzoline to form a coating. A wooden tank having Fe electrodes covering the entire ends is used for the electrolytic treatment. Solns. of NaCl, sugar, or Fe or Zn salts may be employed. Cf. C. A. 9, 950.

Ger., 284,162, Jan. 30, 1913. BAMBACH & Co. Utilizing the waste liquors of the potash industry, for working up H_2O -insol. K silicates such as phonolite, feldspar, mica, leucite, basalt, trachyte, syenite, etc. In the end lyes of the potash industry, small amts. of KCl, NaCl, and MgSO_4 are present, and in addition about 35% of MgCl_2 for which no application has been found heretofore. Expts. have now shown that MgCl_2 , alone or in admixt. with Ca compds. (CaO , CaCO_3 , brown coal ash, etc.), break up the K silicates, in the heat, converting them into a form available for the soil. A suitable amt. of silicate rock in powder form is charged into a heated revoluble tube furnace, into which the end lyes specified above are allowed to flow. A uniformly intimate mixt. of lye and powdered silicate is obtained. Upon ignition of this mixt. the MgCl_2 splits off HCl. The resulting products, such as HCl, MgO, $\text{MgO} \cdot \text{MgCl}_2$,

are highly effective in disintegrating the silicate. The reaction product contains K in available form, and, after grinding, finds direct application as a fertilizer. If the ground silicate and end lyes are ignited with the addition of Ca compds., such as CaO, CaCO_3 , $\text{Ca(NO}_3)_2$, etc., the principal products are CaCl_2 and CaO.CaCl_2 , which have a still greater disintegrating action than MgCl_2 alone. The gases resulting from the process (HCl , Cl , CO_2 , or NO compds.) are washed in the end lyes or the potash end lye mixt. and find application in the next charge.

Ital., 134,069, Aug. 7, 1913. *SOC. DE PRODUITS AGRICOLES MOUILLANTS A L'ADHESOL.* In a process of modifying anti-cryptogamic and insecticidal preparations, liquid or boiled, and acid, neutral or alk., bile is used as an agglutinant, in the proportion of 500-1000 g. per hectoliter of Bordeaux mixt.

Ital., 138,556, Jan. 27, 1914. *DETIPOS POWER CO., LTD. and J. H. LIDHOLM.* In a process of mfg. fertilizer from N carbides, the furnace is in the form of a bell having a movable bottom for the purpose of permitting the renewal of the charge without stopping to cool down the furnace. Cf. *C. A.* 9, 2037.

16. FERMENTED AND DISTILLED LIQUORS.

ROBERT WAHL.

Significance of oryzanin for the nutrition of fermentative organisms. K. KURONO. *J. Coll. Agr. Imp. Univ. Tokyo* 5, 305-24(1915); *J. Soc. Chem. Ind.* 34, 810.—Oryzanin is a constituent of the outer portions of unpolished rice and possesses remedial properties with respect to beri-beri. According to Suzuki it is an indispensable constituent of feeding stuffs generally, without which they lose their nutritive value. K. found that, when added to the extent of 0.01-0.1%, it accelerates the growth and fermentation of yeasts in beer-wort, koji ext., and especially in artificial media, such as Hayduck's and Nägeli's soles., its stimulating action being much greater than that of peptone, asparagine, etc. The accelerating action exerted by "indifferent matters," such as maltculms, on distillery fermentations is attributed by K. to the action of oryzanin.

E. J. C.

U. S., 1,152,154, Aug. 31. M. E. DÖNITZ. A fermented non-alcoholic wine is made by distg. off the alc. from ordinary alc. grape or other fruit wine, adding H_2O to restore the vol. of the residue, pasteurizing, adding pure wine yeast and maturing the wine for 4-12 weeks and finally drawing it off from the pptd. yeast and carbonating.

U. S., 1,152,415, Sept. 7. E. HINTERLACH. Beer low in alcohol. The combined beer and wort is held at a low temp. (preferably about 0°) during its refining, before pasteurizing, to ripen it.

17. PHARMACEUTICAL CHEMISTRY.

M. I. WILBERT.

Thymol production in this country. ANON. *Oil, Paint and Drug Rep.* 88, No. 6, 19(1915).—General article with statistics. E. W. BOUGHTON.

Chloroform denaturant decision. ANON. *Oil, Paint and Drug Rep.* 88, No. 9, 19(1915).—Treas. Dept. decision (T. D. 2234). Formula 20: To 100 gal. EtOH add 1 gal. crude CHCl_3 (d_{20} not less than 1.4). This formula is approved for continuous use in manuf. of CHCl_3 only. E. W. BOUGHTON.

Formation of essential oil in *Ocimum basilicum* in different intensities of light. V. LUBIMENKO AND M. NOVIKOFF. *Bull. Applied Botany* 7, 697-719, 720-4(1914);

Bull. Agr. Intelligence 6, 684.—In order to investigate the influence of light upon the accumulation of essential oils in plants some shading expts. were carried out on sweet basil (*Ocimum basilicum*). The exptl. field, which has a southern exposure, was divided into 4 equal parts, one of which was left uncovered while the others had horizontal cloth shades stretched above them at a height of one meter from the soil. The texture of the cloth varied with each plot and was such that the threads only represented 10, 25 and 50% of the surface, respectively. The plants, when in full bloom, were extd. by distn. in a current of steam. As the illumination decreased, the water content of the plants gradually increased and the stems grew longer. The greatest amt. of vegetative growth, however, occurred with 10% shading only; when the shading was increased to 50% the development of the plant was seriously affected. The production of essential oils was favored by increasing shade, but as the production per unit area also depends on the total yield of dry matter, the largest amt. of essential oil would be obtained with 10% shading and not with 50% shading. E. J. C.

The transformation of nitrogenous substances during artificial curing of tobacco. L. BERNARDINI. *Boll. tecnico della coltivazione dei tabacchi* 13, 288-99(1914); *Bull. Agr. Intelligence* 6, 426.—B. has investigated the changes that take place in the nitrogenous substances during artificial curing as compared with air curing, for the latter method, even after subsequent fermentation, does not succeed in giving good results in the case of five native tobaccos. Conclusions: (1) The art. curing process does not produce any changes in the protein substance of the leaf. (2) In leaves cured by this process there are none of the sol. nitrogenous substances belonging to the amino acids which occur in air-cured leaves. (3) In the art. curing and air curing processes alike, the basic N contained in the leaves corresponds exactly to that present under the forms of nicotine and NH_3 . The consumption of nitrogenous substance observed during art. curing therefore takes place at the expense of the amino acids which are completely used up, while the protein substance and the nicotine remain unaffected. E. J. C.

Importance of the strophanthin reaction when sulfuric acid acts upon strophanthus seed. ALESSANDRO BALDONI. *Univ. Rome. Arch. farm. sper.* 19, 511-28, 534-64 (1915). A. W. DOX.

Inversion of cane sugar in syrupus (U. S. P. VIII). J. L. MAYER. *Am. Druggist* 63, 283-4(1915).—Syrupus made by the hot process contained no more invert sugar than that made by the cold process, very little inversion taking place in either case. C. O. EWING.

Reactions of Kombe and Gratus strophanthin and the distinguishing of these glucosides. C. REICHARD. *Pharm. Zentralhalle* 56, 159-63, 174-8(1915).—R. compares the color reactions of strophanthin obtained from *Strophanthus kombe* and *S. gratus* when treated with various reagents. C. O. EWING.

Some historical and bibliographical notes on the therapeutics and chemistry of the oxypinenes. J. E. BLOMÉN. *Am. J. Pharm.* 87, 398-406(1915).—A review of the literature together with comments by the author. According to B. it appears that an ozonide of pinene prepared from pure pinene and freshly generated ozone would be an ideal therapeutic agent. When such a compd. comes in contact with a moist animal tissue H_2O_2 is gradually and slowly developed, and the intermediary oxypinenes (the aldehydes and ketones) are generally conceded to have greater therapeutic value than the too active turpentine itself. Cf. C. A. 9, 1366, 1769. W. G. GAESSLER.

Wine of beef and iron. GEORGE M. BERINGER. *Am. J. Pharm.* 87, 406-10 (1915).—B. criticises the formula for wine of beef and iron in the N. F., Third Ed., and submits the following improved formula: Dissolve ext. of beef (30 g.) in hot water

(60 cc.), add sirup (100 cc.) and then the compound spirit of orange (1 cc.) and alc. (50 cc.) previously mixed. Dissolve the iron and NH_4 citrate (10 g.) in 750 cc. sherry wine, and add this soln. to the other mixt.; then add sufficient NH_4OH (10%) to make the soln. neutral or only very faintly alk. to litmus paper and then sufficient sherry wine to make 1000 cc. If acid, now add, drop by drop, NH_4OH until neutral or very faintly alk. reaction is obtained. Set aside for 2 days and then filter. An 8-oz. bottle of wine of beef and iron made for the N. F. Revision by the above formula, June 25, 1912, has been kept under observation since that date. For a time it was kept in a cellar, more recently in the lab., subjected to the varying changes of temp. and more or less exposed to light, but to date (after nearly 3 yrs.) it is still clear, free from pptn., and is entirely satisfactory.

W. G. GAESSLER.

Phenoval, a new sedative and hypnotic. SALOMON. Berlin. *Berl. klin. Wochschr.* 51, 935(1914).—Phenoval, $(\text{CH}_3)_2\text{CH}.\text{CHBr}.\text{CONH}.\text{C}_6\text{H}_4.\text{OC}_2\text{H}_5$, is recommended as an excellent sedative and hypnotic when given in warm H_2O in 0.5–1 g. doses. It stops pain and produces a light sleep for 4–10 hrs.

JULIAN H. LEWIS.

Calmonal, a new sedative. v. FEILITSCH. Berlin. *Berl. klin. Wochschr.* 51, 1864–5(1914).—Calmonal has the chem. formula, $\text{CaBr}.\text{CO}(\text{NH}_2)\text{OC}_2\text{H}_5 + 2\text{H}_2\text{O}$. The Br content is 27%. It is a white cryst. substance, easily sol. in H_2O and alc. Its m. p. is 107–107.5°. It is recommended as a good sedative when given in doses of 0.5–1 g.

JULIAN H. LEWIS.

Medicinal chemical compounds protected by trade marks, and the so-called "equivalent" products. DOMENICO MAROTTA. Rome. *Ann. chim. applicata* 3, 325–39(1915).—Many medicinal substances having trade-names are indistinguishable from the equiv. chem compds. Very often, however, foreign substances, such as starch and sugar, are present in the patented pharmaceutical preps. to disguise their compn. By extended tests M. established the identity of "aspirin" with *o*-acetoxybenzoic acid, "duotal" with *o*-methoxyphenyl carbonate, "veronal" with diethylbarbituric acid, "antipyrin" with 1-phenyl-2,3-dimethyl-5-isopyrazolone, "pyramidone" with dimethylaminodimethylphenylpyrazolone, "dermatol" with basic Bi gallate, "diuretin" with Na theobromine and salicylate, "urotropine" with hexamethylenetetramine. The methods of prep. these compds., and the tests used by M. are given.

S. LEVY.

Chemical constituents of Korean ginseng. H. KONDO AND G. TANAKA. *J. Pharm. Soc. Japan*, No. 401, 779(1915).—Korean ginseng was extd. with H_2O , Et_2O and MeOH. The aq. ext. yielded mucilage extensively, which was oxidized by HNO_3 to pyromucic acid. The H_2O -sol. mineral matter obtained by ignition consisted of Fe, Al, Mn, K, P_2O_5 and SiO_2 . The ethereal extract was a yellowish brown oil. It was fractionated with steam into 2 portions. The 1st portion was a light yellow oil. Concd. H_2SO_4 colors this product yellowish brown, which upon the application of gentle heat for a few moments, turns to violet-red. When dissolved in Ac_2O , a magnificent violet color is formed upon the addition of a drop of concd. H_2SO_4 . This product also yielded the terpene, panacene. The 2nd fraction was yellowish brown, and possessed a sirupy consistency. It responded to the phytosterol reaction of Hesse. After sapon. by alc. KOH, a form of phytosterol was obtained, m. 133°, $[\alpha]_D^{20} - 29.1^\circ$. Further sepn. yielded an amorphous acid m. 150–6°. The MeOH ext. contained appreciable amounts of cane sugar with traces of a nitrogenous substance and a glucoside resembling saponin. The ext. was dissolved in H_2O after eliminating MeOH, and pptd. by $\text{Pb}(\text{OAc})_2$. The ppt. was suspended in H_2O and H_2S introduced at 40°. The filtrate was exactly neutralized with NaOH and allowed to stand after the addition of $\text{Ba}(\text{OH})_2$ soln. The Ba compd. of the saponin-like substance was collected and suspended in H_2O and freed from Ba by means of CO_2 . The soln. was evapd. *in vacuo* and the residue dissolved in MeOH and pptd. with Et_2O . The purified powder, m. 220°, does not

reduce Fehling soln. Conc'd. H_2SO_4 produced a crimson color; 1% H_2SO_4 , hydrolyzed it to prosapogenin containing sugar, and after 60 hours' digestion sapogenin free from sugar was obtained. The H_2O -sol. cleavage products responded to the pentose reaction and *d*-glucose was present as proved by the osazone reaction. SIMON MENDELSSOHN.

The preparation of alkaloid hydrochlorides from opium. (Hydrochloras toponali.)

C. A. HUBER AND P. VAN DER WIELEN. Amsterdam. *Pharm. Weekblad* 52, 860 (1915).—The making of an opium prepn. corresponding to "Pantopon" is described. The method of prepn. consists in mixing 50 g. of powdered opium with 300 cc. H_2O and adding small amts. of dil. HCl (about 15 cc.) until a slight color is obtained with Congo red paper. The soln. is allowed to stand 2 hrs. with stirring, adding a few drops of HCl to make weakly acid, decanted, the mass pressed out, and washed 3 times with 100 cc. water. The manipulation must be completed within 3 hrs. The ext. is filtered at once, the filtrates are combined, treated with a soln. of 35 cc. NH_4OH in 65 cc. H_2O , and allowed to stand 12 hrs. The alkaloids are collected, washed on the filter with water until the wash water is colorless, after which the filtrate and wash water are extd. 3 times with 1 liter Et_2O , rendered alk. with NaOH, and again extd. 3 times with Et_2O as before. Each time after the shaking, 10 to 15 cc. alc. is added to hasten the sepn. of the Et_2O . The ethereal solns. are combined and shaken with several 5 cc. portions of H_2O . The Et_2O is distd. off, the residue added to the alkaloids sepd. by the NH_4OH and the whole dissolved by warming on the water bath with 500–600 cc. H_2O , to which HCl is added dropwise until the soln. is weakly acid to litmus paper. The aq. soln. is treated with 10 g. fullers earth previously washed with HCl and H_2O , cooled, filtered, evapd. to dryness *in vacuo*, and pulverized. P. v. D. M.

Chemical patents. S. C. MASTICK. *J. Ind. Eng. Chem.* 7, 789–97(1915).—Lecture to students on patent law and procedure as related to chem. patents. I. M.

Tinctures and extracts in therapeutics. LUIGI PESCIATELLI. *Boll. chim. farm.* 53, 335–43(1914).—P. discusses the history and methods of prep. of fluid, semi-fluid and dry exts. and tinctures. There is appended a tabulated list of approx. 100 drugs, for each of which the therapeutic action and the av. wt. of the principal active substances present in 1 g. of the drug are given, as well as the amts. of fluid, semifluid and dry exts. and tinctures, resp., which correspond to 1 g. of the drug. H. S. PAINE.

The composition of commercial samples of oil of santal and balsam of copaiba. WILHELM BECKERS. *Südd. Apoth.-Ztg.* 55, 12–3(1915).—The copaiba of 2 samples of capsules of balsam of copaiba was found to be pure, and the copaiba of 6 samples was found to be adulterated with gurjun balsam. The acid no. varied from 70.4 to 134.4, and the sapon. no. from 42 to 168. The oil in 5 samples of capsules of oil of santal was found to have an acid no. from 5.61 to 8.41 and santalol content from 70.30 to 92.80%. The detection of gurjun balsam by the Ph. Germ. V method is too complicated and the method outlined by Riedel is preferable. In this method, 4 drops of balsam of copaiba are dissolved in 15 cc. of acetic acid and the soln. treated with 4 drops of HNO_3 having a sp. gr. of 1.4. A rose red color is immediately produced in the presence of gurjun balsam. This color, in the course of time, dependent on the amt. of adulteration present, becomes deeper and gradually becomes violet. M. I. W.

Apomorphine reactions. WILHELM BECKERS. *Südd. Apoth.-Ztg.* 55, 198(1915).—A review of the available reactions for apomorphine. M. I. W.

Rate of evaporation of ether from oils (BASKERVILLE) 11A.

U. S., 1,148,637, Aug. 3. A. THIELE. **Diketopyrrolidine derivatives.** *p*-Methyl-diphenylbenzoyldiketopyrrolidine, cryst. m. 248° is made by heating *p*-toluidine with benzaldehyde in abs. alc., adding Et sodiobenzoylpyrrolacetate dissolved in abs. alc.

and glacial HOAc, heating for 12 hrs. and pptg. with HCl, purifying through the Na salt and cryst. from alc. *1-o-Tolyl-2-phenyl-3-acetyl-4,5-diketopyrrolidine*, rose colored cryst., m. $177-9^{\circ}$, is made by reaction in Et₂O soln. of *o*-toluidine and benzaldehyde on Et acetylpyrroacetate. *1-o-Methoxyphenyl-2-phenyl-3-acetyl-4,5-diketopyrrolidine*, m. $225-7^{\circ}$ (decompn.), is made by reaction in ether soln. of anisidine, benzaldehyde and Et acetylpyrroacetate; *1-Phenyl-2-piperonyl-3-acetyl-4,5-diketopyrrolidine*, m. 197° , by heating together aniline, piperonal and Et acetylpyrroacetate, in C₆H₆. *1-p-Tolyl-2-p-dimethylaminophenyl-3-acetyl-4,5-diketopyrrolidine*, a brown powder, m. 166° (decompn.), is made by reaction in C₆H₆ of Et acetylpyrroacetate, *p*-toluidine and *p*-dimethylaminobenzaldehyde. *1-Quinoly-2-phenyl-3-acetyl-4,5-diketopyrrolidine*, m. 222° (decompn.), is made from 8-aminoquinoline, benzaldehyde and Et acetylpyrroacetate in C₆H₆ soln. *1-[1-Phenyl-2,3-dimethyl-5-pyrasolyl]-2-phenyl-3-acetyl-4,5-diketopyrrolidine*, a light brown powder, with a bitter taste, decomp. on heating, is made from phenyldimethylaminopyrazolone, benzaldehyde and Et acetyl pyrroacetate, by heating in C₆H₆ at $100-10^{\circ}$ for 5-6 hrs. *1-Phenyl-2-furfuryl-3-acetyl-4,5-diketopyrrolidine*, yellow-green cryst., sol. in alc. and ether and m. 190° (decompn.), is made by heating furfural, aniline and Et acetylpyrroacetate in C₆H₆ on a H₂O-bath for 2 hrs. *1-o-Methoxyphenyl-2-phenyl-3-benzoyl-4,5-diketopyrrolidine*, cryst. m. $215-7^{\circ}$ (decompn.), is made by reaction of *o*-anisidine, benzaldehyde and Et benzoylpyrroacetate in C₆H₆ for 24 hrs. All these compds. are insol. in H₂O, difficultly sol. in ether and C₆H₆, sol. in alkalies and stable when heated with dil. acids or alkalies. They are proposed for use as medicines.

U. S., 1,149,712, Aug. 10. L. G. BLECKWENN. Basic aluminium salts of formaldehyde-sulfurous acid are made by combining 1 mol. proportion hydrated Al₂O₃, CH₂O and SO₂.

U. S., 1,150,251, Aug. 17. A. B. DAVIS. Dimethylaminomethylethylamylcarbinol is made by reacting on chloromethyl ω -bromopropyl ketone with EtMgBr, and condensing the tertiary alc. produced with Me₂NH. It is a colorless liquid, b₁₅ 96° . It is a local anesthetic.

U. S., 1,150,252, Aug. 17. A. B. DAVIS. Dimethylaminomethylethylisoamylcarbinol, is made by reacting upon epichlorhydrin with iso-BuMgBr oxidizing the chloromethylisoamylcarbinol formed with K₂Cr₂O₇ to a ketone, reacting on the ketone with EtMgBr to form chloromethylethylisoamylcarbinol and condensing the latter with Me₂NH. It b₃₀ $132-8^{\circ}$ and is a local anesthetic.

U. S., 1,150,253, Aug. 17. A. B. DAVIS. Dimethylaminomethylethylisoamylcarbiny benzoate is made by esterifying dimethylaminomethylethylisoamylcarbinol with BzCl in hot C₆H₆ soln. The ester is a local anesthetic, sol. in H₂O. It forms white prismatic crystals.

U. S., 1,151,113, Aug. 24. H. W. MATHESON. Acetaldo is made by reaction of alc. KOH soln. on acetaldehyde below 10° . The free alkali is then neutralized and the acetaldo is recovered by distn. *in vacuo*.

U. S., 1,151,255, Aug. 24. G. E. FERGUSON. Corrosive action of carbon tetrachloride or other halogenated hydrocarbon due to absorption of O, is prevented by the addition of BzH, toluene, BzCl or PhCHCl₂.

U. S., 1,151,536, Aug. 24. E. ABDERHALDEN. A serum for treating cancer is obtained by injecting cancerous tissue into a horse, bleeding after 2-5 days, sepg. the serum and injecting it into another animal, and then obtaining serum from the latter. By repeated transfer from one animal to another the proteolytic and curative action of the serum is greatly increased. Similar transfers may be made with advantage in prepg. some other remedial sera.

U. S., 1,151,885, Aug. 31. W. KROPP. A condensation product of acetylpyruvic acid and phenylaminopyrazolone is made by reaction of 1-phenyl-2,3-dimethyl-4-amino-5-pyrazolone on the "Na salt of acetone-oxalic ester." The product is cryst., yellowish, difficultly sol. in H_2O and organic solvents, m. $215-20^\circ$, easily sol. in alkalis and forms salts having antipyretic and antineuralgic properties. Similar products are obtained from benzoylpyruvic acid (cryst. m. 195° ; quinine salt m. 210°) or from acetylpyruvic acid and 1-m-tolyl-2,3-dimethyl-4-amino-5-pyrazolone (m. 175°).

U. S., 1,151,928, Aug. 31. P. DUDEN and G. PETERS. Acetaldehyde is made by oxidizing C_2H_2 in a soln. containing 6% H_2SO_4 , 3% $HgSO_4$ or other Hg salt, and a small amt. of $Fe_2(SO_4)_3$. The latter retards the sepn. of Hg from the soln.

U. S., 1,151,929, Aug. 31. P. DUDEN and G. PETERS. Acetaldehyde is made by oxidizing C_2H_2 in a dil. H_2SO_4 soln. of $HgSO_4$ or other Hg salt, using a small amt. of CrO_3 in the soln. to prevent sepn. of Hg.

U. S., 1,152,098, Aug. 31. F. KAUFLEER. Acetic anhydride is made by heating ethylidene diacetate to $250-300^\circ$ preferably with a catalyzer of Cu chips, pumice, $KHSO_4$, H_2SO_4 or $HgSO_4$.

U. S., 1,153,121, Sept. 7. J. LAGUTT. *o*-Sulfamidobenzoyl-*p*-phenetidine, white, lustrous, tasteless cryst., m. $171-2^\circ$, sol. in H_2O and alc. is made by heating *o*-benzoic sulfimide with *p*-phenetidine, in mol. proportions, to 120° for 5-6 hrs., treating with H_2O and soda and crystg. from toluene or alc. It resembles pyrimidine in physiological action.

Aust., 9,181, Oct. 27, 1913. F. WISCHO. In a powder or paste for removing tartar from teeth, employing the neutral alkali- or NH_4 -salts of acids whose Ca salts are sol. in H_2O . This product is combined with a scouring agent which does not contain Ca comps. sol. in the aforesaid salt solns., and as a binder only a suitable neutral or neutralized ingredient is employed.

Brit., 10,176, Oct. 3, 1913. KALLE & Co. Therapeutic products are obtained from non-acidproof bacteria, such as those of anthrax, typhus, etc., by extg. the bacteria, preferably dried and finely ground, first with alc. and then with ether or other fat-extg. solvent; the alc. ext., ether ext., and residue may all be used for inoculating purposes.

Brit., 9,745, Apr. 20, 1914. B. L. MALTBIE. A creosote preparation for use in tuberculosis, bronchitis, and kindred diseases, without producing nausea, consists of a chem. combination of $Ca(OH)_2$ and beechwood creosote. The creosote and CaO are mixed together, and sufficient H_2O added to slake the oxide. The product is then quickly dried.

Brit., 10,198, Apr. 24, 1914. W. A. WHATMOUGH. The adhesive structure of molded menthol and its power of adhesion to a holder are increased by adding to the liquefied menthol a natural wax, fat, or oil, or a fatty acid or its alc. or ester. Examples given are stearin, synthetic glyceryl stearate, and octadecyl alc. The molded product is attached to a holder in the ordinary manner.

Brit., 10,377, Apr. 27, 1914. FARBW. v. M. L. & B. Acetic acid is prepared by oxidizing aldehyde with air or O in the presence of a catalyst and under pressure.

Brit., 10,946, May 4, 1914. RICHTER GEDÉON VEGYESZETI GYÁR. Magnesium *o*-acetoxybenzoate is obtained by stirring *o*-acetoxybenzoic acid with MgO , $Mg(OH)_2$, or $MgCO_3$, and a little H_2O , extg. the product with $MeOH$ or $EtOH$, filtering and pptg. by means of ether.

Ger., 283,825, Nov. 2, 1913. BAYER & Co. Addition to 282,455 (C. A. 9, 2426). Production of hydroxyquinoline containing iodine and bismuth, the nucleus homologs

and their substitution products. Instead of employing BiOI, in connection with hydroxyquinoline, HI is brought into reaction with Bi compds. of *p*-hydroxyquinoline, or Bi compds. are allowed to act on the hydriodides of hydroxyquinolines.

Ital., 135,560, Aug. 25, 1913. SOCIETÀ "BOGATIR." In a process of mfg. pinacone from acetone, the latter is treated in the presence of metallic condensing agents, such as the salts of Hg, with an amalgam of Na, Al, Cd, etc., whereupon the pinacone alcoholate resulting is decomposed by H_2O .

Ital., 141,268, May 6, 1914. A. PETRILLO. In a process of mfg. acetone, a low grade sugar is employed as the initial material, wherein alc. and acetic acid fermentation are induced. The mass is then neutralized with $CaCO_3$, and the resulting Ca acetate is subjected to distn.

Ital., 141,773, May 14, 1914. GES. FÜR ELEKTRO-OSMOSE. Mfg. chemically pure silicic acid by subjecting solns. of alk. silicates to the action of the elec. current in the anode compartment of an element with a diaphragm.

18. ACIDS, ALKALIES, SALTS AND SUNDRIES.

T. LYNTON BRIGGS.

The current status of the borax industry. S. H. DOLBEAR. *Mel. Chem. Eng.* 13, 564(1915).—A general discussion. E. J. C.

The world's potash. ANON. *Chem. News* 112, 81(1915).—A brief review of a pamphlet issued by the Imperial Inst. of Great Britain. Both the old and new sources of K are described so far as details are available. The increased production of K in the United Kingdom from kelp and other vegetable sources is now under serious consideration. F. W. SMITHER.

Potash from Queensland "prickly pear." ANON. *Chem. News* 112, 81(1915).—A brief review of the measures being conducted on the property of the Cactus Estates Co., at Dulacca, for the destruction of the prickly pear pest by the use of $AsCl_3$. The ash from 5 acres yielded a half ton of 80% K_2CO_3 per acre, i. e., prickly pear ash yields 15% K_2O . As high as 7 tons of ash per acre have been recovered, including wood ash. A vacuum machine has been designed to pick up the ash. It is believed that the K_2O yield would pay for clearing land which could not be profitably touched otherwise. F. W. SMITHER.

Sawmill waste as a source of potash. C. T. GIMINGHAM. *J. Board Agr.* 22, 146-8(1915).—Analyses of ash from wood-scrap, sawdust and shavings show that dust from boiler-flues and chimneys contains as high as 10% K_2O , while ordinary coarse ash contains 5 to 7%. It is claimed that timber merchants would profit by erecting plants to burn their scrap. E. J. C.

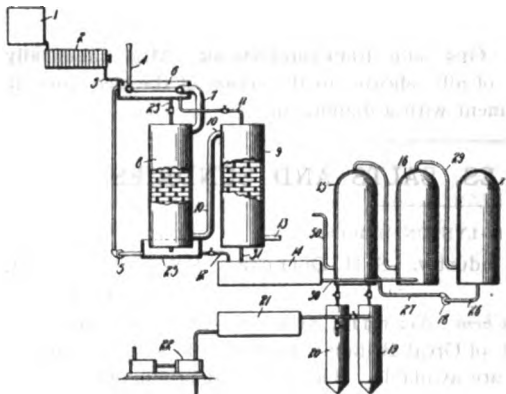
Iodine from Russia. ANON. *Journale Zaria; Pharmazevtizeski Journal; J. pharm. chim.* 11, 313-4(1915).—The alga *Fillafora*, growing abundantly in the Black Sea, yields 11% of ash containing up to 3.8% I (Zernoff). A specimen from the Sebastopol Museum showed 11% ash containing 2.3% I (Pissarevsky). The growth is incinerated, the iodide extd. with EtOH, not with H_2O , and the I set free and collected by a secret process (Pissarevsky and Averki). Ekaterinoslav is the center of prospective manufacture. S. WALDBOTT.

Preparation and uses of animal charcoal. W. WIECHOWSKI. *Oesterr. Chem. Ztg.* 18, 74-5(1915).—A general discussion. ARTHUR LEDERER.

Coloring horn (BEUTEL) 25.

U. S., 1,150,899, Aug. 24. E. H. STRICKLER. **Monosodium phosphate** is made by treating Na_3PO_4 with H_2SO_4 , concg. the soln. until the Na_2SO_4 seps., and drawing off the liquid and crystg. KH_2PO_4 may be similarly made and HCl , HNO_3 or HOAc may be substituted for H_2SO_4 .

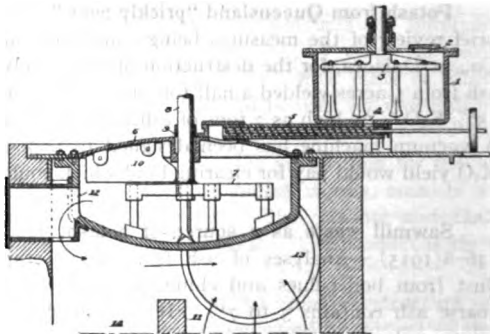
U. S., 1,150,900, Aug. 24. E. H. STRICKLER. **Monosodium phosphate** is made by first forming Na_3PO_4 by furnacing a mixt. of rock phosphate with NaHSO_4 and carbonaceous fuel, treating the Na_3PO_4 thus obtained with H_2SO_4 to form H_2PO_4 and Na_2SO_4 , sepg. the H_2PO_4 and treating it with sufficient Na_3PO_4 to form NaH_2PO_4 , and converting the Na_2SO_4 into NaHSO_4 for further use in the process. Other acids may be substituted for H_2SO_4 .



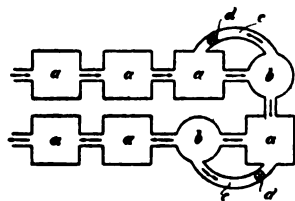
U. S., 1,151,074, Aug. 24. F. S. WASHBURN. **Apparatus for making ammonium phosphate from phosphate rock.** Phosphate rock and H_2SO_4 are mixed in the tank 1, the liquor produced is passed through the filter 2, heated in the tank 6 and then passed successively through the ammoniating towers 8 and 9. Steam from the second ammoniating tower is led to the heating tank and fresh acid is supplied as necessary to the tank 25. The liquor is concd. in evaporators 15, 16,

17 and collected in tanks 19, 20. 21 is a surface condenser.

U. S., 1,151,103, Aug. 24. H. HOWARD. **Making sulfuric acid.** A mixt. of H_2SO_4 and NaNO_3 in the mol. proportions 1:2 is mixed, heated and stirred in the vessel 1, and then heated in the furnace 6. The evolved N oxides are led through the outlet 12 and mixed with sulfurous gases in the flue 13 leading to the Glover tower and the solid Na_2SO_4 remaining is continuously drawn off through the outlet 12 and collected at 14.



U. S., 1,151,294, Aug. 24. G. SCHLIEBS. **Apparatus and process for making sulfuric acid.** The acid vapors and gases are led through a series of towers a to a separator b, then through another tower a to another separator b, and so on as shown in the fig. Fans d in the conduits c force a portion of excess uncondensed vapors and gases back from each of the separators to the preceding towers so that each series of towers and separators is forced to condense its proper portion of vapors and gases.



U. S., 1,151,498, Aug. 24. F. A. RODY and H. M. BURKEY. **Obtaining alkalis and alumina from feldspar, leucite and similar minerals.** The alkali-bearing silicate

is heated to a sintering temp. with additional alkali, *e. g.*, Na_2CO_3 , and CaO , in sufficient amt. to form a H_2O -sol. alkali aluminate and mono- Ca silicate.

U. S., 1,151,533, Aug. '24. F. A. RODY. **Obtaining alkalies and alumina from feldspar, leucite and similar minerals.** The mineral is sintered with sufficient CaO to produce Ca orthosilicate and a H_2O -sol. alkali metal aluminate and the sintered mass after crushing is treated with boiling H_2O . The CaO is formed in the mass by adding CaCl_2 soln., and decomposing with steam (recovering HCl formed).

U. S., 1,151,537, Aug. 24. F. W. DEJAHN. **Producing ammonia.** A mixt. of H and N is passed over a catalyst formed by heating Na or K on pumice in NH_3 to 300° at 550 – 600° under a pressure of 34 – 95 atm.

U. S., 1,151,553, Aug. 31. R. ADLER. **Animal charcoal for use in purifying solutions** is made by washing, boiling, drying and then carbonizing fish.

U. S., 1,151,690, Aug. 31. E. F. KELLEY. **A friction fabric for brake-linings, etc.,** is made of woven asbestos impregnated with a mixt. of alum, MgSO_4 and a decoction of ground bone.

U. S., 1,151,849, Aug. 31. J. W. AYLSWORTH and E. L. AITEN. **Sound-records** are made with a body layer of wood fiber or other filler and a binder of phenolic condensation product and a surface layer of fusible phenol resin mixed with chloronaphthalene or other material which will increase its plasticity.

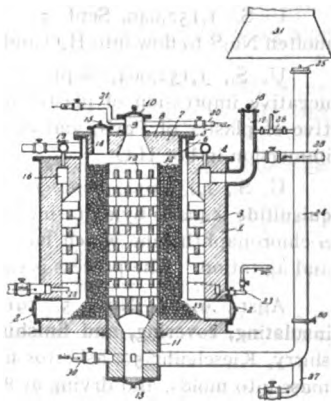
U. S., 1,152,044, Aug. 31. J. F. PLACE. **Heat-interchange system for liquifying air.**

U. S., 1,152,066, Aug. 31. A. WOLFF. **A solution of hydrogen peroxide with a high content of O_3 and O_2** is produced by adding about 0.7 – 0.8% NaCl to a soln. of H_2O_2 of 3% or higher strength, satg. the soln. at 0 – 2° with O_3 and then spraying it through a chamber containing compressed O_2 .

U. S., 1,152,119 and 1,152,120, Aug. 31. J. F. PLACE. **Methods of heat-interchange for liquefying air and separating its constituents.**

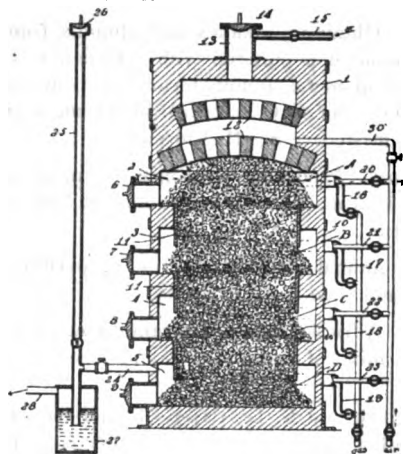
U. S., 1,152,193, Aug. 31. M. MARSA. **Artificial cork** is formed of granular cork mixed with a binder of defibrinated blood, turpentine and glycerol.

U. S., 1,152,196, Aug. 31. A. MESSERSCHMITT. **Making hydrogen.** A reaction mass, 32, composed of spongy Fe or Fe ore is heated from the combustion chambers 3 and 12 and alternate currents of steam and reducing gas are passed through the reaction mass. After steaming, heating and reduction are effected by passing a mixt. of combustible gas and air through one of the combustion chambers, then through the reaction mass and then through the second combustion chamber during the first portion of this step. Then the air is cut off, and the flow of combustible gas continued for some time, the residual gas passing through the reaction mass being burned in the second combustion chamber by air supplied directly to it. 31 is a hood for waste gases and 27 is the outlet for H .



U. S., 1,152,244, Aug. 31. G. N. VIS. **Ammonium sulfate** is made by "emulsifying" gypsum with H_2O , adding it, together with $(\text{NH}_4)_2\text{CO}_3$ to a conct. soln. (at least 30%) of $(\text{NH}_4)_2\text{SO}_4$ and stirring the mixt.

U. S., 1,152,197, Aug. 31. **A. MESSERSCHMITT. Making hydrogen.** A reaction mass of spongy Fe which is alternately treated with steam and reducing gas, is heated after steaming by burning gas in annular zones around short layers (A, B, C and D) of the material. The mixt. of gas and air is supplied through the pipes 16, 17, 18, 19, 20, 21, 22, 23, combustion products being drawn off through the material and the flow of reducing gas being continued after cutting off the supply of air. Waste gases are vented at 26 and H at 28.



U. S., 1,152,245, Aug. 31. **G. N. VIS. Ammonium sulfate.** See Brit., 2,002 (C. A. 8, 2462).

U. S., 1,152,499, Sept. 7. **H. FRASCH. Mining sulfur by the fusion process.** H_2O is withdrawn from a H_2O -flooded subterranean deposit of S at a temp. below the m. p. of S and at the same time a portion of S in the deposit is fused by introduction of hot H_2O and the fused S is withdrawn from the deposit.

U. S., 1,152,625, Sept. 7. **B. B. GOLDSMITH. A composition for uses similar to those of celluloid** is made by treating soy bean, castor, or similar vegetable oil with 50% of dil. HNO_3 at about 100° to oxidize it without nitration and mixing the product with nitrocellulose and solvents.

U. S., 1,152,777, Sept. 7. **F. J. WOOD. Evaporating brine to recover salt.** The brine is heated in 2 or more stages by surface contact with heated air under pressure.

U. S., 1,152,930, Sept. 7. **C. BOSCH, A. MITTASCH, H. WOLF and G. STERN. Making ammonia synthetically** by passing H and N over Fe, and Al_2O_3 or other carrier, under 100 atm. pressure or more at 450° .

U. S., 1,152,949, Sept. 7. **J. H. HIRT. Sodium hydroxide** is made by allowing molten Na_2S to flow into H_2O and adding $Ca(OH)_2$ to the hot dil. soln., in small portions.

U. S., 1,152,964, Sept. 7. **W. NIELSEN. Dental models** are made, using a negative impression of plaster of Paris 4 and potato flour 1 part, molding the positive of plaster of Paris, and detaching the positive and negative from each other by immersion in hot H_2O .

U. S., 1,153,054, Sept. 7. **F. C. FRARY. Finely divided pure phosphorus sesquisulfide** is made by agitating S and P together at the b. p. in an inert solvent such as α -chloronaphthalene which has a b. p. above 180° and sepg. the product by cooling and agitation. The process is carried out in an atm. of CO_2 .

Aust., 9,445, Nov. 5, 1913. **FORBESER KIESELGUHR- UND TONWERKE. Mfg. insulating, covering, and finishing plates** by intimately mixing with H_2O , to a thin slurry, Kieselguhr 50, asbestos fiber 30, best kaolin 10 and gypsum 10%, pouring this mass into molds, and drying at 80° .

Brit., 9,087, Apr. 9, 1914. **GE. SIEMENS & Co. Addition to 8,015, 1914 (C. A. 9, 2575). Double fluorides of rare earths** and the metal of one of the precipitants mentioned in the parent specification, particularly fluorspar, are produced by stopping the reaction when an intermediate compd. (the double fluoride) has formed and before it is decomposed. The reaction is stopped by filtering off the ppt. To det. the

point at which this should be done, samples of the ppt. may be analyzed from time to time. A clarification, which occurs in the liquid when the double salt has been formed and is followed by a cloudiness when the double salt begins to decompose, is also an indication of the time to stop the reaction. In an example, raw oxides of rare earths in the form of a residue in the extrn. of Th are dissolved in a small excess of HCl or HNO₃, fluorspar is added, and the mixt. is boiled for 1/2 hr.

Brit., 9,271, Apr. 14, 1914. **BADISCHE.** Removing carbon monoxide from gases containing it by treatment with solns. of ammoniacal cuprous oxide containing little or no halogen. In this prepn. of such solns., weak acids, such as CO₂ or organic acids, may be employed, or little or no acid may be used in such prepn. According to examples, solns. are prepared by mixing Cu₂O, (NH₄)₂CO₃, NH₄OH, and H₂O, or by dissolving Cu(OH)₂ in NH₄OH and shaking with finely divided Cu; HOAc or tartaric acid, or their NH₄ or Cu salts, may be added. The removal of CO may be effected under pressure; the process is particularly applicable to the removal of small quantities of CO from H. Cf. C. A. 9, 2299, 2575.

Brit., 9,390, Apr. 15, 1914. **A. HEINEMANN.** Condensation products from phenols, cresols, and formaldehyde or the like are prepd. by passing SO₂ into the mixt. of the parent materials, or a liquid hydroxybenzyl alc. prepd. therefrom, and allowing the action to proceed without the application of external heat. The process is carried out in the absence of a solvent.

Brit., 9,534, Apr. 17, 1914. **SIEMENS & Co.** Addition to 8,015, 1914 (C. A. 9, 2575). Double fluorides of rare earths and the metal of one of the precipitants mentioned in the parent specification, particularly fluorspar, are obtained by conducting the reaction in the presence of an organic acid, such as (HOCO)₂, which may be first added to the rare-earth soln. The ppt. is of granular nature and may be converted into rare-earth fluorides without losing its form, by heating in the mother liquor.

Brit., 9,775, Apr. 20, 1914. **M. P. P. GLOESS, L. P. J. DARRASSE and E. R. DARRASSE.** The extraction of iodine, mineral salts, mucilage and cellulose from seaweed. See U. S., 1,103,283 (C. A. 8, 3119).

Brit., 9,918, Apr. 22, 1914. **C. BUTTERS.** For discharging the cake from a leaf filter for slimes, the cake is satd. with liquid from the inside, arrangements being made to prevent the pressure of the liquid within the filter from being greater than that outside.

Brit., 9,920, Apr. 22, 1914. **C. BUTTERS.** For discharging the cake from a leaf filter, the cake is especially dried by prolonging the vacuum, and then flooded with liquid.

Brit., 9,968, Apr. 22, 1914. **P. M. PIERSON.** A composition for cleaning cinematograph films. See Fr., 465,596 (C. A. 8, 3538).

Brit., 9,973, Apr. 22, 1914. **P. M. PIERSON.** A composition for cleaning cinematograph films consists of an oily material, ether, and camphor.

Brit., 9,974, Apr. 22, 1914. **FARBW. v. M. L. & B.** Manuf. of nitrogen oxides and nitrogen. According to the process of 3,662, 1913 (C. A. 8, 2607), NH₃ is burnt in air with the aid of a catalytic agent, the proportions of NH₃ and air being such that only N oxides and N are contained in the resulting product. In the present process, part of the air is replaced by O, the proportion of NH₃ being still such that after combustion no excess of O remains. Elevated pressures may be used in the process.

Brit., 10,126, Apr. 24, 1914. **J. WUNSCH.** Decolorizing charcoal is obtained by heating any C-containing substance such as wood, sawdust, cellulose, starch, sugar, peat, brown coal, coal, animal offal, etc., with ZnCl₂ or a soln. thereof until carbonization is effected. The ZnCl₂ is removed by washing with H₂O, with addition of acid,

if required. Spent, decolorizing charcoal may be revived in the same way; cellulose may be added to the decolorizing charcoal, and is carbonized in the subsequent re-vivification. Ca compds. may be removed by treatment with HCl before revivification.

Brit., 10,175, Apr. 24, 1914. GEB. SIEMENS & Co. Complex fluorides, such as borofluorides, silicofluorides, titanofluorides, are prepared by reacting with HF on a mixt. of a metal oxide or salt such as a carbonate or chloride and an oxide such as H_2BO_3 , H_2TiO_3 or SiO_2 , capable of forming complex F acids. Examples are the production of KBF_4 from potash or KCl or $K_2B_4O_7$ and H_3BO_3 ; K_2TiF_6 from KCl and H_2TiO_3 . When Na salts are prepared, the process is modified if the products are sol., the soln. being concd. and then purified. If Na and K salts are prepared together, they may be sepd. by their differences of solubility.

Brit., 10,304, Apr. 25, 1914. L. W. DAMMAN. Ground rock salt. See Ger.; 276,344 (C. A. 9, 362).

Brit., 10,379, Apr. 27, 1914. AKT.-GES. FÜR ANILIN-FABRIKATION. In the process of 19,688, 1912 (C. A. 8, 2039), instead of *p*-dichlorobenzene, other chlorinated benzenes or Cl derivs. of homologs of benzene are employed for protecting furs, etc., from moths, etc., and for killing these and other pests, such as fleas, wood-lice, ants, bugs, phylloxera, and weevils.

Brit., 10,420, Apr. 27, 1914. E. A. ASHCROFT. The fixation of nitrogen is effected by treating a mixt. of a metal, such as Na, with C and, with or without a catalyst, with N at a temp. not greater than 700° and a pressure of 50 atms. or more. Na subcyanide, Na_2CN , is produced by heating Na and C in N under these conditions. It is a powerful reducing agent, and may be used instead of Na to obtain NaCN from $Na_4Fe(CN)_6$. It may be converted into Na_2NCN by heating with NH_3 , or into a mixt. of NaCN and NaOH by treatment with H_2O , H being evolved in both cases. If a catalyst, such as Fe, be mixed with the Na and C or with the Na_2CN , and the whole heated with N under the stated conditions, Na_2NCN is obtained, which, after removing the catalyst, may be heated with C to obtain NaCN, or may be treated with steam or H_2O under pressure to obtain NH_3 and alkali carbonate. H or coal-gas may be mixed with the N used in the above reactions, and C may be supplied to the charge by adding naphthalene, benzene, acetylene, paraffin, or the like. The Na may be in the metallic form prepd., *e. g.*, as described in 1,001 and 1,003, 1912 (C. A. 7, 2163) or dissolved in NaOH as obtained by the process described in 228, 1910 (C. A. 5, 3013) and 1,002, 1912 (C. A. 7, 2163), in which case the melt may be circulated between the pressure vessel and the secondary cell of the electrolytic app.; or an alloy may be used, such as a Pb-Na alloy; or the mass obtained by strongly heating charcoal impregnated with fused or dissolved alkali hydroxide or carbonate. The Fe employed as catalyst may be that obtained in prepg. NaCN by reacting with Na on fused $Na_4Fe(CN)_6$. Other metals, especially those of the Fe group, or any metallic compd. having catalytic properties, may be used. The app. employed in the N-fixing reactions may be a polished Fe or steel crucible set within an autoclave capable of standing high pressure; or the gases may be circulated by a pump connected with a pipe dipping into the reaction mixt., which is then maintained in fusion; or charcoal may be packed in an upright column or pressure vessel, the melted Na being forced through it by means of a pump or squeezing device, and the Na traveling downwards with the compressed N; or a mechanical device resembling a ball-mill may be employed. It is stated that, in the production of Na_2NCN by the help of a catalyst as above described, if the Na is placed in a sep. vessel in contact with the N and H which is also in contact with the mixt. of C and catalyst, practically no reaction occurs unless the conditions are such as to allow of the formation of NH_3 by catalytic action, when Na_2NCN is slowly produced, a part of the C being taken up by the gases.

Brit., 10,476, Apr. 28, 1914. I. LITTLEFIELD. A **metal polish** consists of Al silicate, $(\text{HOCO})_2$, paraffin or other oil, and H_2O .

Brit., 10,612, Apr. 29, 1914. G. CALVERT. In the **catalytic synthesis of ammonia**, the catalyst, or heater, or both of these are moved relatively to the gases by an enclosed motor. By this arrangement, moving joints under pressure are avoided, and opportunity is given for the escape of the nascent NH_3 by reason of the continual change in position of the reaction zone.

Brit., 10,797, May 1, 1914. J. L. HALMAN. A **washing composition**, for cleaning clothes, crockery, etc., and for removing paint, enamel, or varnish, 1 or more coats at a time, consists of an aq. soln. of not more than 10% of alkali hydroxide, not more than 2% of alkali carbonate, and about 3% of NH_4Cl and 5% of MeOH or EtOH .

Brit., 10,808, May 1, 1914. H. G. HUGGINS. In the **manuf. of polishing cloths**, the material, such as flanelet, is first treated to remove the dressing therefrom, and the polishing agent is then applied to it. The dressing is removed by passing the material around rollers through an acetic acid bath, the material being then passed over a muslin pad or strainer and pressed between rollers and dried. The acetic acid soln. in the bath is then replaced by a polishing soln. obtained by whipping together oleic acid, pptd. SiO_2 or tripoli, and H_2O , to which rouge or other coloring matter may be added, and the material is again passed through the bath and between rollers, the pressure on the material at this stage being limited to the wt. of the upper roller. The cloth is then hung up to dry.

Brit., 10,977, May 4, 1914. C. CAPSONI. **Equally subdividing loose substances**, such as hair, grain, etc., by scattering the material in the upper part of a closed chamber, in which it falls uniformly, and collecting it in a revolving circular receptacle divided radially into a number of sector-shaped parts of detd. capacities.

Brit., 11,001, May 4, 1914. P. ZÜRN. A **metallic non-corrosive lining for tanks**, etc., made of cement and concrete, is obtained by applying, first a coating of a metal, such as Fe, which is not attacked by the concrete, and, second, a coating of metal, such as Al, Pb, Cu, etc., indifferent to the liquid to be stored. The coatings may be applied by spraying.

Fr., 475,034, July 11, 1914. H. SCHROER. A **compn. for preventing the fouling of window glass**, as by tarnishing by coating with ice, as well as by the adhesion of drops of rain, consisting of fruit juice, such as apple or orange juice, preferably dild. by H_2O .

Ger., 284,042, Sept. 26, 1913. NORSK HYDRO-ELEKTRISK KVAELSTOFAKTIESELSKAB. **Prepn. of lime for absorption of nitrous gases** at 300–400°, by burning CaCO_3 , in lump or briquet form, with the aid of hot gases at 700–750°. At higher temps. the absorptive power is weakened materially. If the nitrous gases have a temp. of about 800°, the contained heat is sufficient to burn the amt. of CaCO_3 required for the absorption.

Ger., 284,176, May 2, 1914. BADISCHE. **Mfg. hydrogen** by reaction between steam and CO, under the catalytic influence of O compds. of the rare earth metals, especially Ce. The oxides are applied preferably in a finely divided or finely porous form, which is secured by heating the formed pptd. hydroxides, alone or with the addition of a binder or diluent, the gas mixt. being conducted over the product.

Ger., 284,177, Feb. 24, 1914. CHEMISCHE FABRIK BUCKAU. **Addition to 283,096 (C. A. 9, 2439).** In the **utilization of magnesium chloride liquors from the potash industry**, according to the principal patent, the liquors are heated with H_2SO_4 until all HCl is driven off, whereupon the residual soln. solidifies to a solid crystal mass, the removal of which from the vessel is attended with difficulty. This objection is met

by heating the liquors with H_2SO_4 *in vacuo*. All HCl is expelled at a low temp. The condensed HCl is much stronger, and a soln. of MgSO_4 which does not solidify remains in the vessel. Furthermore, the HCl distils over free from As , since at the low temp. employed *in vacuo*, the formation of volatile AsCl_3 does not occur.

Ger., 284,178, Apr. 29, 1913. TORFENTGASUNG STAUBER. In a furnace for obtaining ammonia, from smouldering bituminous substances at a low temp., the H_2O -tubes or chambers, provided with inlet and exit tubes for H_2O and steam, are so disposed as to divide the interior of the furnace into two adjacent chambers. The H_2O -tube system is provided above with a steam valve, through which steam can be conducted to the incandescent mass.

Ger., 284,258, Oct. 4, 1914. ELEKTROCHEM. WERKE and O. DREIBRODT. Mfg. faultless artificial or synthetic precious stones. By fusing Al_2O_3 powder or mixts. thereof with metals or their oxides, in a vertically disposed oxyhydrogen flame, in such manner that the falling powder is brought to a state of fusion at a point upon a refractory rod of fire-brick, a crystallized stone may be obtained, as the fused drops assume the form of an optical crystal, which is enlarged by subsequent additions. The flame and the rod are encased in a nonconducting chamber, the purpose of which is to prevent rapid cooling of the products. Obtained in this manner, the stones exhibit, upon polishing, marked colored striations, and often enclose gas bubbles. This objection is overcome by rotation of the refractory rod at a rate of 200 r. p. m. This axial rotation is continued until the product is cold. Uniform temp. is maintained throughout the process so that fracture of the stone on cooling is prevented. As a result of the rotation the stone assumes a cylindrical form, with a horizontal upper surface, the bubbles escape, and the striation is right-lined. The optical axis of the stone lies either in the direction of the axis of rotation or vertical thereto, which is of advantage in cutting.

Ital., 135,224, Aug. 12, 1913. U. VIGANÓ and L. SOLDI. Obtaining ammonia from molasses slops. After the extn. of the alc. from the molasses, the residual liquid is treated in a furnace, whereby a residue rich in K salts is obtained. This mass, after being drawn from the furnace in an incandescent state, is burned further *in pleno*, cooled, and crushed for the market. The N still contained in the furnace may be utilized by means of a circulation of air and water-vapor, with condensation of the resulting NH_4OH , or the NH_3 may be absorbed in H_2SO_4 ; the yield of $(\text{NH}_4)_2\text{SO}_4$ is about 20% of the theoretical.

Ital., 139,955, Feb. 24, 1914. A. BAMBACH. In a process of mfg. sulfuric acid and oxides from sulfates, preferably alk.-earth sulfates are decomposed at a high temp. with gas and air within a suitable container. The process is applicable to oxidized S.

Ital., 139,971, Feb. 26, 1914. G. ODDO. Mfg. concentrated solutions of sodium hydrosulfite by allowing concd. solns. of Zn hydrosulfite to react with NaHCO_3 .

Ital., 140,537, Mar. 18, 1914. NORSK HYDRO ELEKTRISK KVAELSTOFAKTIESELSKAB. Oxygen and nitrogen are obtained from the air by liquefaction and rectification. The air employed in the process is made to pass, after dialysis, through a suitable membrane, in order to enrich it in O.

Ital., 140,547, Mar. 20, 1914. R. FULLONI. Treatment of red bauxite, by means of HCl , to sep. the Fe, which goes into soln. The slimes left from this treatment may be similarly treated.

Ital., 141,206, Apr. 29, 1914. J. PATRK. Preparing hydrogen peroxide by distg. a simple mixt. of NH_4 persulfate, or other readily sol. alkali persulfates, with H_2SO_4 , and carefully sepg. the H_2O_2 formed.

Ital., 141,241, Apr. 17, 1914. F. HÄUSSER. In a process of absorbing rarefied nitrous gases in water, the reoxidation of the NO, resulting from the action indicated

in the following equations, is effected by passage of the gases from the first absorption, and subsequent treatments, through a long conduit, repeatedly back to the absorption app. $\text{N}_2\text{O}_4 + \text{H}_2\text{O} = \text{HNO}_2 + \text{HNO}_3$; $3\text{HNO}_2 = \text{HNO}_3 + 2\text{NO} + \text{H}_2\text{O}$.

Ital., 141,275, Apr. 16, 1914. A. CLASSEN. In a process of mfg. compounds of nitrogen, the reacting gases are subjected, under high pressure, to the action of the silent elec. discharge in the presence of catalyzers formed of metals or alloys in the colloidal state deposited on indifferent substances such as asbestos, etc. The process serves for the manuf. of both NH_3 and HNO_3 .

Ital., 142,260, May 27, 1914. R. CRUSA and R. TORCHI. In a process of deodorizing vegetable liquids or saps and exts. thereof, on a commercial scale, with the use of K salts, the liquid under treatment is heated in the autoclave with the final addition of an acid, and sepd. from the K salts by the addition of perchloric acid or perchlorates.

Ital., 142,456, June 13, 1914. K. SCHAEFER. Preparing oxygen by the alternate passage of reducing gas and steam over heated Fe. A highly heated reducing gas is passed over the Fe material, together with an excess of air (with which the impurities, S and C, are burned). When the heating has been effected, air is added; with it the Fe and the lower oxides are completely oxidized. Finally, a current of superheated steam is passed.

19. GLASS AND CERAMICS.

G. E. BARTON, A. V. BLEININGER.

Clay products as engineering materials. A. V. BLEININGER. Bureau Standards, Pittsburgh. *Trans. Intern. Eng. Congress 1915* (advance copy).—In building brick the mortar is usually the limiting feature in strength. Porosity is a good index of the quality of bricks from any one clay, but different clays cannot be directly compared. Six different clays showed porosity of 23.0, 25.0, 26.5, 29.5, 33.5 and 40.0% when burned sufficiently in each case to give a compressive strength of 5000 lbs. per sq. in. Compression testing of whole bricks flatwise is condemned. Half bricks on edge are much better—edge testing gives results 13% lower than flat testing. In exposed structural work, resistance to freezing and thawing stresses are most important. This resistance is not a direct function of porosity. Actual freezing tests are good but laborious. Accelerated tests like Brard's (immersion in boiling soln. of Na_2SO_4 and then crystg.) show clearly when burning has developed full strength, but in comparison with freezing such tests are too severe. Paving brick, hollow tile, fireproofing, architectural terra cotta, sewer pipe, drain tile, floor tile, wall tile, roofing tile, enameled brick and sanitary ware are briefly discussed.

C. H. KERR.

Manufacture and tests of silica brick for by-product coke ovens. KENNETH SEEVER. Harbison-Walker Refractories Co. *Bull. Am. Inst. Mining Eng.* 1913, 1913-27.—The term "silica brick" should embrace only products with 94% or more SiO_2 , usually made from quartzite rock with a small % CaO added as a binder. The largest quartzite fields are Pa., Wis., Ala., and Col., given in the order of their importance. Pa. makes 75-85% of the U. S. product, mostly from quartzite of the Medina and Oneida formations in Huntingdon and Blair Cos. Typical analysis shows 97.8% SiO_2 . A hard cryst. rock like the Medina quartzite is required for a strong brick. Prepn. embraces (1) crushing to 1 to 2 in. ring, (2) wet pan grinding with the addition of 2% CaO added as milk of CaO . With 3% CaO brick is less resistant to abrasion. With more CaO , even up to 7%, strength still further decreases. There is no appreciable effect on refractoriness up to 3%, but above that the fusing point is lowered. Less

than 2% CaO does not give the required strength. The finer the grinding the greater the resistance to abrasion. In molding, the damp mix is rammed in by heavy beaters. Firing takes 9 to 12 days, with a final temp. of 1650° usually held a little over 1 day. Cooling takes about the same time. During burning, bricks take a permanent expansion of about $\frac{3}{8}$ in. per ft., due to the inversion of quartz to cristobalite directly (not through tridymite). To det. the amt. of inversion of quartz to cristobalite, 3 lots of SiO₂ brick were subjected to 1, 2 and 3 regular burns, resp., to 1540°, and also 2 lots of quartz rock received 1 and 2 burns, resp. Powdered samples were immersed in the liquid of $n_D = 1.51$ to distinguish between quartz (slow ray $n_D = 1.544$) and cristobalite (fast ray $n_D = 1.485$). Of the SiO₂ brick, the 1, 2 and 3 burn samples showed, 77.35, 82.87 and 83.98% cristobalite and the 1 and 2 burn quartz samples showed 49.5 and 68.62% cristobalite. "Thus far we have assumed the changes in cryst. form to be desirable because of their effect on the expansion of the material." Modulus of rupture on reburning showed 624, 809 and 1001 lbs. per sq. in. for the 1, 2 and 3 burn SiO₂ brick samples, resp., and the crushing strength was 4313, 4396 and 4500 lbs. per sq. in.

C. H. KERR.

U. S., 1,151,911, Aug. 31. E. C. SULLIVAN and W. C. TAYLOR. Glass for making seals of incandescent lamps, etc., is formed of SiO₂ 42, soda 19, potash 5, BaO 19 and Al₂O₃ 15%. It has a linear expansion coeff. of 0.0000135.

U. S., 1,151,942, Aug. 31. V. H. GREGORY. Glass-furnace.

U. S., 1,152,428, Sept. 7. A. T. MALM. Pyrometer tubes or combustion tubes and similar refractory articles are formed of fused alumina carrying a coating of glazing material to render them impervious to gases and with outer and inner coatings of fused Al₂O₃. The latter prevents the glazing from adhering to the support of the tube when it is heated in use.

U. S., 1,152,828, Sept. 7. W. N. MATHEWS. Glass-furnace.

Brit., 10,161, Apr. 24, 1914. H. BECKER. Crystalline glass products, resembling stone, granite, etc., are manufd. by heating the raw materials for glass-making (e. g., sand, soda, lime, clay, etc.) until incipient fusion takes place, and then removing the mass from the furnace or beyond the range of smelting temp., and coating or annealing, as usual.

Brit., 10,488, Apr. 28, 1914. A. J. DAVIS. In the manuf. of colored lenses, plates, prisms, etc., more especially for railway, shipping, lighthouse, and other like purposes, ordinary com. colored sheet glass is coated with a thin layer of a fusible silicious compd. consisting of SiO₂, red lead, borax, pearl-ash, KNO₃, or other like ingredients. The sheet is bent under heat to the required shape in a mold, during which process the cement is fused and forms a transparent coating on the glass. Molten clear white glass is then applied to the sheet and molded to the required form.

Brit., 10,983, May 4, 1914. E. MAUVILLIN and V. GUILLER. In a process of imitating mother-of-pearl in designs on glass, as in making sign boards, an iridescent surface is first produced by depositing a very thin pellicle, e. g., of nitrocellulose, upon a polished Zn or other plate which has been irregularly undulated, as by stamping. The desired design is reproduced upon a sheet of glass by means of an opaque varnish or by photography, and when dry it is coated with a granular deposit, which gives the appearance of the glass having been ground; or the design may be directly produced in the ground face of a celluloid plate. The diffusing layer may also be produced by the action of a sand-blast or of HF upon glass or mica. The glass and Zn plates are then superposed. The granular deposit may be produced from a mixt. of ether, benzene, putty, and sandarac.

Brit., 10,985, May 4, 1914. R. GREIFELT. **Lithophane porcelain ware**, such as beer tankards, milk mugs, etc., is produced by applying a highly translucent material in the required design to the modelling face of a plaster mold of the article to be produced, and then casting over it a less translucent material having a higher m. p., but the same coeff. of shrinkage. The covering material is partly removed or scooped out on a turning disk until only a thin covering remains on the translucent material, and the article is burnt and finally glazed.

Ger., 282,990, Sept. 26, 1911. P. KAEHLER. Press for mfg. corner pieces of ceramic masses.

Ger., 284,092, Apr. 4, 1914. VERTRIEBSGES. FÜR AUTOMATISCHE FLASCHENTRANSPORTVORRICHTUNGEN. Addition to 283,036. Construction and operation of automatic bottle-blowing machines.

Ger., 284,309, Mar. 27, 1914. ADLER-INDUSTRIEWERK. **Flower boxes or pots** are poured in the rough, from a mixt. of magnesite and $MgCl_2$ lye and sand, in oiled molds. After removal from the molds the box or pot is etched in a HCl soln. until a rough surface similar to that of natural stone is obtained, and the structure is porous. The acid which has penetrated is removed by washing with water.

Ger., 284,310, Nov. 26, 1912. O. FRICK. **Mfg. bricks and furnace lining** from strongly burned magnesite, with avoidance of H_2O for mixing. The MgO , obtained by burning the natural impure magnesites, is finely ground so that the enclosed particles of CaO are broken up and distributed uniformly through the mass, thereby avoiding any marked stress due to slaking. This mass is then ignited at a temp. above 550° to expel hydrate H_2O . Refined petroleum, or other completely volatile indifferent liquid, is used for mixing. The black or lining material is burned at a high temp. until no more shrinking occurs. For furnace lining the temp. of burning must be at least 1550° . The products are especially suitable for use in elec. induction furnaces. The magnesite can be used repeatedly provided the steel particles are removed. About 15–20% of fresh incompletely burned magnesite is added and mixed intimately therewith.

20. CEMENT AND OTHER BUILDING MATERIALS.

C. N. WILEY.

Lime concrete in the East. E. A. W. PHILLIPS. *Surveyor* 47, 667(1915).—Lime is mixed with "soorkhee" (finely powdered red brick), to enable it to set under water. A mixt. much used is, 5 parts under-burnt, 5 parts well-burnt soorkhee, 1 slaked lime and 1 sand, all measured dry. Addition of portland cement improves the mortar.
W. D. C.

Preservative treatment of timber. H. F. WEISS AND C. H. TEESDALE. *Trans. Intern. Eng. Congress 1915* (advance copy), 45 pp.—A general review of the results obtained in the U. S. is presented. The quantity of wood preservatives used, the amt. of timber treated annually and the extent to which the various treatments have prolonged the natural life of wood are shown. The increase in the amt. of wood treated between 1908 and 1913 was 230%. A partial bibliography is included. E. J. C.

Prolonging the life of poles. W. F. GOLTRA. *Wood Preserving* 2, 49–50(1915).—A brief description of various ways for preserving poles used for support of wires.

C. N. WILEY.

U. S., 1,151,039, Aug. 24. E. L. POWELL. **Yellow pine piling** is preserved by removal of the outer bark from the entire pile, removal of the inner bark from the larger end only and impregnation of the larger end with preservative.

U. S., 1,151,095, Aug. 24. E. DYER. Gypsum plaster is mixed with an aq. ext. of bean straw to retard its setting.

U. S., 1,151,204, Aug. 24. H. S. LOUD. Impregnating wood with preservative liquids. The wood is first subjected to a vacuum and then drenched with the preservative, commingled with air under gradually increasing pressure, so that some of the air is carried into the pores of the wood with the preservative. Then the wood is again subjected to a vacuum to draw off the excess preservative.

U. S., 1,151,205, Aug. 24. H. S. LOUD. Preserving wood as in the process of the preceding pat. except that the drenching is intermittent instead of continuous, each treatment being under greater pressure than the preceding.

U. S., 1,151,515, Aug. 24. C. ELLIS. Partially fritted portland cement ingredients are formed into soft porous granules by carefully regulated burning. These granules have approx. the comp. of finished portland cement and on further burning will coalesce into ordinary hard cement clinker. The relative softness and friability of the granules facilitate grinding.

U. S., 1,152,613, Sept. 7. T. A. EDISON. Calcining and clinkering portland cement ingredients by a rotating kiln which is fed with unusually large amts. of fuel and cement mixt. Complete calcining and clinkering take place in successive and distinct zones of the kiln and the lining of the kiln at the clinkering zone is protected by a coating of clinker which is maintained on the lining by proper regulation of the amt. of material maintained in the kiln and its speed of rotation.

U. S., 1,153,032, Sept. 7. R. CONN and O. H. SHULTZ. Artificial stone is made by mixing concd. H_2SO_4 1 with PbO 3 parts, adding a soln. of MgCl_2 175 in H_2O 226 parts and stirring until reaction ceases, and then adding a mixt. of CaSO_4 210, MgCO_3 105, and sand 280 parts, and molding.

Brit., 10,130, Apr. 24, 1914. J. M. BROTHERS. A plaster is made by mixing together hydrated gypsum and dehydrated lime, and heating the mixt. preferably to 212–300° F. to dehydrate the gypsum and slake the lime.

Brit., 10,491, Apr. 28, 1914. H. VON DER HEIDE. Waterproofing stone, plaster, fibrous insulating-materials, etc., by means of a soln. formed by mixing an ammoniacal or alk. soln. of the hydroxides of such metals as Zn, Cu, Pb, Sn, Cr, or Al with a soln. of soap.

21. FUELS, GAS, TAR AND COKE.

J. D. PENNOCK.

The fusibility of coal ash in mixtures of hydrogen and water vapor. A. C. FIELDNER AND A. L. FEILD. Bur. Mines. *J. Ind. Eng. Chem.* 7, 742–7(1915); continuation of C. A. 9, 1837.—The softening temps. of 5 coal ashes were detd. in various mixts. of H and H_2O vapor from 100% H to 100% H_2O . There is a high softening temp. in pure H at one end due to the reduction of Fe_2O_3 to Fe and a similar high temp. in H_2O vapor or air at the other end due to conversion of Fe_2O_3 to Fe_3O_4 . In the range 30–70% H_2O vapor there is a more or less lower softening temp. due to reduction of Fe_2O_3 to FeO in which form it combines readily to form fusible silicates. It is shown that fuel bed conditions are such as to favor the formation of clinkers containing principally Fe^{++} . A new method of detg. the minimum softening temp. is given. In this the ash is heated in an atm. of 50% H and 50% H_2O vapor by which means the Fe_2O_3 is reduced principally to Fe^{++} . ISADOR MILLER.

Economic utilization of coal and production of cheap power. W. F. REID. *J. Soc. Chem. Ind.* 34, 775–81(1915).—R. discusses the coal resources of the world as

compared with those of England, and the various methods for the production of power.

C. A. COLE.

Thermal study of the carbonization process. H. HOLLINGS AND J. W. COBB. Univ. Leeds. *J. Chem. Soc.* 107, 1106-15 (1915); cf. *C. A.* 8, 3110.—The substances tested were heated in thin fire-clay boats, through which passed long thin silica tubes containing thermo-couples. The boats and silica tubes were inserted in a porcelain tube which was heated in an elec. furnace, the tube being placed so as to bring the boats in the center of the furnace. A coke standard was previously prepd. by packing coal in one of the boats and heating to 1100° in an atm. of N. Substances to be tested were placed in one boat and the coke standard in the other. The couples were connected in opposition to show the difference in temp. of the coke standard and the test. The heating was always done in an atm. of purified N, and the most suitable rate of raising the temp. of the coke was found to be 7° per min. It is claimed that potentiometer deflections to the left indicated a preponderance of endothermic reactions, and deflections to the right exothermic. After obtaining the heating curve of coal against a coke standard, a control expt. was made by heating the coke obtained from the coal against the same coke standard. Deflections obtained below 200° were disregarded. Below 400° cellulose showed a strong endothermic reaction commencing at 345°; this was much weakened in dehydrated cellulose and lignite, and absent in coals. Between 400 and 600° the characteristic differences of different types of coal were manifest. Oils, unsatd. hydrocarbons, higher paraffins and oxygenated compds. were produced, varying with the nature of the coal, and the thermal phenomena were varied in a corresponding degree. Between 600 and 800° CH₄ was evolved and all coals show marked exothermicity. Above 800° H was the main product of distn., the process being either thermally neutral or more probably slightly endothermic. Thermal phenomena at low temps. were marked with cellulose and coals of high O content, at high temps. with anthracite and coals of low O content.

L. W. RIGGS.

Effect of temperature and moisture on carbonization. G. E. FOXWELL. *Gas World* 63, No. 1620 (*Coking and By-Product Sec.*), 13-14 (1915).—Water vapor has two functions in the coke oven: it can act as a cooling agent or as a diluent. In the latter case the result of its action is to conserve the by-products. A little cooling may be advantageous in that it will prevent overheating and so preserve NH₃ and C₄H₄ from decompn. in passing through the hot layer of partially carbonized coal. If cooled too much the coal will be carbonized at too low a temp. and yield of NH₃ and other products will suffer. The yield of coke continually decreases as the % of added H₂O in the charge increases. Under 9% the decrease is rapid and above that point it is slower. At about 10 or 11% the moisture has attained its max. as evidenced by the falling off in CO after 13%. Up to about 9% the effect is to protect the NH₃ from decompn.; above this % the charge becomes too cool for the max. formation of NH₃ and the yield of NH₃ decreases. This same moisture content of 9 to 10% still seems to bear some essential relationship to the yield and comp. of the hydrocarbons. High moisture decreases the C₄H₄ content of the gas and as the C₄H₄ decreases, C₂H₂ increases. This increase is probably due to the lowering of the temp. in the oven. Moisture exerts a protective influence over the tar, the quantity of which increases with the increase of H₂O content. The general conclusion to be drawn from well-known facts and from lab. expts. seems to be that a temp. of about 900° and a moisture content of as nearly 9% as possible will give the best results.

M. L. TROWBRIDGE.

Briquetting and tar distilling plant of the Nürnberg gas works. RUDOLF TERHAERST. *J. Gasbel.* 58, 300-1 (1915).—The plant has operated since 1912. Egg-shaped briquets are made from coke breeze and coal-tar pitch. To supply the pitch there was installed a tar still, which not only served the briquetting plant but also re-

distd. wash oil for the naphthalene washers, and furnished a tar oil which could be used for lubricating the exhausters. These last two alone yielded a profit on the distn. plant. The pitch was pulverized and stored in bins, as was also the coke breeze. From these bins coke and pitch were withdrawn by feeding tables, heated to 200° , by superheated steam in a mixer, and then fed to the press. The amt. of pitch could not be varied much without producing either crumbly briquets or briquets that stuck in the press. Briquets were made with 15,000 kg. pressure with 8% pitch, and had a crushing strength of 80 kg. along the short axis. The output of each machine was 25 to 30 metric tons per day. The briquets are used under the boilers or sold for domestic heating. Used in the water-gas plant, the pitch assists in the carburization. Costs are about 30 pf. for 100 kg. without allowance for material. Previously the breeze was burned in the plant for steam raising, but has to be supplemented by coal. Now the same amt. of breeze, briquetted, furnishes all the steam and leaves a surplus for sale. In distg. the tar the temp. is run to $350-60^{\circ}$, with vacuum toward the end. 53% pitch and 47% oil are obtained.

W. L. BADGER.

Report of the committee on manufacturing, Iowa District Gas Association. ANON. *Am. Gas Light J.* 103, 131-2(1915).—The following matters were discussed: Water-gas machine results in a small works; different kinds of oxides; the most economical way to heat the water in holder in a small plant to prevent freezing. In regard to water-gas machine results the following items are recommended: Maintenance of the temp. of the superheater within $1,300-1,400^{\circ}$ F.; avoidance of high temp. at the top of the carburetor; equipment of the machines with pyrometers; the use of a good grade of coal, and the maintenance of deep fuel beds in the generator; operation of the machine during the period that the most gas is being sent out to avoid stand-by losses; removal as soon as possible of the gas in the relief holder to the storage holder to prevent hydrocarbons from dropping out; the use of a gas analysis app. to det. the quality of the gas; proper care in the distribution of tar as a waste product. A good iron oxide is prepd. by mixing wet shavings or cobs with cast iron borings and salt, and left to cure. Particular attention should be paid to the scrubbing and condensing, as oxides rapidly deteriorate by being coated with tar. Oxide should not be discarded until it contains 60% of S. Holders are prevented from freezing by circulating water from the tank through the condenser back to the cups and tank.

P. J. COLE.

The composition of natural gas used in twenty-five cities. G. A. BURRELL AND G. G. OBERFELL. *Bur. Mines, Tech. Paper* 109, 1-20(1915).—Methane is the predominant constituent. No H_2 , O_2 , CO, H_2S , or olefin hydrocarbons were found. Higher paraffins were present. Different strata in the same region may yield gas with different characteristics. B. t. u. values range from 740 to 1312. Explosive limits are 4.92 to 11.50% gas. Ignition temp. is 550 to 750° . Compn. is const. for long periods. Ra Em and He have been found in the gas. Natural gas has no toxic effect on men or birds but acts as diluent of O_2 . When % O_2 falls to 8 suffocation occurs.

BERMAN.

Waste heat recovery in gas plants. ERNST SCHMIED. *J. Gasbel.* 58, 327-9(1915).—The plant in question consists of 3 Munich chamber ovens and 3 vertical ovens (both 8's). The steam demands on the plant in very cold weather, when the holder water has to be heated, are excessive. The sources of heat considered are the hot gas, the hot coke, the stack gases, and the radiation. The first is dismissed as being too small for the installation necessary to recover it. At present the coke is all quenched; and it is calcd. that sending what is needed directly to the producers without quenching would save 75,000-150,000 cal. per hr. The stack gases should leave the regenerator at 400° , and between this and $250-300^{\circ}$ (necessary for draft) there is too little fall available to be worth while. At S.'s plant the gases left the regenerator at 730° , and the question

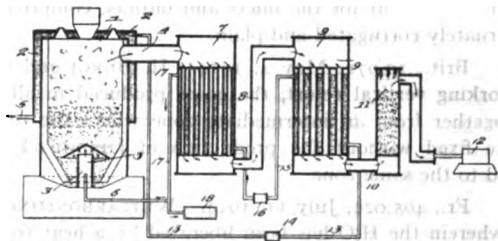
was whether to improve the firing so as to have no after-combustion in the regenerators and hence cooler stack gases, or to use the heat under existing conditions. In this case the latter was preferable. It is also suggested that by covering the top and sides of the oven blocks with pipe coils large amts. of heat otherwise lost by radiation would be recovered, but not as high-pressure steam. S. recommends a waste-heat boiler on top of the vertical ovens to take part of the heat of the gases of combustion before they go to the regenerators, pipe coils in the flues to take up heat from the gases leaving the regenerators, and coils on the outside of the blocks as above.

W. L. BADGER.

The production of sulfate of ammonia in 1914. ANON. *Am. Gas Light J.* 103, 161-4 (1915).—Statistics are given and discussed.

E. J. C.

U. S., 1,151,676, Aug. 31. H. FOERSTERLING. **Generating steam and producer gas.** Currents of air and steam are continuously and simultaneously directed through the pipes 3 and 17, 6, resp., into the fuel bed of the producer 1. H_2O is preheated in the jacket 2 of the producer and is then converted into steam in the boilers 7, 9 which are heated by the gas generated in the producer. High-pressure steam in excess of that required in the producer is generated in the boiler nearest to the producer. From the boilers, the producer gas passes through a scrubber 11 to a gas engine 12. Circulation of the H_2O is maintained by pumps 14 and 16. 18 is a steam engine for utilizing surplus steam.



U. S., 1,151,825, Aug. 31. T. RIGBY. **Removing water from peat.** The peat is heated until it is wet-carbonized, then cooled to about 70° by heat interchange with fresh peat, filter-pressed while still heated and the warm effluent from the filtration is used in the heat-regenerator to heat fresh peat. Cf. C. A. 9, 369.

U. S., 1,152,514, Sept. 7. E. A. W. JEFFERIES. **Gas-producer and app. for rotating the fuel in the producer.**

U. S., 1,152,869, Sept. 7. C. F. ZEEK. **Apparatus for making water-gas.**

Brit., 9,849, Apr. 21, 1914. W. J. MELLERSH-JACKSON. In the distillation of coal in vertical retorts provided at their bases with a body of coke, the working temp. is high enough to raise the coke to incandescence, and steam is passed through the coke continuously during distn. to produce water gas and prevent deposition of C on the walls of the retorts. Before charging coal on to the bed of coke, the retorts are heated to a temp. of from 1800 to 2300° F. Steam is supplied by pipes, and the body of coke, after starting the operation, is supplied from the retorts.

Brit., 10,059, Apr. 23, 1914. J. MACKENZIE. **Ammonium sulfate** is obtained by treating moist distn. gases, containing NH_3 and H_2S , with N oxides or oxy-acids, which may be obtained by treating $NaNO_3$ with H_2SO_4 , so as to oxidize the H_2S to H_2SO_4 , which immediately combines with the NH_3 . Any excess of N oxides is absorbed in H_2SO_4 , and subsequently recovered for use again.

Brit., 10,284, Apr. 25, 1914. L. L. SUMMERS. A coke oven of the kind described in 6,504, 1910, and 7,049, 1910, is divided by longitudinal walls of relatively light construction into a number of cells in which the charge is compressed equally and moved forward simultaneously by the connected reciprocating floors. Heating flues are formed in the side walls, roof, and partition walls, preferably by tiles, each having

formed therein a portion of a flue, and the abutting faces of the tiles are jointed to allow of expansion and contraction, as by rib-and-groove joints. Cf. C. A. 8, 3852.

Brit., 10,928, May 4, 1914. STUART AMERICAN PRODUCTS CO. In a process of carburetting air with crude oils or low-grade hydrocarbons, of the kind wherein the oil is vaporized by heat and the vapor mixed with air, the mixt. being led to a settling tank from which it is passed upwards through a filtering medium, the mixt. as it enters the settling tank impinges against a deflecting surface and is given a downward motion. The air supply is admitted to the pipe conveying the mixt. to the settling tank at some distance behind the delivery end of the vapor supply pipe, and, in some cases, the air may be admitted after or both before and after the vapor has passed through the filtering medium.

Brit., 10,960, May 4, 1914. V. GAUMER. Preventing back-firing in tanks for storing inflammable liquids and gases, and in lamps, carburetors, etc., by providing an attachment for the inlets and outlets, comprizing a series of superposed disks, alternately corrugated and plain.

Brit., 10,972, May 4, 1914. H. BURGI and C. H. TENNEY. In a continuously working vertical retort, the gases produced in all parts of the retort are withdrawn together from an intermediate zone where the temp. is such that the hydrocarbons are fixed without the production of lamp-black. Enriching hydrocarbons may be fed to the same zone.

Fr., 465,022, July 11, 1914. WETCARBONIZING LTD. Process of dehydrating peat (wherein the H_2O has been liberated by a heat treatment such as wet carbonization), consisting in subjecting the material, in relatively thin layers, to the action of a slight difference of pressure, as by aspiration, by action of a light pressure, or by both means. After the mass has been brought in this manner to a suitable consistence (say with 78-80% H_2O), it is passed through a press or exposed in a finely divided state to the action of a hot gas to complete the drying. Cf. C. A. 8, 1663.

Fr., 475,023, July 11, 1914. WETCARBONIZING LTD. In a process of collecting peat from wet or badly drained peat beds, applicable especially in combination with heat treatments designed to render the H_2O expressible, and particularly where the peat is to be transported in the form of pulp by pipe conduit, the extrn. of the peat is effected in a series of separate excavations, the peat after heat treatment being returned to the excavation for further treatment.

Ger., 283,211, Feb. 28, 1914. A. KLONNE. Gas holder with a gas-tight piston.

22. PETROLEUM, ASPHALT AND WOOD PRODUCTS.

F. M. ROGERS.

Oils, their production and manufacture. F. M. PERKIN. *J. Roy. Soc. Arts* 63, 837-48, 853-62, 869-75 (1915).—A lecture on the origin, occurrence, compn. and production of petroleum and the manuf. of various oils therefrom. Cf. C. A. 9, 1111, 1541. F. W. SMITHER.

The analytical distillation of petroleum. W. F. RITTMAN AND E. W. DEAN. *J. Ind. Eng. Chem.* 7, 754-60 (1915); cf. C. A. 9, 963.—Comparison of the results obtained by the use of 17 different stills. Of all, the Hempel is easily the best on the basis of mechanical advantage. Illustrations of the types of still-heads used are given and also many tables of data showing the results obtained with each form of app.

ISADOR MILLER.

Improvement of high boiling petroleum oils and the manufacture of gasoline as a by-product therefrom by the action of aluminum chloride. A. M. McAFEE. *J.*

Ind. Eng. Chem. 7, 737-41(1915); cf. *C. A.* 9, 2147.—Description of the author's process. Crude oil is first heated to drive off any gasoline and H_2O present and anhydrous $AlCl_3$ added to the residue, after which the mass is boiled at $500-550^\circ F.$ for 24 hrs. Any ordinary still can be used. Between the still and the final condenser are 2 air-cooled condensers in series; these separate the low and the high boiling oils. The volatilized $AlCl_3$ and its compds. are returned to the still. Vapor enters the final, water-cooled condenser at a temp. of $300-350^\circ F.$ The product here is a mixt. of gasoline, solvent oil and kerosene, all water-white and sweet-smelling. Results on 3 typical crudes (Texas, Oklahoma and Caddo) are given as illustrative of the process. After a time the $AlCl_3$ loses its activity and is converted into a coky mass. It is recovered from this by first removing the bulk of the oil and then extg. with H_2O or steam to obtain a concd. soln. of hydrated $AlCl_3$. This last has no catalytic action but if heated breaks up into Al_2O_3 and HCl (gas). The Al_2O_3 is then treated with C and HCl (gas) at high temp. and $AlCl_3$ recovered. Or, the coky mass is heated to redness in an atm. of Cl. Also in *Met. Chem. Eng.* 13, 592-7(1915)

ISADOR MILLER.

The solid constituents of the mineral oils. J. MARCUSSEN. Berlin. *Chem. Ztg.* 39, 581-2, 613-6(1915).—The solids consist of 2 classes, hydrocarbons and compds. containing O. The latter consist of acids (in negligible amts.), resins and asphaltic substances. The asphaltic substance sepd. with alc.- Et_2O , or fuller's earth, or blood charcoal, m. below 100° and is resolved, when treated with light benzene, into sol. and insol. portions. The sol. portion is the "mineral oil resins" which form a transition group between the hydrocarbons and asphalts. Nitration showed that both the resins and asphalts are apparently poly-cyclic compounds, which may be oxidized by $KMnO_4$ to acids which form characteristic alkali salts. The 1st stage of oxidation of the hydrocarbons produces the resins and further oxidation results in asphaltine. The 2nd step occurs slowly at ordinary temp., rapidly and completely at 120° , or by auto-oxidation of the satd. and unsatd. hydrocarbons, the latter usually being polymerized at the same time. S plays a similar role. The solid hydrocarbons are partly crystalline, resembling paraffins, partly amorphous, resembling ceresins. Ceresin is shown by several methods to consist chiefly of isoparaffins. The organic theory of the formation of petroleum is briefly discussed. Cf. *C. A.* 8, 1868, 1870. J. H. MOORE.

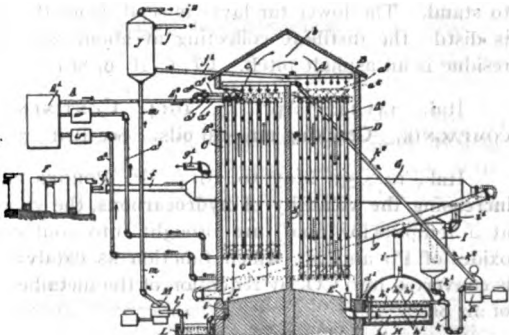
The Mexican oil fields. L. G. HUNTLEY. *Bull. Am. Inst. Mining Eng.* 1915, 2067-107.—A general review and discussion with cuts, analytical and statistical data.

F. W. SMITHER.

Sawmill waste as a source of potash (GIMMINGHAM) 18.

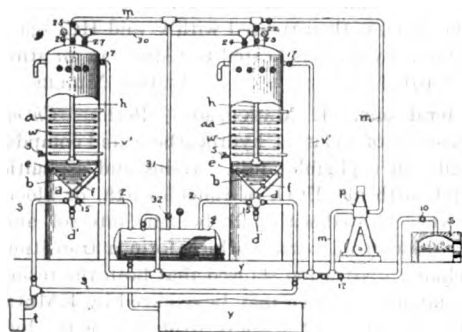
U. S., 1,151,422, Aug. 24. C. W. TURNER. Distilling petroleum oils. See Brit., 25,832 (*C. A.* 8, 1501).

U. S., 1,151,597, Aug. 31. J. E. JOHNSON, JR. Recovering constituents of the volatile products of wood distillation. The volatilized products from the retort are cooled and scrubbed in condensers *F* of the usual type. The waste gases are passed through the heat-exchanger or regenerator *G* and then refrigerated by contact with the pipes *A* which are cooled by an NH_3 refrigerating system. After



the first stage of this scrubbing and cooling, alk. liquor is supplied to the scrubbing soln. from the tank *L* from which it is passed by a pump through the heat-interchanger *J* to a rectifier for distg. off alc. and other constituents to be recovered. The residual liquor from the rectifier is returned to the regenerator *J* and passed through it in the reverse direction, and after this preliminary cooling and further refrigeration is used for the second stage of the scrubbing in the chamber *D* cooled by the pipes *A*¹. Waste gases escape from the pipe *g*¹ and may be led to a burner after a final treatment in the scrubber *H*.

U. S., 1,152,399, Sept. 7. W. M. CRONENBERGER. Separator and filter for purifying naphtha and gasolene used in dry cleaning establishments.



U. S., 1,152,478, Sept. 7. J. C. BLACK. Apparatus for refining petroleum by treatment with sulfur dioxide. SO_2 is generated in the burner *S* and is passed into the oil in the tanks *a*, *aa*, provided with coils for regulating the temp. Petroleum oils in the tanks are refined by the resultant pptn. of the heavier hydrocarbons which are drawn off after pptn. into the evaporator *g* where the SO_2 carried down is recovered for reuse. *y* and *t* are storage tanks for oil.

U. S., 1,152,765, Sept. 7. P. SABATIER and A. MAILHE. Converting heavy petroleum hydrocarbons into volatile hydrocarbons distg. at 150° or lower. The oil is mixed with an active metallic catalyst, *e. g.*, Fe, Co, Cu or Ni, which has been dild. by admixture of MgO , Al_2O_3 , CaO , BaO or other non-silicious, inert material to reduce its activity, and is then passed through tubes lined with MgO , BaO or bauxite which are heated to between 400° and a dark red heat and are filled with the catalytic mixt. Steam at about the same temp. is passed over the catalytic mixt. to revivify it by the action of the water gas produced and the volatile products obtained by the catalytic treatment are hydrogenated with a metallic catalyst at $150\text{--}300^\circ$. Cf. C. A. 9, 711.

Brit., 10,383, Apr. 27, 1914. A. MARKL. A heating, lighting, and power oil is obtained from crude tar or from tar from which the light constituents have been removed. The tar is treated with a very weak soln. of KOH or other alkali, and allowed to stand. The lower tar layer is sepd. from the upper reddish colored aq. layer and is distd., the distillate collecting at about $200\text{--}280^\circ$ constituting the fuel oil. The residue is an asphalt pitch. Cf. C. A. 9, 861.

Ital., 141,142, Apr. 13, 1914. CONTINENTAL CAOUTCHOUC & GUTTA-PERCHA COMPAGNIE. Cracking mineral oils. See Brit., 7,112 (C. A. 9, 2452).

Ital., 142,453, May 30, 1914. P. PORGES and S. STRANSKY. In a process of increasing the volatility of hydrocarbons, the vapors of the latter, mixed with steam, at a temp. below 600° , are brought into contact with metallic oxides such as the oxides of Pb and Ni, which function as catalyzers. A portion of the hydrocarbon is converted into CO_2 by reduction of the metallic oxide which is regenerated by means of air or O.

24. EXPLOSIVES AND EXPLOSIONS.

C. E. MUNROE.

The quantity of gasoline necessary to produce explosive mixtures in sewers. G. A. BURRELL AND H. T. BOYD. *J. Ind. Eng. Chem.* 7, 750-4(1915).—Report of tests in a Pittsburgh sewer. The quantity of gasoline necessary to produce an explosive mixture is dependent upon the size of the sewer, the velocity of the sewage, the temp. of the sewer air, the vol. of gasoline, the rate of inflow, etc. A barrel (55 gals.) of gasoline poured all at once into a man-hole of a fast-flowing sewer renders the air explosive at any particular point for only a few min. If the gasoline is introduced at the rate of 5 gals. per min., a dangerous condition exists as long as the flow lasts. Even small amts. can produce very dangerous conditions if the sewer outlet is submerged by high H_2O . The greater the vol., the greater the danger. Cf. Munroe, *C. A.* 4, 2571. ISADOR MILLER.

U. S., 1,150,857, Aug. 24. W. A. FAIRBURN. Match splints are rendered non-glowing after extinguishment of the flame, by impregnating with $(NH_4)_2HPO_4$ and $(NH_4)_2SO_4$ and paraffin. When the match is used the paraffin burns and the wood remains intact. Cf. *C. A.* 9, 423.

U. S., 1,150,858, Aug. 24. W. A. FAIRBURN. "Double-dipped" matches are dried after the first dipping in an atm. of 30% humidity or less at 38-65°, and after the second dipping are dried at about 20° in an atm. of 50-65% relative humidity.

U. S., 1,151,180, Aug. 24. T. HAWKINS. An explosive of the sprengel class. See Fr., 461,332 (*C. A.* 8, 3366).

Brit., 9,851, Apr. 21, 1914. J. J. C. ALLISON. In a method of minimizing the effects of colliery explosions, doors, normally shut, are opened by the force of an explosion so as to release the gases into the return airway and upcast.

Ital., 133,882, Aug. 7, 1913. G. SESTI. An aluminium safety explosive for the use of miners. Powdered Al, which should have a wide application in the manuf. of high power explosives, cannot be used because of the danger of spontaneous combustion. S. overcomes this objection by using Al in tablet or scale form, together with NH_4NO_3 and, to prevent oxidation of the Al and deliquescence of the salt, the product is coated with a film of dinitrotoluene.

Ital., 135,420, Aug. 16, 1913. F. RASCHIG. An explosive is composed of $NaNO_3$ 69, Na cresolsulfonate 3 parts.

25. DYES AND TEXTILE CHEMISTRY.

L. A. OLNEY.

Notes on identifying amido-H-acids. B. C. HESSE. *J. Ind. Eng. Chem.* 7, 674-5(1915).—H. gives 3 identification tests for the presence of 2-amido-H-acid, 7-amido-H-acid and 2,7-amido-H-acid either alone or in admixt. in dyes, etc. (H-acid is 1,8-aminonaphthol-3,6-disulfonic acid). The tests are based on color reactions.

ISADOR MILLER.

A new native dye wood. F. P. DUNNINGTON. *J. Ind. Eng. Chem.* 7, 806(1915).—The dyestuff is extd. from the sawdust, chips, etc., of the yellow locust (*Robinia pseudocacia* L.) which occurs in the Middle States, Va. and N. and S. Carolina.

ISADOR MILLER.

Theory and practice of coloring horn. E. BEUTEL. *Z. angew. Chem.* 28, I, 170-3(1915).—The bleaching of horn is accomplished by the use of solns. containing H_2O_2 . This process requires considerable skill and care, as has been fully described by B. (C. A. 7, 3429). Mordanting, or, more accurately, coloring with inorganic salts, is accomplished by the use of salts of Pb, Hg, Mn and of HNO_3 . Formulas are given. Au and Ag salts are used sometimes. Horn behaves in dye solns. like the wool of sheep. Acid dyes are the best, and many formulas for these are included.

W. F. FARAGHER.

Manufacture of Turkey red oils from fatty acids. W. J. SCHEPP. *J. Ind. Eng. Chem.* 7, 806(1915).—Brief notes on precautions to be taken. ISADOR MILLER.

A quick method for testing the non-staining quality of textile oils by means of the Cooper-Hewitt quartz lamp. T. T. GRAY. *Oil, Paint and Drug Rep.* 88, No. 6, 19(1915).—Test pieces of tape are treated with the oils and placed 6 in. below the Cooper-Hewitt quartz tube. After $\frac{1}{2}$ hr. the tapes are examd. for yellow-brown stains. A Russian petroleum oil, which develops no stain, is used as a standard.

E. W. BOUGHTON.

Weighted silk. KARL HOMOLKA. Limbach. *Färber-Ztg.* 26, 46-7(1915).—Silk weighted by the Zn phosphate-silicate process becomes brittle and discolored when stored, subjected to perspiration, or to the action of NaCl solns. or of benzine. The exact causes for these changes are not known, but presumably oxidations caused by photochem. processes and liberation of mineral acids as a result of the change of the weighting compds. from the colloidal to the cryst. condition, are involved. If the silk is impregnated with 8-10% HCO_2NH_4 soln., and then squeezed and dried, considerable improvement in the keeping qualities is effected. Easily oxidizable substances such as thiourea and hydroquinone do not preserve silk weighted with Sn compds. Hydroxylamine hydrochloride used in 1-1.5% soln. gives satisfactory results.

W. F. FARAGHER.

Injury of vegetable fibers during bleaching with bleaching-powder solutions in the presence of metals. P. WEYRICH. *Z. ges. Textilind.* 18, 176-7, 819; *Chem. Zentr.* 1915, I, 1288-9.—White (*J. Soc. Chem. Ind.* 22, 132(1903)) observed weakening of vegetable fibers during bleaching in solns. of bleaching powder when the fibers were in contact with certain metals. Briggs also calls attention to a similar phenomenon in the presence of Cu (*J. Soc. Chem. Ind.* 30, 397(1911)). It is known that the hydroxides and oxides of certain metals, such as Hg, Cu, Co, Ni and Fe, catalyze the decompn. of hypochlorite solns., O being liberated. This O converts cellulose into oxycellulose which is brittle. In the case of alloys, less is known in this regard. It is possible that some alloys do not act catalytically upon hypochlorites, and that these would be suitable for use in the construction of bleaching app. A number of com. alloys were tested by W. by placing strips, which had been cleaned carefully, into 1° Bé. soln. of bleaching powder (3.343 g. available Cl per l.). The areas of the surfaces of all strips were the same, and the strength of the bleaching-powder solns. was tested at regular intervals. Borscher's alloy, which is a Cr-W steel, had the least action on the soln. Vegetable fibers were wrapped around pieces of the alloys and metals and were then immersed in the soln. for 6 hrs. Tests for oxycellulose were made after the soln. had been removed by rinsing. Cu, bronze, Ni, Co, Mn, manganin, cast iron, Cr steel, and Zn caused formation of considerable oxycellulose; Pb and Cd were less active, and Borscher's alloy, Sn, Bi, Cr and Al were practically without action.

W. F. FARAGHER.

The Peufailit method for retting flax. A. DURAND. *Bull. soc. encour. ind. nat.* 121, 153-86(1914); *Bull. Agr. Intelligence* 6, 622.—The following methods

of retting flax have been carefully examd.: Legrand-Vansteenkiste, J. B. Cousinne, Emile Feuillet (¹), Peuffaillit. The Feuillet process has been already adopted on a large scale. As distinct from the others, the Peuffaillit process is exclusively chemical and based on the action of hydrocarbons under pressure in the presence of water vapor. The bundles of flax are ranged in metal baskets, two of which are placed in one autoclave. After exhausting the air, the autoclaves are filled with water. Heavy petrol is then injected in the proportion of 4% by wt. of the flax. The pressure is gradually increased to 35 lbs. per sq. in. and maintained during 8 hrs. The autoclaves are emptied under pressure and the strands of fibers separate intact. The flax is then dried and beaten with rotating cylindrical beaters and the fiber is so completely sepd. that stripping is unnecessary. After combining the process is completed. The proportion of tow is reduced to a minimum. The fiber has a characteristic color of its own, and is uniform and tough. The smell of petrol is perceptible in the tow, but is very slight in the fiber and disappears completely at the first combing. A by-product is obtained from the gummy substance remaining in the autoclaves, the sale of which should cover a considerable part of the expenses. This method is also applicable to the extrn. of other fibers, such as hemp, ramie, palm and papyrus. E. J. C.

U. S., reissue 13,969, Aug. 24. A. STOCK and F. HZIM. **Bluish triphenylmethane dye.** See original pat. 1,065,405 (C. A. 7, 2858).

U. S., 1,150,152, Aug. 17. F. SINGER. **Alizarin** is made by heating meso-nitro derivs. of anthracene to 200° for 2-3 days with H₂O, NaOH, Na₂SO₃, Ca(OH)₂, and NaNO₂. 9,10-Dimitroanthracene, 9-nitro-10-keto-9,10-dihydroanthracene or nitrate of 9-nitro-10-hydroxy-9,10-dihydroanthracene may be used.

U. S., 1,150,656, Aug. 17. A. BLANK, C. HEIDENREICH and J. JANSEN. **Polyazo dyes** are formed from *m*-aminobenzenyl derivs. of 2-amino-5-naphthol-7-sulfonic acid. They form dark-colored salts sol. in H₂O, dye cotton green rendered fast to CH₂O and on reduction with SnCl₂ and HCl yield *p*-phenylenediaminesulfonic acid, another diamine compd. (e. g., 1,4-diamino-2-naphthyl ethyl ether when the dye is formed from 1-amino-2-naphthyl ethyl ether, 2-naphthylamine-8-sulfonic acid and *m*-aminobenzenyl-1-thio-2-aminonaphthylene-5-hydroxy-7-sulfonic acid), a *m*-aminobenzenyl deriv. of 2-amino-5-naphthyl-7-sulfonic acid and aminoresorcinol (when resorcinol is a component).

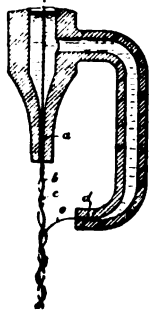
U. S., 1,150,675, Aug. 17. O. GÜNTHER. **Azo dyes** dyeing cotton blue and greenish blue, rendered fast by diazotization on the fiber and capable of development with diazotized *p*-nitroaniline, are made by combining sulfoaminonaphthyl ethyl ether with a diazotized chloroanilinesulfonic acid, further diazotizing and combining with *p*-aminobenzoyl-2-amino-5-naphthol-7-sulfonic acid or by combining a naphthylamine-sulfonic acid or aminoazobenzenesulfonic acid with sulfoamino-2-naphthyl ether and *m*-aminophenyl-1,2-naphthimidazole-5-hydroxy-7-sulfonic acid, *p*-aminophenyl-1,2-naphthothiazole-5-hydroxy-7-sulfonic acid or an aminobenzoylaminonaphtholsulfonic acid or homologs.

U. S., 1,150,863, Aug. 24. R. JUST and F. ECKHARD. **Dihydroanthraquinone-azine**, forming a vat with hydrosulfite dyeing cotton blue, insol. in H₂O or dil. acids or alkalis, slightly sol. in boiling PhNO₂, is prepd. by stirring a 20% alk. hydrosulfite paste of dihydroanthraquinoneazine in air for 36 hrs. When pptd. from alk. hydrosulfite soln. by a rapid current of air the dye yields a blue pigment less reddish in tint and having less covering power than the original compd.

U. S., 1,151,257, Aug. 24. W. B. FINK. **Composition for bleaching and cleaning fabrics;** from CaO 7, K₂CO₃ 25, KMnO₄ 1, NH₄Cl 2, borax 12 lbs., and sufficient H₂O to make 48 gals.

U. S., 1,151,416, Aug. 24. G. A. STRENGER. Composition for removing stains from textile fabrics; a dry powder formed of $\text{Na}_2\text{S}_2\text{O}_4$ 30, tartaric acid 10 and NaHSO_4 60 parts.

U. S., 1,151,487, Aug. 24. B. LÖRWE. Artificial silk is made by drawing a thread or filament of natural silk through a bath of ingredients for forming artificial silk, through the die *a*, projecting a jet of artificial silk material from the nozzle *d* against the thread or filament as it comes from the die, twisting the composite thread and finally treating it with a solvent such as a hot dil. soln. of soap and Na_2CO_3 to loosen the strands so that they do not adhere to each other.



U. S., 1,151,628, Aug. 31. K. THIES. A vat dye is made by treating 2,5-dianilino-3,6-dichloroquinone with $\text{Na}_2\text{S}_2\text{O}_4$ or S and NaOAc and alc. or pyridine. It is a nearly black powder, almost insol. in organic solvents, sol. in H_2SO_4 with a dark bluish violet color, and dyes wool a fast blackish tint. Similar dyes, dyeing olive-gray to blackish tints, are obtained from the condensation product of chloranil and *p*-toluidine.

U. S., 1,151,916, Aug. 31. J. T. WOOD. Cop-holder for dyeing apparatus.

U. S., 1,151,917, Aug. 31. J. T. WOOD. Perforated beam or spool for dyeing apparatus.

U. S., 1,152,159, Aug. 31. E. FEUILLETTE. Apparatus for steeping or retting flax, hemp, etc.

Brit., 10,085, Apr. 23, 1914. CHEM. FABRIK GRIESHEIM ELEKTRON. Monoazo and diazo dyes are obtained by combining diazo or tetraazo compds. of the anthraquinone series with arylides of 2,3-hydroxynaphthoic acid; the dyes may be prepd. in substance or on the fibers.

Brit., 10,378, Apr. 27, 1914. AKT.-GES. FÜR ANILIN FABRIKATION. 1-Amino-4-arylaminoanthraquinone-2-sulfonic acids, which dye wool greenish blue shades, are obtained by treating 1-amino-4-haloanthraquinone-2-sulfonic acids with aromatic amines in presence of H_2O and of Cu or Cu compds.; acid fixing agents may be present or not. The product from 1-amino-4-bromoanthraquinone-2-sulfonic acid and *p*-toluidine is described in examples.

Brit., 10,527, Apr. 28, 1914. T. D. MORSON and C. S. ROY. Fabrics for filter cloths are woven with warp and weft of threads formed by spinning and twisting fibers of ordinary soda or Pb glass or like vitreous silicious material.

Fr., 475,010, Jan. 12, 1914. CASSELLA & Co. Mfg. vat dyes by heating 1-amino-2-methylantraquinone and an aromatic diamine, with S at an elevated temp.

Fr., 475,014, Jan. 13, 1914. CASSELLA & Co. Mfg. yellow sulfine dyes by heating at elevated temps. the *N*-alkyl-, *N*-aralkyl-, or *N*-acyl-carbazoles, with S and with or without the addition of benzidine or other substance having a similar action.

Fr., 475,049, Jan. 13, 1914. A. and J. BECHETOILLE. In a process of applying metal to textiles, the material is subjected to electrolytic action in one or more baths containing a metal or a metallic salt, and after rinsing the metal is fixed on the fiber by means of HCHO or a like fixing agent.

26. PAINTS, VARNISHES AND RESINS.

A. H. SABIN.

Standard specifications for the purity of raw linseed oil from North American seed. ANON. *J. Ind. Eng. Chem.* 6, 164(1914).—The specifications adopted by the Am. Soc. for Testing Materials are given. E. J. C.

Linoleum cement. K. MICKSCH. *Kunststoffe* 5, 181-2(1915).—A brief discussion of the comp. and desirable properties of mixts. for cementing linoleum to different surfaces. F. W. SMITHER.

The resin industry in Spain. ITURRALDE Y ELORRIETA. *Rev. de montes* 39, 3-11(1915).—Production statistics. E. J. C.

U. S., 1,151,700, Aug. 31. M. E. McDONNELL. **Painting metal car bodies.** Successive layers of paint are applied which contain no artificial driers and each coat is heated to 120° for 3 hrs. before applying the next coat. After painting, successive coats of varnish, also free from artificial driers, are applied and dried at 52-65°.

U. S., 1,151,701, Aug. 31. C. MACNICHOL. **Painting cement or concrete structures.** The surface of the cement is coated with a mixt. formed of ZnO 2, ZnSO₄ 6, glue soln. 2 parts and coloring materials and oil paint is applied over this coating. The ZnSO₄ reacts to form ZnO and CaSO₄ and fill the pores of the cement treated.

U. S., 1,152,693, Sept. 7. L. V. BARTON and W. P. THOMPSON. **Mixing apparatus for making white lead** by the reaction of PbO, H₂O, CO₂ and a catalyzer, *e. g.*, HOAc or Pb(OAc)₂.

Brit., 9,292, Apr. 14, 1914. KARPEN & BROS. **Phenol-formaldehyde condensation products** are prepared by heating together, under practically anhydrous conditions, a methylene compd., a phenolic compd., and either a phenolic compd. different from the first phenolic compd. and having an alkylated OH group in the mol., or Me benzoate, or Ph Me ketone. Hydrobenzamide may be used instead of a methylene compd. In an example, a mixt. of phenol, anisole, and hexamethylene-tetramine is heated in an open vessel. The first product of the reaction is a viscous material, which solidifies on cooling and, on further heating with or without pressure, is converted into an insol. infusible solid. Alc. or other solvent may be added to the mixt. to control the reaction, and also to dissolve the fusible resin formed in the first stage. The product may be used for insulating purposes, and as a varnish, or mixed with PbO, sand, etc., as a paint or coating, or as a binder, *e. g.*, for abrasive material, in which case the reaction mixt., after a short heat treatment, is mixed with Al₂O₃, and the mixt. baked.

Brit., 9,926, Apr. 22, 1914. RUDGE-WHITWORTH, LTD., and H. L. HEATHCOTE. **In coating metals**, phosphate coatings such as are described in 8,667, 1906, are treated with a drying oil, lacquer, or varnish, capable of reducing the friable nature of the coating and of entering into combination with matters concerned in or arising from rusting. Linseed oil, with or without coloring matter in soln. or suspension, is applied to the surface by dipping or spraying, and the article is stoved at 300-400° F.; the treatment may be repeated, or followed by enamelling, etc. Instead of linseed oil, celluloid varnish may be applied, and the stoving effected at a temp. not exceeding 110° F.

Brit., 10,497, Apr. 28, 1914. S. SCHWIMMER. **A solvent for removing paints, lacquers, and varnishes** consists of a mixt. of C₂H₂Cl₄ with 1 or more halogenized hydrocarbons or halogenized substituted hydrocarbons, with or without substances

such as paraffin, tar oils, aniline, or colophony, for preventing the rehardening of the softened coating. The halogen derivs. mentioned are C_6H_5Cl , C_6H_4Cl , CCl_4 , CBr_4 , C_6H_5Cl , and halogenized amines, phenols, etc., such as chloroaniline. It is stated that the addition of acetic anhydride is frequently necessary in known paint-removers in order to increase their effect, but this addition is not necessary in the mixts. according to the present invention. Cf. C. A. 8, 2818.

27. FATS, FATTY OILS AND SOAPS.

E. SCHERUBEL.

Preparation of the Wijs iodine solution. NIEGEMANN AND KAYSER. Cologne. *Chem. Ztg.* 39, 491-2(1915).—This is a reply to Dubovitz (C. A. 9, 388). A review is given of the various methods of prepn. recommended since the soln. was first described by Wijs in 1898.

J. H. MOORE.

Determination of ricinic acid in oil preparations. FR. ERBAN. Vienna. *Seifen-fabr.* 35, 578-81, 598-600(1915); cf. C. A. 8, 2818; 9, 1255, 1400.—The complete analysis of a weakly sulfonated Turkey red oil (made by using 25 parts $66^\circ H_2SO_4$ per 100 of castor oil) is described in detail, including detns. of neutral fat, organic and inorganic SO_4 , total fat by the paraffin cake and the ether methods, titration of total fat, sol. fatty acids and their titration and (qual.) glycerol. From these analytical data numerous calcns. are shown.

P. ESCHER.

The deodorization of olive oil. G. BARRION. Régence de Tunis, Protectorat français, Direction générale de la colonisation, *Bull.* 18, No. 80, 573-8(1914); *Bull. Agr. Intelligence* 6, 461-2.—The methods in use for refining lower grade oils do not succeed in freeing the oil from its unpleasant rancid flavor. B. recommends filtering the oil through animal charcoal to decolorize it, followed by the neutralization of any acids which are present and treatment with steam at reduced pressure in a closed vessel. The rancidity products, being more volatile than the oil, are carried off by the current of steam. The oil left behind has no unpleasant smell, but is insipid and non-aromatic; these defects are remedied by mixing it with unrefined oils.

E. J. C.

The composition of palm kernel and coconut oil. A. HEIDUSCHKA. *Z. angew. Chem.* 28, I, 304(1915); cf. C. A. 9, 1400.—H. doubts the correctness of Elsdon's views regarding the comp. of the above fats. The oleic acid content of the fat by no means coincides with the I no., also the high content of palmitic and stearic acid obtained by E. is striking. Numerous exams. of these fats by H. have shown them to contain at a max. only traces of these acids. It is also stated that the sapon. equiv. of the two fats given by E. are unusual, especially the proportion of the two sapon. equiv. to one another.

H. R. GUNDLACH.

Copra drying. C. W. HINGS. *Philippine Agr. Rev.* 7, 323-6(1914).—The Philippines supply about $\frac{1}{3}$ of the world's output of dried copra. Modern methods of drying and extn. are not used and the greater part of the copra produced is of poor quality. The objectionable dark color is caused by long drying and the large amt. of H_2O retained favors the development of molds and bacteria. The proper method of drying is described. The % of oil in the fresh meat usually runs from 30 to 45%. The % remaining in the dried product is largely governed by the % of remaining H_2O . Oven-dried material will contain 70-80% of oil. Two processes, the hydraulic and the continuous, are commonly used in extg. the oil. The former usually gives higher extn. but is slower in operation than the latter. The press cake makes a valuable cattle feed and also an excellent fertilizer.

E. W. BOUGHTON.

Manufacture of Turkey red oils (SCHEPP) 25.

U. S., 1,151,002, Aug. 24. C. ELLIS. An edible fatty product is prepd. by polymerizing fish oil or whale oil (with or without addition of corn oil or cottonseed oil) by heating to 250° for 12-18 hrs., in H, without a catalyzer and then heating with H and a catalyzer for a shorter time.

U. S., 1,151,003, Aug. 24. C. ELLIS. A catalyzer for hydrogenating oils and fats is prepd. by depositing Ni electrolytically on charcoal, graphite or metal. Small amts. of Cu, Zn or Ti may be deposited with the Ni. Cf. C. A. 8, 1025.

U. S., 1,151,045, Aug. 24. W. D. RICHARDSON. Hydrogenating oils or fats with a catalyst produced by electrolytically disintegrating Ni in ether or other fat solvent.

U. S., 1,151,523, Aug. 24. J. J. HOOD and A. G. SALAMON. Decolorizing mineral or vegetable oils. The oil, e. g., cottonseed oil, is dissolved in light petroleum spirit, filtered through powdered, freshly ignited MgO until completely decolorized, and then the petroleum spirit is distd. from the oil.

U. S., 1,151,718, Aug. 31. W. D. RICHARDSON. A catalyzer for use in hydrogenating oils and fats is made by reducing Ni oleate with H under pressure while it is dissolved in an oil or fat. Oleates of Cu, Co or Fe may be similarly reduced.

U. S., 1,152,023, Aug. 31. O. T. JOSLIN. Purifying catalytically hardened or hydrogenated fats or oils. The material is treated with at least its own vol. of a solvent, e. g., EtOH or MeOH, which will dissolve impurities such as fatty acids but will have but little solvent action on the hydrogenated oil or fat itself. After thorough mixing, the soln. of impurities is sepd. by gravity and the small amt. of residual solvent is removed from the purified material by volatilization.

U. S., 1,152,591, Sept. 7. R. F. BACON and B. H. NICOLET. A catalyst for hydrogenating oils and fats is made by impregnating kieselguhr, pumice or other finely divided carrier with NaOH and Na aluminate, adding a Ni(NO₃)₂ soln. to ppt. Ni(OH)₂ and Al(OH)₃ and reducing the Ni at 350-450°.

U. S., 1,153,167, Sept. 7. E. KOCHENDOERFER. Perborate soap is made by mixing comminuted dehydrated soap with Na perborate and subjecting the mixt. to pressure sufficient to melt it into a solid homogeneous mass.

Brit., 10,601, Apr. 29, 1914. R. T. H. WERLEMAN. In a process of extracting oils from nuts, the kernel or flesh of coconuts and other nuts is grated with a small quantity of H₂O, and the creamy liquid is sepd. from the residue and allowed to stand. The thick cream which rises to the top is boiled, and subjected to pressure to sep. oil.

Brit., 10,863, May 2, 1914. NAAMLIOOZE VENNOOTSCHAP ANT. JURGENS, VEREENIGDE FABRIEKEN. In processes for cooling hot or molten fats, emulsions, etc., in which the material is taken up by a rotating feeding cylinder and conveyed to the surface of a rotating cooling cylinder, the 2 cylinders are arranged close together but not in contact, and the layer on the feeding cylinder is regulated so that it is a little thicker than the distance between the 2 surfaces, and is conveyed to the cooling cylinder by a spreading or smoothing action. The distance between the cylinders is adjustable, and they rotate preferably in the same direction, the speed of the feeding cylinder being greater than that of the cooling cylinder. The fat, etc., is maintained in a molten condition until it reaches the cooling cylinder.

Ital., 132,238, July 12, 1913. OELWERK BERLIN G. M. B. H. In a process of deodorizing fish oil and the fatty acids derived therefrom, the crude materials are treated with 20-50% by wt. of benzenesulfonic acid in soln. in mineral acids. After standing for a short time, the product is worked up to a smooth mass which is odorless.

Ital., 134,086, May 2, 1914. W. PUCHS. In a process of mfg. catalyzers for reducing liquid fatty acids and their glycerides, inorganic compds. of base metals are subjected to the action of a reducing gas, in a vessel, under a layer of the oil, and under pressure.

Ital., 134,087, May 2, 1914. W. PUCHS. Reducing unsaturated fatty acids and their glycerides by means of strongly heated H acting on the moderately heated acids or glycerides. The action of the H can be increased by means of chem. active rays.

Ital., 138,942, May 5, 1914. M. PADOA and C. G. DALLA. Deodorizing and decolorizing chrysalis oil by passing a current of air or H, or a mixt. of these gases, at 140–250°, through the oil, to which may be added a catalyzer. The decoloration of the oil, which becomes brown as a result of the treatment, is effected by shaking with dichromate and H₂SO₄. The oxides of Ni, Co, Fe, Mn, Cu, Pb, Ce, etc., are specified as suitable catalyzers.

Ital., 140,846, Apr. 4, 1914. M. PADOA and C. G. DALLA. Deodorizing fish oil, and the like, by heating it in the autoclave at 150–250° with an alk. substance or a substance becoming alk. during the treatment.

28. SUGAR, STARCH AND GUMS.

A. HUGH BRYAN.

Variation in the sugar content of beets in the first year of growth. O. MUNERATI, G. MEZZADROLI AND T. V. ZAPPAROLI. *Stas. sper. agr. ital.* 48, 85–136(1915).—At 12 different stages of growth from June 10 to Dec. 12, samples representing about 100 beets each time were harvested; the weight of roots and leaves detd. and the sugar polarized. Beginning with 6.62% sugar, the percent of this constituent gradually increased up to the 9th of Nov. to 15.8% and then decreased to 13.6% in Dec. There was no regularity in ash and total N content during this period; the injurious N ("schädliche" N of Herzfeld-Andriik) gradually decreased. No conclusions are drawn from the ratio wt. leaves/wt. roots and the % of sugar in the roots. The repeated stripping off of leaves caused a decrease in sugar content. Even a single stripping off of leaves caused a decrease in sugar accumulation. J. A. LECLERC.

Absorption of fertilizers in different growth phases of the sugar beet (CALZOLARI)
15.

U. S., 1,152,458, Sept. 7. W. H. WAGGONER. Apparatus for bleaching cane juice, etc., by treatment with SO₂.

Aust., 4,250, May 9, 1914. B. TURKA. App. for the dry separation of sugar saps.

30. RUBBER AND ALLIED SUBSTANCES.

R. T. STOKES.

Proteins in rubber and in rubber latex. F. FRANK. *Gummi-Ztg.* 29, 196–8(1914); see C. A. 9, 2003. RAXLEY F. WEBER.

Rubber solvents in war time. F. FRANK AND E. MARCKWALD. *Gummi-Ztg.* 28, 1897–8, 1978–9(1914); 29, 59(1915).—Xylene and the derivs. of the paraffin hydrocarbons are the most promising substitutes for the low boiling hydrocarbons usually employed. Lab. expts. show that the addition of EtOH (5%) to the solvent greatly

decreases the time required for soln. of the rubber and the viscosity of the resulting soln. In consequence, less solvent is needed. Practical tests of the use of alc. as a means of saving solvent are urged on the manufacturers of rubber goods.

RAXLEY F. WEBER.

U. S., 1,149,577, Aug. 10. K. GOTTLOB. **Synthetic caoutchouc** is prepared by polymerizing isoprene or similar hydrocarbon in a dil. aq. soln. of egg albumen, blood serum or milk, while in the form of an emulsified mixt., by heating for several weeks at 60° and then sepg. the caoutchouc-like product from the albumen by coagulation. The product resembles natural rubber. Starch or gelatin may be substituted for albumen.

U. S., 1,149,580, Aug. 10. F. HOFMANN and K. GOTTLOB. **Vulcanizing rubber.** The rubber before vulcanization is mixed with about 1-2% its wt. of acetaldehyde-ammonia compd. and the vulcanization is then effected by heating with S in the usual manner. The acetaldehyde-ammonia compd. shortens the time required for vulcanization. NaNH_2 and *p*-phenylenediamine have a similar effect.

U. S., 1,151,948, Aug. 31. F. W. HERBOLD. **An elastic solid which may be used as a substitute for rubber** is made by mixing a fatty material such as castor oil or fish oil with CCl_4 or other inert solvent, treating the mixt. with Cl or Br, driving off the solvent, removing the HCl or HBr which has been formed in the material by a current of CO_2 , heating with S and washing.

U. S., 1,152,372, Aug. 31. T. W. MILLER. **Seamless rubber articles** (e. g., gloves) are formed by depositing successive layers of unvulcanized rubber on a form and vulcanizing each layer before applying the next.

U. S., 1,152,834, Sept. 7. R. B. PRICE. **Vulcanizing rubber articles such as shoes, tires or hose.** The rubber composition is formed into shape after mixing with the S required for vulcanization and is then heated in direct contact with a body of fusible alloy or glycerol, CaCl_2 soln. or other material which has an affinity for moisture and which is fluid at the vulcanization temp. Pressure is maintained on the article to retain its desired shape during vulcanization. The use of CaCl_2 , etc., prevents ingress of moisture during the process.

U. S., 1,152,835, Sept. 7. R. B. PRICE. **Vulcanizing rubber tires, hose, etc.,** by heating under 500 lbs. pressure or more per sq. in. while immersed in a body of CaCl_2 soln. or a mixt. of talc and glycerol, to produce a very compact homogeneous product.

U. S., 1,152,836, Sept. 7. R. B. PRICE. **Vulcanizing fabrics coated with rubber composition** while the coating is compacted and firmly united to the fabric by suction.

U. S., 1,152,837, Sept. 7. R. B. PRICE. **Vulcanizing rubber articles such as boots or shoes.** The material is first warmed somewhat, then is heated to a temp. above the vulcanization temp. and then subjected to the vulcanization process. The intermediate heating serves to cause only superficial vulcanization.

U. S., 1,152,838, Sept. 7. R. B. PRICE. **Vulcanizing sheet rubber.** The sheets are coated with glycerol to prevent them from adhering to each other during vulcanization and are then placed one on another in a pile and vulcanized while so piled.

U. S., 1,152,935, Sept. 7. J. P. CRANE. **Method of molding rubber reinforced with parallel fibers of steel wool.**

U. S., 1,153,040, Sept. 7. H. DEBAUGE. **Caoutchouc** is purified by attrition and heating in a solvent, e. g., xylene, and subjecting the soln. to dialysis to remove resins, S, etc.

Brit., 9,066, Apr. 9, 1914. R. C. FULTON and D. A. MACCALLUM. Coagulating latex from rubber and like trees, and curing it, by treatment with aldehydes or ketones other than HCHO in an inert carrier or diluent, such as H_2O , but excluding alc. *E. g.*, 80-90 parts of H_2O are added to 10-20 parts of aldehyde or ketone, and this dild. soln. may be used with about half its vol. of latex, which is preferably poured into or sprayed over the coagulant. Formalin to the extent of 1% may be added to the latex before coagulation.

Brit., 10,030, Apr. 23, 1914. H. GARE. Regenerating old vulcanized rubber in the manuf. of India rubber or ebonite goods by adding sufficient H_2O or other suitable inert fluid to the rubber during or after grinding to bring it to a semi-fluid or pasty condition, and then molding in this condition and pressing out the bulk of the H_2O , etc., prior to subjecting the rubber to the action of heat for vulcanization or reformation, *e. g.*, at 300°F . After the pressing operation, residual moisture may be evapd. with or without warming. Softening, hardening, bleaching, coloring, or like agents may be mixed with the rubber mass or added H_2O , etc.

Brit., 10,833, May 2, 1914. S. J. PRACHEY. Accelerating the vulcanization of natural or artificial caoutchouc-like substances, with the aid of *p*-nitrosodiphenylamine or reduction products of the nitroso compds. such as dimethyl-*p*-phenylenediamine, mentioned in the parent specification, 4,263, 1914 (*C. A.* 9, 2163).

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